MEETING OF THREE SEAS

WATER CORRIDOR DANUBE–ODER–ELBE

KŘÍŽOVATKA TŘÍ MOŘÍ

VODNÍ KORIDOR DUNAJ–ODRA–LABE

Josef Podzimek and team

Česká republika, dokončení vodního koridoru Dunaj–Odra–Labe jako součásti dopravní sítě V4
Czech Republic, Completion of the Danube–Oder–Elbe Water Corridor as a part of the transport network V4

Kraje v zájmové oblasti / Regions in the area of interest:

JIHOČESKÝ KRAJ	JIHOMORAVSKÝ KRAJ	MORAVSKOSLEZSKÝ KRAJ	OLOMOUCKÝ KRAJ	PARDUBICKÝ KRAJ	STŘEDOČESKÝ KRAJ	ÚSTECKÝ KRAJ	ZLÍNSKÝ KRAJ	PRAHA PRAGUE PRAGA PRAG
SOUTH BOHEMIAN REGION	SOUTH MORAVIAN REGION	MORAVIAN-SILESIAN REGION	OLOMOUC REGION	PARDUBICE REGION	CENTRAL BOHEMIAN REGION	ÚSTÍ NAD LABEM REGION	ZLÍN REGION	

Plavební stupně na Labi / Locks and dams on the Elbe River

1 Děčín
2 Malé Březno
3 Střekov
4 Lovosice
5 České Kopisty
6 Roudnice n./L.
7 Štětí
8 Dolní Beřkovice
9 Obříství
10 Lobkovice
11 Kostelec n./L.
12 Brandýs n./L.
13 Čelákovice
14 Lysá n./L.
15 Hradištko
16 Kostomlátky
17 Nymburk
18 Poděbrady
19 Velký Osek
20 Klavary
21 Kolín
22 Veletov
23 Týnec n./L.
24 Přelouč II
25 Srnojedy
26 Pardubice

Plavební stupně na Vltavě / Locks and dams on the Vltava River

1 Hořín
2 Miřejovice
3 Libčice n./V.
4 Roztoky
5 Podbaba
6 Štvanice
7 Smíchov
8 Modřany
9 Vrané n./V.
10 Štěchovice
11 Slapy – lodní zdvihadlo
12 Kamýk n./V.
13 Orlík – lodní zdvihadlo
14 Kořensko
15 Hněvkovice – jez
16 Hněvkovice – přehrada
17 Hluboká n./V.
18 České Vrbné

Plavební stupně na D–O–L - dunajská větev Locks and dams on the D–O–E water corridor, the Danube branch:

1 Rokytnice
2 Záříčí
3 Kroměříž
4 Bělov
5 Uherské Hradiště
6 Rohatec
7 Hodonín
8 Tvrdonice
9 Kúty
10 Zohor
11 Devínská Nová Ves

Plavební stupně na D–O–L - oderská větev Locks and dams on the D–O–E water corridor, the Oder branch:

1 Lipník n./B.
2 Černotín
3 Poruba
4 Kunín
5 Petřvald
6 Proskovice
7 Výškovice
8 Svinov
9 Přívoz
10 Bohumín/Chałupki
11 Racibórz
12 Dziergowice
13 Koźle

Plavební stupně na D–O–L - labská větev Locks and dams on the D–O–E water corridor, the Elbe branch:

1 Střelice
2 Králová
3 Zábřeh
4 Hněvkov
5 Homole
6 Tatenice
7 Kerhartice
8 Brandýs n./O.
9 Dvořisko
10 Tutov
11 Černá za Bory

Legenda / Captions:

- Železniční koridory / Railway corridor
- Dálnice a rychlostní komunikace / Highways and limited-access highways
- Vodní tok / Water stream
- Splavná Horní Vltava / Navigable Upper Vltava
- Plánovaný úsek vodního koridoru D–O–L / Planned section of the D–O–E water corridor
- Hotový úsek vodního koridoru D–O–L a Dolní Vltavy / Built section of the D–O–E water corridor and Lower Vltava
- Plánovaný stupeň (jez, PK a reverzní VE) / Planned lock and dam (dam, lock and reverse hydropower plant)
- Existující jez (přehrada) s plánovanou PK (lodním zdvihadlem) / Existing dam with planned lock (boat lift)
- Plánovaný stupeň na provozované vodní cestě / Planned lock and dam on the waterway in operation
- Přečerpávání vody z Dunaje do vodohospodářsky deficitních oblastí / Pumping water from the Danube to areas with water deficiency
- Plánovaný průplavní tunel / Planned canal tunnel
- Moravská brána - nejnižší místo evropského rozvodí / Moravian Gate – the lowest point of the European watershed
- Plánované logistické centrum / Planned logistics centre

www.d-o-l.cz

SROVNÁNÍ DOPRAV / COMPARSION OF TRANSPORT

312 kontejnerů TEU přepraví:
(o rozměrech 6,1 x 2,4 x 2,4 m)
312 TEU containers can be transported by:
(container dimensions 6.1 x 2.4 x 2.4 m)

1 typická lodní souprava / 1 typical inland navigation push-tow
pro vnitrozemskou plavbu na vodním koridoru D–O–L / on the D–O–E water corridor

nebo / or

3 vlakové soupravy se 104 vagóny / 3 trains with 104 wagons

anebo / or

312 kamionů / 312 trucks

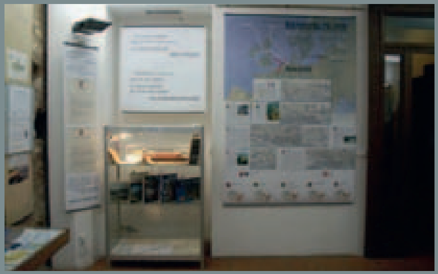
312 TEU = 190 m lodní sestava / 190 m inland navigation push-tow

312 TEU = 1,6 km 3 vlakové soupravy / 1.6 km 3 trains

312 TEU = 4,5 km dlouhá kolona kamionů / 4.5 km long convoy of trucks

Jedenáct zastavení putovní výstavy „Křižovatka tří moří, vodní koridor Dunaj–Odra–Labe“

Eleven stops of travelling exhibition called “Meeting of Three Seas, Water Corridor Danube–Oder–Elbe”

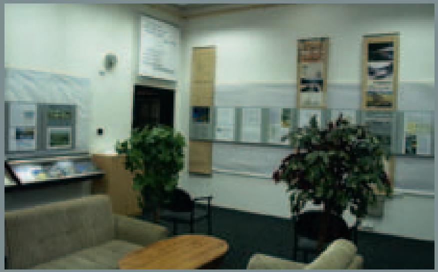


Praha, Jindřišská věž, 2007
Prague, St Henry's Tower, 2007

Ostrava, Vysoká škola báňská, 2008
Ostrava, VSB – Technical University of Ostrava, 2008

Brno, Krajský úřad Jihomoravského kraje, 2008
Brno, Regional Authority of the South Moravian Region, 2008

Břeclav, Městské muzeum a galerie, 2009
Břeclav, Town Museum and Gallery, 2009



Přerov, Městské informační centrum a Vysoká škola logistiky, 2009
Přerov, Town Information Centre and College of Logistics, 2009

Zlín, Univerzita Tomáše Bati ve Zlíně, 2010
Zlín, Tomas Baťa University in Zlín, 2010

Praha, Střední průmyslová škola stavební, 2011
Prague, High School of Construction, 2011

Praha, Jindřišská věž, 2013
Prague, St Henry's Tower, 2013

Štrasburg, evropský parlament, 2014
Strassbourgh, European Parliament, 2014

Praha, Pražský hrad, šest prezidentů EU, 2014
Prague, Prague Castle, six presidents of EU states, 2014

Pražský hrad, Kancelář prezidenta republiky, 2015
Prague Castle, Presidential Office, 2015

MEETING OF THREE SEAS

WATER CORRIDOR DANUBE–ODER–ELBE

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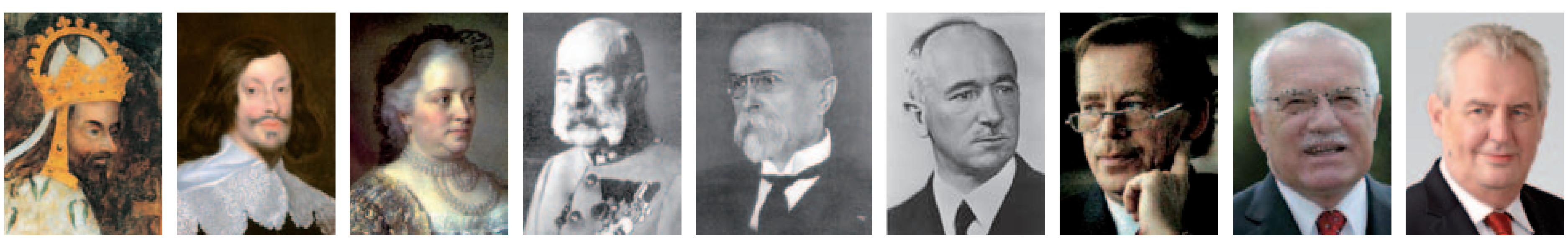
The English version of the book can be downloaded from www.d-o-l.cz, or you can send us an e-mail to: vodnicesty@seznam.cz and recieve it in the PDF format.

Bez podpory hlav státu by to nešlo.
It would never work without the support of Heads of State.



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Meeting of three seas

Water Corridor Danube–Oder–Elbe

Křížovatka tří moří

Vodní koridor Dunaj–Odra–Labe

Josef Podzimek and team

Toto třetí vydání bylo připraveno ke 114. výročí VODOCESTNÉHO ZÁKONA, který dne 11. června 1901 rozhodl, kromě jiného, i o výstavbě dunajsko-oderského průplavu a spojení s Labem u Pardubic. Doba výstavby zákonem stanovená: 1904–1924

Velká, zdravá myšlenka bývá zřídkakdy hned na první ráz příznivě přijata a správně pochopena. Trvá to někdy velmi dlouho, než dojde k jejímu uskutečnění, jemuž se staví v cestu mnohdy celé hory překážek. Kdo razí novou cestu, musí překážky ty postupně odstranit, aby se uvolnila schůdná cesta k vytknutému cíli. To mnohého původce velké myšlenky odradí od jejího dalšího sledování. Taková velká myšlenka zapadá zdánlivě, ne však na trvalo. Oživuje opět a opět za příznivějších okolností, až konečně ve vhodné době a na připravené půdě nabude takové síly a průbojnosti, podporována velkým okruhem zájemníků, že dosáhne svého vysoko vytknutého cíle, když byly odvaleny z cesty a překonány překážky rázu technického, hospodářského, finančního a někdy i politického.

Jednou z takových velkých, zdravých myšlenek, jež naráží na bezpočetné překážky, jest vybudování plavební cesty Dunaj–Odra–Labe. Jde o vodní cestu evropského významu, snadno proveditelnou, nejvýš nutnou a důležitou po stránce dopravní, obchodní a hospodářské.

prof. dr. h. c. ing. Antonín Smrček
rektor c. k. České vysoké školy technické v Brně, 1904

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This third edition was prepared for the 114th anniversary of the WATERWAYS ACT which was adopted on 11th June 1901 and decided, among other things, about the building of the Danube–Oder Canal and its connection with the Elbe River at Pardubice.

Building time stipulated by the Law: 1904–1924

Great sound ideas rarely are accepted unreservedly and fully understood. It can take a long time before they are seen through as their path often is lined with obstacles. Those who pioneer a new trail have to rid of such obstacles step by step, thus clearing a viable path to their objective. Many an idea originator gets discouraged from pursuing it further. A great idea is thus abandoned for a time, however, never for good. It keeps coming back to life in more favourable conditions. Eventually – on promising grounds of convenient times – it gains the desired drive strength. Supported by many, it finally reaches the desired goal, having done with all the obstacles, having solved problems of technical, economic, financial, and quite frequently political nature.

Clashing with numerous obstacles, construction of the Danube–Oder–Elbe waterway ranks among such great ideas. It is a waterway of European significance, easy to take through, highly needful and absolutely fundamental for transport, trade and economy.

Prof. Dr. h. c. Ing. Antonín Smrček
Rector c. k. Česká vysoká škola technická [Czech Technical University] in Brno, 1904

Moravané!

Je důležitější otázky nežli ta, jak zlepšit a zpříjemnit život nás všech? Jak ulehčit práci rolníků a zvýšit výnos jejich polí a luk? Jak osvobodit lidi pracující v průmyslu od dřiny a zvýšit jejich mzdy využitím sil mechanických a sil přírody? Jak ozdravit naše vesnice a města a pomoci svým dětem, aby vyrůstaly ve zdravé, silné pokolení? Je naší povinností myslit nad těmito úkoly a domyslit je. **Nikdy se nedostaneme ani krůček dopředu v budování blahobytu obyvatelstva země Moravskoslezské, pokud si neuděláme pořádek ve svých hlavách.** Boží prozřetelnost a lidská moudrost dávných státníků soustředily celou naši zemi do povodí jedné řeky. Šťastnými politickými poměry máme v rukou vládu stejně nad pramenem této řeky jak nad jejím ústím vzdáleným několik kilometrů od moravských hranic na Slovensku u Děvína. Příroda i politické síly připojily nás takto na mohutnou světovou řeku Dunaj, kde náš stát má právo plavby a po níž můžeme pronikat do jižních zemí a moří po celý rok. Není druhé země, jejíž budoucnost, bohatství a blahobyt by byly tolik závislé na jediné řece jako Morava, jejíž jméno není proto nahodilé. **A co jsme udělali my, Moravané, s tímto bohatstvím svěřeným nám boží prozřetelností a bráněným po tisíce roků našimi předky?** Jak jsme je využili? Vzlétnete-li nad dolní tok řeky Moravy, musí se vám sevřít srdce lítostí, protože shlédnete pod sebou pustinu, ve které řádí řeka právě tak jako za dob mamutů. Jsou kraje, kde tyto poměry jsou katastrofální. Je řada měsíců, kdy v obcích od Hodonína dolů nelze vykročit na pole ani lidem, ani dobytku, kdy lidé musí utíkat z polí před hejny komárů; kdy vládnou nad celým krajem komáři rojící se v mračnech z bažin, povodněmi promáčených rovin.

Čeští zástupcové, kteří dovedli lépe domyslet životní problémy své země, trvali na usplavnění svých hlavních toků Labe a Vltavy.

Co jsme vykonali my, Moravané? Co udělali naši zástupcové ve vídeňském parlamentu? Přijali pouze slib pánů na průplav dunajsko-oderský, který měl být světodějnou událostí, ale v jehož uskutečnění nikdo nevěřil. Úpadek, v jakém se nalézáme, je nejlépe patrný z vládního návrhu zákona o vodocestném fondu, který má být rozhodujícím pro úpravu vodního hospodářství v celém státě. **O zemi Moravskoslezské zmiňuje se tento návrh jako o neznámé zemi, v níž otázky vodocestné se ponechávají k rozřešení soukromým podnikatelům, kteří prý uskuteční průplav labsko-dunajsko-oderský.** Nevytýkáme návrhu zákona, že míní v těchto místech řeky usplavňovat. Bolí nás však, že o Moravě se tu píše jako o zemi neznámé, že její nejživotnější potřeba se odbývá několika slovy a obnosem, který jest jen poněkud více nežli nic, a rozřešení nejživotnějších potřeb země se ponechává „soukromému kapitálu" v neznámých dobách. Bolí nás, že zde přímo zákonem se projevuje nezájem vůči životu obyvatelstva celé naší země Moravskoslezské. A přece problém usplavnění řeky Moravy není problémem lokálním.

Je více nežli problémem země a více nežli problémem říše. Je to problém evropský, ba světový, neboť usplavněním Moravy přiblížíme se k uskutečnění spojení tří největších středoevropských řek: Labe, Dunaje a Odry a spojení tří moří.

Není lepší peněžní investice nežli tato, neboť kromě plavby je zde výnos z vodní síly, zisk z nezničené úrody, vyšší výnos z pozemků a hlavně rozvoj života a podniků okolo řeky. O zemi Moravskoslezské praví, že její „usplavnění" rozřeší „soukromý kapitál". Jest jistě mnohem pohodlnější odbýt nejživotnější otázky země sliby, ponechat zemi ve starých pověrách nežli uspokojit její potřeby. Zde jest však vina na nás všech Moravanech, neboť nemůžeme očekávat, že někdo bude za nás přemýšlet o tom, co potřebujeme k životu dnes a zítra. Zužitkováním našich vod pro produktivní účely zlepší se hospodářský stav našeho obyvatelstva a zmohutní průmysl a zemědělství do té míry, že nalezneme prostředky pro vybudování umělého kanálu mezi Přerovem a Odrou a tím dosažení spojení Černého moře s mořem Baltickým územím naší země, což jest nejpřirozenější. Tímto řešením se přiblížíme stejně i k vybudování kanálového spojení Labe s Moravou a takto k připojení na Dunaj a Odru. Takto též přinesou i obnosy, jež se mají investovat do usplavnění Odry na našem území, plný požitek severovýchodním městům naší země a velikému průmyslu na Ostravsku.

Tomáš Baťa
projev přednesený na Zemském zastupitelství v roce 1930

Dear Moravians!

Is there a more important question than the one how to make the life of all of us more pleasant? How to make peasants' labour easier and increase their yield from fields and meadows? How to liberate industrial workers from toil and increase their wages by making use of both mechanical and natural force? How to improve the conditions in towns and villages and help our children grow up into a healthy, strong generation? It is our duty to think these things over and do that thoroughly. **We will never get even a step ahead in the realm of building prosperity of the Moravian-Silesian land inhabitants if we do not make it clear in our heads.** Divine Providence and human wisdom of ancient statesmen concentrated our country into the basin of a single river. Thanks to a fortunate political situation we control both its spring and its mouth which is just a few kilometres from the Moravian border, at Děvín in Slovakia. The nature and political forces connected us this way to the mighty Danube River on which our state has the right to navigate and therefore go as far as southern countries and seas all year long. **There is no other country in the world than Moravia, the future, wealth, and welfare would be so dependent on a single river of the same name – the name of our country is not random at all.** Anyway, what have we, Moravians, done with the legacy given to us by Divine Providence and protected by generations of our predecessors for centuries? How have we utilised it? If you fly above the lower reach of the Morava River, you will feel grief and sorrow as all you will see is barren land in which the river rages in the very same way as back in Stone Age.

There are regions where the situation is almost disastrous. The villages south of Hodonín are a prime example of an area where people or cattle cannot even think of going to the field for several months year in, year out. If they venture out, they have to run away in no time as mosquitoes gather in flocks and virtually reign the area, being helped by their offspring being born in swamps and flat land waterlogged after floods. Czech deputies thought about natural problems of their land more thoroughly and insisted on making the Vltava and the Elbe navigable.

What have we, Moravians, done? What did our deputies in the parliament at Vienna do? They only accepted the promise about the Danube–Oder Canal which should have been of major importance, but nobody actually believed that its construction would even go ahead. Our current decline is best visible in the government proposal of the Waterways Fund which should play a decisive role in the revision of water management in the country. **The Moravian-Silesian Land is mentioned as an unknown piece of land in it – the solution of our waterway issues is left to be solved by entrepreneurs, and they are expected to implement the Elbe–Danube–Oder canal.** We are not criticising the proposal that it plans to make the rivers in these places navigable. Still, it is painful that it mentions Moravia as an unknown piece of land and that it is done with its vital needs in a few words and by an amount of money which is just a little more than nothing – the solution of the most necessary needs of the land is left to "private investment" in these uncertain times. It is painful that the lack of interest in the life of inhabitants of the whole Moravian-Silesian Land appears even in the proposal of an act that. And yet the issue of making the Morava River navigable is far from a local issue. It is even much more than a national issue, and than the one of the (former) empire. It is an issue of the European, or even global importance as making the Morava River navigable will draw the interconnection of three biggest Central European rivers – the Elbe, the Danube, and the Oder – and therefore the three seas at hand much closer.

There is no better financial investment than this one as apart from navigation there will also be yield from water power, higher prices of land, and improvement of agricultural and industrial life on the banks.

It is said that "private investment" will implement making the Morava River navigable. As a matter of fact, it is certainly much more comfortable to be over and done with the most vital issues of our land by promises and leave it in old myths than to satisfy its needs. Indeed, all of us Moravians are guilty as we cannot expect that someone else would think about us and what we need for a decent life today and tomorrow. Utilising all our rivers and streams for productive purposes will bring about improvement of the economic situation of our inhabitants, strengthen the industry and agriculture, and as a result we will find resources for building a canal between Přerov and the Oder which would mean a connection of our land with the Black Sea and the Baltic Sea – and it appears to be the most natural solution. Moreover, it would bring us closer to the canal connection between the Morava and the Elbe, and therefore the connection to the Danube and the Oder. This way, the amounts which should be invested on our territory to making the Oder navigable would bring great benefits to towns and cities on the north-east of our land as well as to all industries in the Ostrava Region.

Tomáš Baťa

address presented at the Land Assembly of Representatives in 1930

100 let po první světové válce opět začínáme

Nechci zde hovořit o celosvětové politice posledního století, která byla rozhodujícím způsobem ovlivněna první světovou válkou. Chci se soustředit na jeden z nejvýznamnějších projektů pro střední Evropu a pro Českou, Slovenskou a Polskou republiku zvláště.

Jde o dokončení vodního koridoru Dunaj–Odra–Labe. Povědomí o jeho důležitosti se táhne od dob Karla IV., jenž pro oživení hospodářství a povznesení významu milovaných Čech, a obzvláště hlavního města Prahy, doporučoval novou obchodní cestu po vodních cestách Dunaje–Vltavy–Labe. Dokonce podle kronikáře Dubraviuse Karel IV. zahájil v roce 1375 práce na průplavu. Není to první zmínka o důležitosti vodní dopravy pro naši zemi, která leží v srdci Evropy bez přímého napojení na moře. Již Karel Veliký se v roce 805 zabýval plavbou po Labi. V roce 1524 byla ustavena první cechovní organizace plavců a pět let poté byla zřízena zvláštní komise pro řešení špatných plavebních poměrů na řece Moravě.

První úřední zmínka o průplavu Dunaj–Odra pochází z roku 1653, kdy Moravský zemský sněm podpořil důležitost tohoto projektu. Avšak technicky přesně formuloval tuto vodní cestu až v roce 1700 Lothar Vogemont, který na popud hraběte Kounice sepsal „Pojednání o užitečnosti, možnosti a způsobu spojení Dunaje s Odrou, Vislou a Labem plavebním kanálem“.

To vše a mnoho dalšího jsem dříve nevěděl a dozvěděl jsem se to až z prvního vydání knihy Křižovatka tří moří, a proto jsem byl ovlivněn názorem mých dřívějších ministrů, že vodní dopravu nepotřebujeme, neboť vše odvezeme po železnici a po silnici. Tuto knihu jsem obdržel od jejich autorů Ing. Jaroslava Kubce a Ing. Josefa Podzimka již před osmi lety, a protože jsem měl na své chalupě na Vysočině dost času, přečetl jsem ji, doplnil informace o své ekonomické a politické zkušenosti a dospěl jsem k názoru, že jde o nejdůležitější projekt pro naši krásnou zemi a celou střední Evropu. Nechápal jsem pouze, proč již nebyl realizován, když již v roce 1872 předložila rakouská vláda parlamentu návrh zákona dunajsko–oderského, který byl již následující rok schválen poslaneckou i panskou sněmovnou. A pak jsem najednou našel zmínku, že koncesi na výstavbu průplavu Dunaj–Odra v roce 1873 získala Anglo–rakouská banka a následně ji prodala se ziskem Severní dráze císaře Ferdinanda… a ta přípravu průplavu na dlouhou dobu zlikvidovala – bez ohledu na to, že císař František Josef byl velký příznivec projektu, což nakonec dokázal v roce 1901, kdy podepsal

Vodocestný zákon o stavbě průplavu Dunaj–Odra, Dunajsko–vltavského průplavu, kanalizování Vltavy od Českých Budějovic do Prahy, připojení Labe na průplav Dunaj–Odra a kanalizování Labe z Mělníka po Jaroměř. A jako politik jsem pochopil, že zákon byl přijat jako „kuhandl“ za stavbu alpské železnice. Vždyť my také podporujeme dokončení dálniční sítě a nemáme nic proti přípravě vysokorychlostních železnic.

Musíme však trvat na dokončení vodního koridoru Dunaj–Odra–Labe, na kterém se pracuje, s výjimkou posledních 20 let, více než jedno století. Byly postaveny desítky jezů, plavebních komor, byly upraveny řeky i vybudovány související přehrady, a to za více než 200 miliard Kč (v dnešních cenách). Pochopil jsem, že mimo nesmiřitelného soupeření mezi železnicí, silnicí a vodní cestou je neuvěřitelné nepochopení významu tohoto projektu. Je to dáno jeho univerzálností. Právě tato jeho přednost je zároveň příčinou jeho nepochopení. Vždy se srovnává pouze s jedním segmentem jeho přínosů. Buď je srovnávána rychlost přepravy, nebo jednostranné zásahy do přírody, aniž by se uvedly nezpochybnitelné ekologické přednosti vodní dopravy. Řešíme povodně dílčími protipovodňovými opatřeními, ale zapomínáme na mimořádný protipovodňový přínos vodního koridoru D–O–L. Připravujeme se na období sucha, ale odkládáme jednání s okolními státy o odebírání dunajské vody, kterou bychom snadno přečerpávali do vodohospodářsky deficitních oblastí jižní a střední Moravy právě vodním koridorem D–O–L. Máme problémy se solárními a větrnými elektrárnami, ale nebudujeme přečerpávací a průtočné elektrárny pro zmírnění očekávaného energetického kolapsu. Úplně mimo pozornost občanů je zajištění energetické bezpečnosti státu. Upínáme se na ropovody a plynovody a zapomínáme na přepravu zkapalněného plynu a dalších strategických surovin v tankerech po vodě, která umožní rychlý přesun z bezpečných oblastí. Připravujeme se na velkou nezaměstnanost, obzvláště na Ostravsku, ale neurychlujeme výstavbu průmyslové zóny u vodního koridoru D–O–L po vzoru norimberského přístavu, který byl vybudován deset let před tím, než zde byla dokončena výstavba průplavu Rýn–Mohan–Dunaj. Pomalu využíváme sportovní a rekreační potenciál plavby na našich řekách a bydlení u vody a na vodě, ale jako bychom nevnímali tyto budoucí možnosti na vodním koridoru D–O–L.

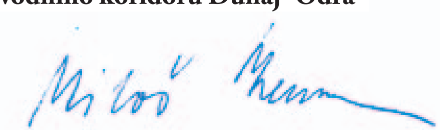
Necháváme se ovlivňovat negacemi vodní cesty a nevšímáme si, jak jsme manipulováni do pozice pro nás občany nevýhodné. Nikdo nám nepřipomíná, že jsme jedinou zemí z 28 států EU, která není přímo nebo kvalitní vodní cestou napojena na moře. Přitom je spočítáno, že státy, které nemají vodní dopravu, jsou minimálně o 5 % chudší, než státy přímořské. Poukazuje se na mimořádné finanční náklady, aniž by se dělily počtem let výstavby, a dokonce možným a rozhodujícím financováním z evropských peněz. Také se nepřipomíná, že jen dostavba dálniční sítě, kterou ani v nejmenším nezpochybňuji, představuje víc než dvojnásobek ceny dokončení celého vodního koridoru D–O–L.

Také mi nějakou dobu trvalo, než jsem přistoupil na celý dlouhý název tohoto projektu. Ale právě on přesně vystihuje podstatu věci a měl by odstraňovat i dílčí vyhraněné pohledy, co je nejdůležitější a co může počkat. Název „Dokončení vodního koridoru Dunaj–Odra–Labe“ by měl uspokojit i ty, kteří by chtěli nejdřív postavit plavební stupeň Děčín, aby se zlepšila splavnost Labe, i ty, kteří právem doporučují plavební stupeň Přelouč II, neboť jako jediné vodní dílo chybí, aby se dalo doplout až do Pardubic. Uspokojí i ty, kteří by chtěli urychleně napojit naši republiku na Dunaj po rozpadu Československa, ale může uspokojit i zastánce připojení Ostravska na vodní cesty směřující k Baltskému moři a tím zmírnit velikou nezaměstnanost tohoto regionu.

Musíme se však naučit říkat, co považujeme za prioritní a větu ukončit. My však vždy ještě na podporu svých názorů řekneme, že priority těch druhých jsou špatné. Sám se domnívám, že začít na dokončovacích pracích vodního koridoru Dunaj–Odra–Labe se musí kdekoli na trase, kde bude nejlepší ekonomická a politická poptávka.

Zároveň musíme stále pracovat na osvětě mezi námi Čechy, Moraváky a Slezany a o spolupráci musíme přesvědčit i naše sousedy v Polsku, Slovensku, ale i v Německu a Rakousku. I našim sousedům dokončení propojené soustavy evropských vodních cest pomůže k budoucí prosperitě.

Závěrem bych vyzval nás všechny k dokončení vodního koridoru Dunaj–Odra–Labe.



Miloš Zeman
prezident České republiky

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100 Years After WWI: Starting Anew

I do not want to talk about the last century politics which was decisively influenced by WWI. I want to focus on one of the most significant projects in the framework of Central Europe, and particularly for the Czech Republic, the Slovak Republic, and Poland.

The project in question is – Finishing the Danube–Oder–Elbe water corridor. The awareness of its importance was at its height even at the time of Charles IV who recommended a new trade route via the waterways of the Danube–Vltava–Elbe which would boost the economy and elevate the importance of his beloved Bohemia, and its capital – Prague – in particular. According to chronicler Dubravius, Charles IV even inaugurated works on the canal in 1375. Interestingly enough, it not was not the first mention regarding the importance of water transport for our lands that are situated in the heart of Europe, and have no direct connection to the sea. It was Charlemagne (also known as Charles the Great) who contemplated the navigation on the Elbe River back in 805. Later on, in 1524, a guild of navigators was founded, and a special committee for the resolution of poor navigation conditions on the Morava River was established five years later. The Danube–Oder canal was first mentioned in an official document in 1653 – the Moravian Land Assembly supported the importance of this project then. However, this route was technically defined only by Mr. Lothar Vogemont – encouraged by Count Kounic, he wrote a tract called "Dissertatio de utilitate, possibilitate et modo conjuctionis Danubii cum Odera, Vistula & Albi fluviis, per canalem navigabilem" (Dissertation on utility, possibility and manner of connecting the Danube with the Oder, Vistula and Elbe Rivers by a navigable canal).

Admittedly, I did not now that and a lot of other interesting and important things before. I only learnt them from the first edition of the Meeting of Three Sees, and therefore I remained influenced by the opinion of my former ministers that water transport was not necessary as everything could be transported on railways and roads. I received the book from its two authors – Mr. Jaroslav Kubec and Mr. Josef Podzimek – some eight years ago, and as I enjoyed lots of free time at my cottage in the Bohemian–Moravian Highlands, I read it thoroughly, complemented the information in it by my economic and political experience, and came to a conclusion that the project in question was the most important one for our beautiful country as well as the whole of Central Europe. I only failed to understand why it had never been implemented – the Austrian government presented the proposal of the Danube–Oder Act to the parliament already in 1872, and the act was authorized both by the House of Lords and the House of Deputies of the Imperial Assembly (Reichsrat) one year later. And then I discovered a little note that the concession for the development of the Danube–Oder Canal was granted to the Anglo-Austrian Bank which subsequently sold it to the North Railway of Kaiser Ferdinand... and it put the development of the canal on hold for a long time – regardless the fact that Emperor Franz Joseph supported the project a lot, which he eventually proved by signing **the Waterways Act of constructing the Danube–Oder Canal, Danube–Vltava Canal, canalizing the Vltava River from České Budějovice to Prague, connecting the Elbe River to the Danube–Oder Canal, and canalizing the Elbe River from Mělník to Jaroměř.** As a politician, I realized that the act was adopted as a "barter" for the construction of the Alps railway. Well, we also support finalizing the highway networks and do not protest against the preparation of high-speed railways.

Still, we have to insist on finishing the Danube–Oder–Elbe water corridor. In fact, the works on it have been going on for over a century, only with the exception of past 20 years. Tens of locks and dams have been built, rivers have been modified, and also dams related to the project have been built – all this to the value of CZK 200 bn (in current prices). I have come to understand that as well as fierce railway–road–waterway competition, there is also an incredible lack of understanding when this project comes to the fore. It is most probably due to its versatility. Indeed, this is its advantage and the main reason why it is so little understood at the same time. The fact remains, that only one part of its benefits comes to comparison each time it is discussed – either it is the speed of transport or one-sided modifications of the countryside. However, undoubted ecological advantages of water transport are never mentioned in such discussions. We have to solve flood threats by partial anti-flood measures, but we tend to ignore the anti-flood benefit of the D–O–E water corridor. We prepare for the period of drought, but we postpone negotiations with neighbouring countries regarding the relatively easy pumping the water from the Danube River to the regions of southern and central Moravia where there is a deficiency of water sources. The D–O–E water corridor would present a natural solution. We have a problem with wind and solar power plants, but we do not build impoundment, diversion, and pumped-storage hydroelectric power plants that would help us mitigate the expected energy collapse. Moreover, safeguarding the energy security of our country is a question that somewhat evades the public attention. We take gas and oil pipelines for granted, and we completely ignore the possibility of transporting liquefied gas and other strategic raw materials in tankers via waterways which could ensure their fast transfer from secure areas. We prepare for high unemployment, particularly in the Ostrava Region, but we do nothing for speeding up the development of the industrial zone along the D–O–E water corridor – there is a prime example in the form of the port of Nuremberg that was built ten years before the Rhine–Main–Danube canal was finished. We slowly make use of the sport and recreational potential of navigation on our rivers as well as the potential of living on the banks of rivers or directly on the water surface, but we still tend to ignore future opportunities on the D–O–E water corridor in this respect.

We give ears to negative features of waterways, and we fail to notice that we are being driven to the position that is far from advantageous for us as citizens. Nobody reminds us that we are the only one out of 28 EU member states without a direct connection to the sea (or at least without a connection via a quality waterway). Still, it has been calculated that countries without water transport are poorer than seaside countries by at least 5 %. Seemingly extraordinary costs are pointed out, but they are never divided by years of construction, and possible (and probably decisive) financing from EU funds is even ignored. Another disregarded fact is that finishing the development of highway network, which I never doubt at all, represents more than double costs of finishing the whole D–O–E water corridor.

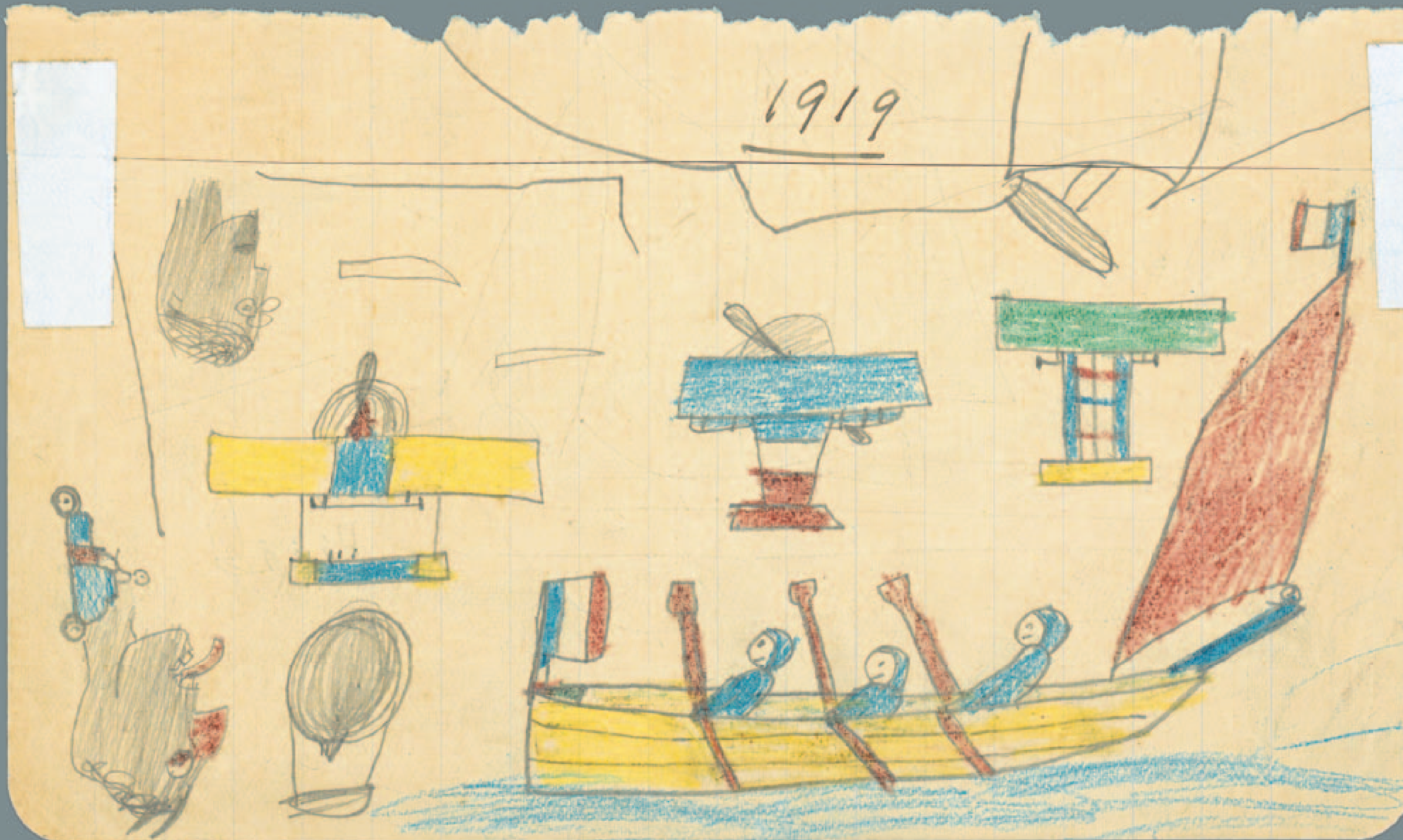
It also took me quite a long time before I acceded the whole long name of the project – but it is exactly the name that fully captures the essence of the project. Moreover, it should erase partial "strong" and "politically influenced" views of what is more important and what can wait. The name "Finishing the Danube–Oder–Elbe water corridor" should satisfy those who would like to see the Děčín lock and dam built first so that the navigability of the Elbe River could be improved as well as those who rightfully recommend the Přelouč II lock to be prioritized because it is the only missing water project to make the navigability up to Pardubice possible. It will satisfy even those who would like to see a connection of the Czech Republic with the Danube River as fast as possible (as the connection is non-existent after the break-up of former Czechoslovakia), and the promoters of connecting the Ostrava Region to waterways in the direction of the Baltic Sea at the same time.

However, we have to learn how to say what we consider to be our priority and finish such a sentence this way. Unfortunately, we tend to go on and support our opinion by saying that the others' priorities are bad. I believe that it is necessary to start the work on finishing the Danube–Oder–Elbe water corridor anywhere on its route where the economic and political demand is at its highest.

At the same time, we have to continue the edification among us – Czechs, Moravians, and Silesians – and we also have to persuade our neighbours in Poland, Slovakia, Austria, and Germany that the best solution would be to cooperate. Indeed, finishing the interconnected series of European waterways will definitely help us and our neighbours to prosper in the future.

As last but not least, I would like to ask all of us to take up the challenge and finish the Danube–Oder–Elbe water corridor.

Miloš Zeman,
President of the Czech Republic



Kamil Lhoták

During the history different ways of transportations where used in conformity with human invention. Nevertheless, on concluded that the nature offers the best transport ways – the large rivers.

Memorandum about the State hydraulic engeneeing and inland navigation in the Czech Kingdom, Prague 1891.

Úvod
Introduction

Vodní koridor Dunaj–Odra–Labe, dříve označovaný jako vodní dílo Dunaj–Odra–Labe, vodohospodářská soustava Dunaj–Odra–Labe, propojení D-O-L či průplav D-O-L, ale nejčastěji nazývaný vodní cesta D-O-L, je dnes pojmem evokujícím mnoho významů, často velmi rozdílných až protichůdných. Někteří v něm vidí slibný a hospodářsky prospěšný projekt, jiní zastaralou myšlenku patřící nejspíš do archivů a zajímavou leda pro historiky. Mnozí si od její realizace slibují zajímavé přínosy pro kvalitu životního prostředí, zatímco rozhodní odpůrci projektu naopak varují před katastrofální devastací přírody a krajiny, kterou by realizace vyvolala. Kde je pravda? Jedná se o neodpovědnou gigantománii, nebo o stavbu, jež se svým rozsahem ani svými náklady nijak neliší od stovky jiných již realizovaných či těch, které rostou před našima očima, mají běžná měřítka, ani nevyvolávají větší pozornost, natož vážné spory?

The Danube–Oder–Elbe water corridor, earlier called the Danube–Oder–Elbe water project, the Danube–Oder–Elbe water management system, the D-O-E interconnection, or the D-O-E Canal, has most often been referred to as the D-O-E waterway. Recently the concept has evoked rather controversial connotations. Some view it as a progressive, economically beneficial project, some as an out-of-date idea attractive merely just to historians. Some expect its realization to guarantee significant contributions to environmental quality, while the resolute opponents of the project warn against the disastrous devastation of the landscape. Where does the truth lie? Is it an act of reckless megalomania, or a project like hundreds of others, which have grown all around, which are no different in terms of size or costs, and which do not even cause much attention, let alone serious controversies?

I

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There is no simple answer to the question. Neither is the D–O–E water corridor a simple and single-purpose project. Its multiple functions are employable in many different areas. It can be regarded from various points of view, assessed by both professionals and outsiders, both of them favouring different features or impacts of the project. It does not mean, though, that there is no such answer. To track it down you must thoroughly consider all the project aspects, from the earlier views and theories of its usefulness, down to its present significance for the regions along its route, for the Czech Republic, and in fact, for the whole Europe. You will have to regard it with the respect to its technical solution, considering the wildlife, environment and landscape, take into account its social impact, especially unemployment, and eventually even broader politics – unless you take it for empty politicking. There is its role in flood control over large areas, and water-supply of otherwise water-deficient places. Then there is a significant influence of the water project on transport, agriculture and enterprise. Only after having considered all that, you can judge. We actually believe that the controversial viewing of the project is partially due to insufficient information. This book should try to fill in the information gap, so that the reader could find the answers themselves.

The problem is that for Czechs merely the word "canal" has a very blur connotation. One extreme opinion turns into another, quite opposing the first extreme.

I suppose, as You will surely affirm, that construction of a canal ranks among the most elementary affairs. We shall not disturb the outsiders' impression that such project calls for a genius mind. Both of us know very well that it is merely a large ditch. The practical design aspect of the project could be taken care of by two civil engineers with a sufficient supply of pegs and a long enough rope. I have already prearranged the job with Engineer Stárek and Engineer Mikota, whom I have met in the Czech Tourist Club. Both are able walkers and Engineer Mikota, a noted pioneer of Scouting, can actually make his own pegs in the wild. Both gentlemen have already agreed who is going to peg which side, and they have been practicing between Prague and the East Bohemian town of Kopidlno, which distance (82 kms) equals exactly the width of Panama's narrow. Thus, the project of the canal basically is ready. Side problems of the project will then truly challenge the technical inventiveness: accommodation, transport, board, hygiene and tools for three hundred thousand diggers, which I count on for the Panama.

The tool estimation is as follows:

100,000 pickaxes

(four spare ones)

100,000 spades

(12 spare ones – 3x higher fault rate)

100,000 handbarrows

(for every 1,000 handbarrows 1 kg of nails, 1 hammer and 1 pair of pincers for repairs).

Hygiene will remain the main problem. Such a large number of diggers, in the matters of hygiene left on their own, could devastate 4 hectares of countryside a day.

Thus, both on the left and right 50-metre belts will be pegged (so called Fekalzonen), which later, when ploughed under, will create decorative flower belts along the canal sides (so called Blumenzonen).

From a letter of the Great Czech Jára Cimrman to the designer of the Panama Canal, Ferdinand Marie Vicomte de Lesseps.

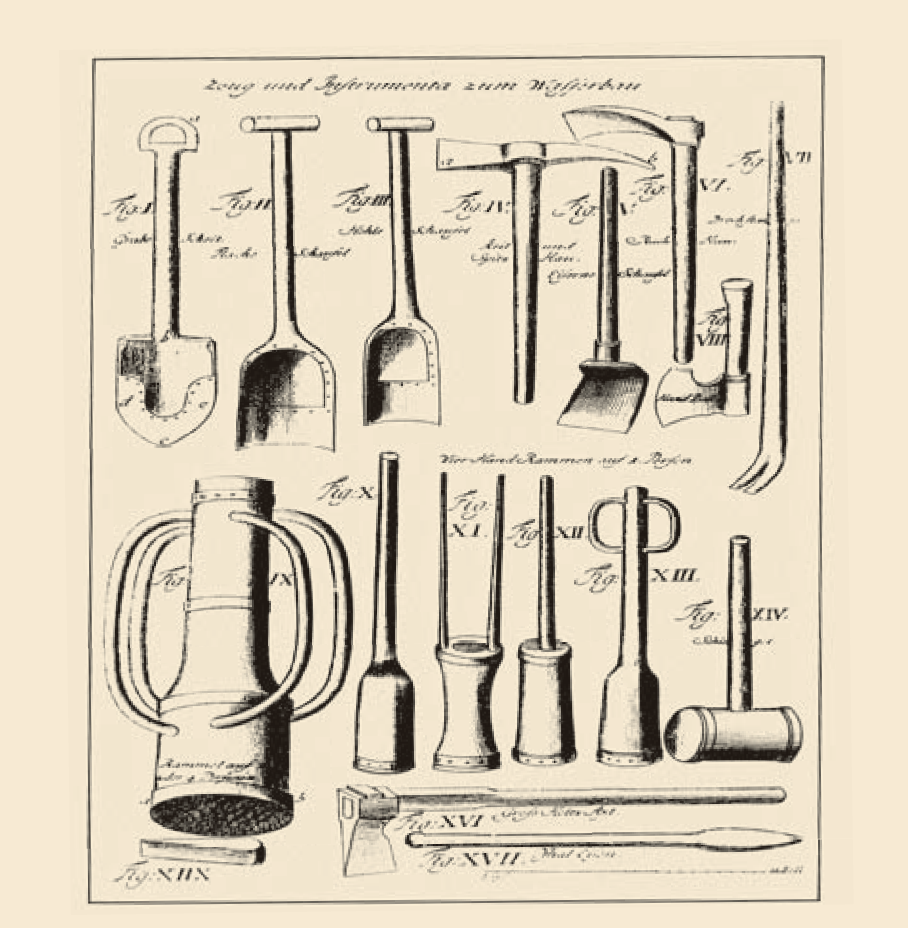
It is obvious that to compare the Panama Canal to "a large ditch" is only a humorous hyperbole. Only its summit cut at Culebra, crossing a 177 ms high mountain ridge Gold Hill, represented removal of more than 60 mill. m^3 of rock, an amount which until than had not been excavated at any other traffic or water management project. On the other hand, the canal dimensions have provoked much less humorous, and rather completely false notions of the opposite extreme; according to them, any canal necessarily has to be a gigantic work, which ploughs mountain ranges with deep cuts. In addition, it is not the only myth. Part of the nation connects the idea with some kind of a concrete channel. Only the more objective or conciliatory may consider it more carefully, and even endorse the statement of the writer František Nepil, a notorious conservationist, as it has appeared in the film "Pánbůh nás má rád" [God loves us].

Motorways and railways, of course, we will get used to them. Still, they scar the landscape forever. Canals and channels rather decorate, they scar only when being built; as soon as a canal gets to work, its surrounding springs with green, it turns into a decorative part of countryside, not into a slash; it enriches wildlife and pleasantly varies the face of nature.

The time has come to explain eventually what the D–O–E water corridor actually is, and what its functions are.

The Czech Republic does not have that much to offer to the advanced Europe. It sure has one thing though – the lowest spot of the Danube and Oder watershed – Moravian Gate.

We shall hope that this book will find its way among you, readers from both the Czech Republic, and those of the spreading European Union, at the right time. The year 2004 has united European countries ever more closely, and a good life together includes economic welfare and prosperity. Prosperity of any region tightly links with an efficient transport system. Such system can hardly lack its most ecological means – water transport. And no system can work properly, unless properly completed. One system of interconnected European waterways is discontinued precisely in the territory of the Czech Republic, which we like to call the Heart of Europe. Czechs, Moravians, Europe, do you not mind that the blue arteries of the continent are cut off in its heart, where they should all link up! Especially in case of far more than just transport links!



Speciální nástroje, používané při výkopu průplavů ještě v 18. století (podle knihy Theatrum Machinarum Hydrotechnicarum J. Leupolda, vydané v Lipsku roku 1724). Úsměvná ironie autorů „dopisu Járy Cimrmana“ vlastně odpovídá praxi, která panovala ještě v 18. století.

Special tools used in canal construction still in the 18th century (according to the book „Theatrum Machinarum Hydrotechnicarum“ by J. Leupold, issued in Leipzig in the year 1724). The serene irony of “Jára da Cimrman's letter“ corresponds with the actual practice of 1700s.

Práce na zářezu Culebra v trase Panamského průplavu v roce 1911. Rozsah prací na tomto mořském průplavu byl samozřejmě impozantní a vešel do obecného povědomí, stejně tak jako skandály, které jeho výstavbu provázely.

Panama Canal: excavation of the deep cut near Culebra in 1911. The extent of construction works on this canal for sea-going vessels was really impressive; it became commonly known along with financial scandals connected with the project.

Současný stav Panamského průplavu dává za pravdu optimistickým slovům Františka Nepila. Na březích či v bezprostřední blízkosti tohoto mořského průplavu vzniklo 7 chráněných oblastí, k nimž patří i národní vyhlášené parky.

The present state of the Panama Canal affirms the optimistic words of František Nepil. There are 7 protected areas proclaimed along the sea canal, including national parks.

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Kamil Lhoták

History by apprising
them of the past
will enable them
to judge of the future.

Thomas Jefferson

Proti proudu času

Against the stream of time

II

Pojednání o čemkoliv začínají popisem minulého vývoje. Tomuto nepsanému pravidlu se ani my nemůžeme vyhnout. Znalost minulosti totiž usnadňuje orientaci i v otázkách aktuálních. Zejména v otázce, jaké místo mají vodní cesty v dnešním přetechnizovaném světě.

Any discourse commences with a description of past development. Neither we wish to avoid this imperscriptible rule. Awareness of the past guarantees accurate viewing of current affairs: such as the position of waterways in the technologized world of today.

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Even canals have “prehistory”

Císař Karel Veliký již v roce 793 usiloval o vodní cesstu Dunaj–Severní moře.

As early as in 793 the Emperor Charles the Great longed for a waterway Danube–North Sea.

Největší Čech, římský císař a český král Karel IV., v roce 1375 zahájil práce na vodní cestě Dunaj–(Vltava)–Labe.

Charles IV, Holy Roman Emperor and King of Bohemia, commenced works on the waterway Danube–(Vltava)–Elbe in 1375.

We could set off with a hypothesis that the first means of transport probably appeared as floating tree trunks, which makes rivers, lakes and seas the first traffic routes. We could also pull out an argument that Archimedes’s law – as a main attribute of the water transport advantages – was as good in the time of flake tools as it is in our time of mobile phones and computer viruses. However, nobody pondered on the fact that a tree trunk was no-way-carry-able ashore, while easily manoeuvrable afloat. Leaving such assumption behind, we could safely place the very beginning of canal prehistory to the time, when they were still mere “large ditches”. They were set up in places where natural waterway was not available, and allowed fluent movement of floating trunks, later hollowed trunk barks, and other more sophisticated vessels. Such was probably a canal between the Nile Delta and the Red Sea, which was built more than 4,000 years ago in Ancient Egypt. The Chinese Imperial Canal may serve yet another example. Although the first excavation works commenced more than 2,500 years ago, the canal has worked – after numerous reconstructions – until today. It is probably the world oldest waterway continuously used. As builders of the ancient canals were at loss when it came to surpassing higher terrain obstacles, they simply had to dig patiently through them, or simply drag the vessels sleigh-like by land. Such operations used to compromise at conditioning of the “tow trail” and at using pulleys or other mechanical devices. Some languages even granted them with a special term (slipway). However, the slipway system limited the size of such amphibian vessels. The term of amphibian vessel actually does not steer too far from reality, as some boats were truly equipped with wheels.

We shall remain in Central Europe, though, with the watershed of the Danube and rivers heading for the North and Baltic Seas. Its passing had been a challenge long before the idea of the D–O–E canal came to life. **Perhaps the first attempt to connect the Danube with the North Sea watershed was carried out by Emperor Charles the Great. He ordered to dig through a terrain ridge between the river Schwäbischer Rezat in the Rhine river basin, and the Altmühl, leading its waters to the Danube. Although the works actually commenced in 793, they had to be discontinued for landslides of the slopes into the deep cut.** The Avar danger at the eastern border of the empire was probably also a significant distraction, which diverted the emperor’s attention elsewhere. Remains of the proposed deep cut – Fossa Carolina – are to be found not far away from the Czech border, south from Nuremberg. Easily spottable in the terrain, they prove what a difficult task it used to be to pass the watershed even with smaller vessels. And they did not carry more than one ton at a time.

Almost 600 hundred years later, in 1375, works commenced on a different connection of the Danube with the rivers running north. This time it headed for the River Vltava. The proposal appeared in 1365, when the efforts of Charles IV, King of Bohemia and Holy Roman Emperor, escalated in order to transit Venetian goods via Bohemia to Belgian Bruges.

Further details of the project are to be found in the Latin chronicle of Dubravius. Its author (died in 1552) insists he himself visited some remains of the unfinished canal sites. Nevertheless, today we are certain neither of their location, nor of the canal routing. According to some later remarks, its route should have branched off the Danube at Passau. Then it would have had to cross the Šumava Mountains in its highest spot, thus being more of a chain of slipways than a waterway. King of Bohemia and Holy Roman Emperor, baptized as Wenceslas, accepted the name Charles to honour Charles the Great’s tradition. His bold project could have been a similar gesture. **At the same time, it proves that this great ruler purposefully tried to influence the inconvenient geographic and inland situation of his ancestral domain. It must be the first of designs of the Danube – (Vltava) – Elbe; its legacy should inspire future attempts to benefit from the geographic location in the Heart of Europe.**

První šikmá mechanická lodní zdvihadla ve Velké Británii se podobala spíše převlakám, i když byla vybavena výkonnými pohybovými mechanismy a vyhověla větším člunům.

Although fitted with powerful tractive mechanisms suitable for larger barges, the first canal inclines in Great Britain resembled rather slipways used for towing small boats across land.

Plavební ruch na Velkém (Císařském) průplavu v čínském městě Suzhou. Ani po 2500 letech neztratil tento starý průplav díky tradiční, avšak v daných podmínkách osvědčené technologii (používání dlouhých lodních vlaků z malých jednotek) svůj dopravní význam.

Navigation on the Imperial Canal in Chinese Suzhou. Thanks to the traditional technology, well proved in the given conditions (use of long trains of relatively small boats), the canal has kept its transportation significance for 2500 years of its existence.

Replika staré převlaky (holandský termín je overtoom) u Venhuizen v Nizozemsku.

A replica of an old slipway (in Dutch: overtoom) at Venhuizen in the Netherlands.

Historická převlaka na čínské vodní cestě. Stará kresba znázorňuje i rumpály, sloužící k vlečení lodí po svahu.

A historical slipway on a Chinese waterway. The old drawing shows capstans used for pulling boats uphill.

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Fossa Carolina se nachází u vesničky Graben v blízkosti Treuchtlingen a je dnes turistickou atrakcí. Na jednom z domů v obci připomíná plán Karla Velikého malba s alegorií Rýna a Dunaje.

Fossa Carolina, located by the village Graben near Treuchtlingen, is a tourist sight today. The allegory of the Rhine and Danube Rivers on one of the village houses recalls Charles the Great's plan.

Miniatura z tzv. Friezsovy kroniky z roku 1546 je dobovou představou o práci na výkopu průplavu mezi Rýnem a Dunajem za vlády Karla Velikého.

The miniature from Friezs's chronicle from 1546 shows the contemporary idea of the Rhine and Danube canal digging in the times of Charlemagne.

Nedokončená Fossa Carolina nedala spát podnikavým duchům více než 1000 let. Příkladem byl Georg Zacharias Haas, který ve svém spisu De Danubii et Rheni conjuctione, vydaném v Řezně roku 1726, navrhl dokončení tohoto propojení. Na připojeném plánku je zachycena nejen jeho trasa, ale i představy o překonání výšek. Je znázorněna jak převlaka (nahoře), tak již i plavební komora (dole). Plánek je tedy pro převratnou změnu technických představ symbolický.

The unfinished Fossa Carolina disturbed gritty minds for over 1000 years. One of them, Georg Zacharias Haas designed its completion in his script De Danubii et Rheni conjuctione edited in Regensburg in 1726. The map shows the route and solutions of surpassing height differences. You can see a slipway (above) and a lock (below). The plan is a symbol of the radical change in technical thinking.

History – the real canals now

When did the prehistory come to its end and when did the era of real canals commenced? Undoubtedly, such breakpoint came with the invention of a lock, i.e. device enabling the vessels to overcome water level differences, and allowing the canals to climb to altitudes dictated by morphology of the area. The principle of first locks was as simple as it was ingenious. It was a water tank bordered with walls or fortified slopes, and fitted with two gates, which separated the parts of a waterway (pools) with different water levels. By filling and emptying of the lock, the water level inside adjusted to the level in the respective pool. Thus, the vessels could be lowered or elevated to the level of the upper or the lower pool. Thanks to this invention, it was incomparably easier to surpass altitude differences. At the same time, it broke the size limits of boats imposed by their byland transits, as the lock sizes allowed lifting of boats carrying tens and later even hundreds of tons. Neither the exact date, nor the author of the invention could be pointed out precisely. The primacy has been claimed in the Netherlands, in Germany, in North Italy, as well as in China. However, most resources agree that the very first lock was built in North Italy on the canal Naviglio Grande in 1439, as they state the engineers Filippo da Modena and Fioravante da Bologna as its builders. A lock is actually one of the great Renaissance inventions. Its improvements engaged even Leonardo da Vinci (1452 – 1519) himself. His sketches include a detailed draft of a lock miter gate, i.e. a construction, which thanks to its reliability and efficient force distribution has been the most commonly used ever since. For canal builders a lock meant previously unthought-of possibilities. Remarkable projects started to come to life. The first canal, Canal de Briare between the Seine and the Loire in France, built in 1608 – 1642, became the first to surpass high watershed between two rivers with cascades of locks. Shortly, in 1664 – 1681, it was followed by the Canal du Languedoc, also called the Canal du Midi, between the Garonne emptying into the Bay of Biscay, and the Mediterranean Sea. It was led along the base of the Pyrenees, and admitted barges carrying over 100 tons. The greatest boom of canal building happened in Britain. Slightly exaggerating we can talk about a canal fever, when in the 18th century and in the first half of the 19th one more than 7,500 kms of canals were built. There were thousands of locks, almost a hundred of canal tunnels, and not a shorter count of canal bridges (aqueducts). However, relatively modest parameters of the canals were a disadvantage of the British network. Majority of the canals were built for ”narrow boats”, which carried only 25 – 30 tons of cargo. They used to be towed by mules. In their time they were popular means of transport for all kinds of articles, as documented in Charles Dickens’ Pickwick Papers.

‚Any luggage, Sir?‘ inquired the coachman.
‚Who--I? Brown paper parcel here, that‘s all--other luggage gone by water--packing-cases, nailed up--big as houses--heavy, heavy, damned heavy,‘ replied the stranger...

Charles Dickens: The Pickwick Papers, chapter 2

However, the speed of British navigation was scanty, namely due to the high number of low locks following shortly one after another. Thus, the inventive Mr. Jingle could excuse an absence of appropriate eveningwear with a pontifical exclamation when referring to the slow boats: “…confounded luggage, heavy smacks, nothing to go in, odd, ain’t it?”

Despite the above mentioned, we have to admit that the British canals brought a revolutionary change into transport of the time, as horse carts used to be the only land alternative, which could not carry more than a fraction of the load at a speed only a bit higher. Practical experiments proved that at a given speed one horse could pull this much of cargo: 0.6 ton in a wagon on an unpaved road, 2.0 tons on a paved road, 30 tons in a boat on a river, and 50 tons in a boat on the canal! Naturally, the water transport could thus become one of the main pillars in the industrial revolution. The later decline of the inland navigation came as naturally as its boom, as the British canal network, built to compete with wagons on muddy roads, could hardly stand up to the spreading rule of railways.

If the reader has got the impression that we have excursed too much to the British history from our path of the D–O–E problematic, let the following chapters excuse the detour, and show how notion of the canal history beginnings helps to navigate you through the disputes of today.

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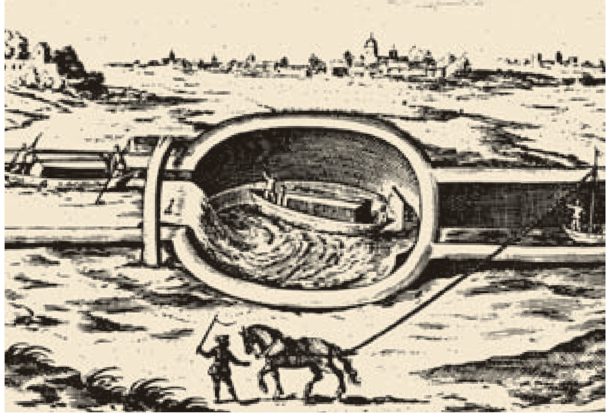
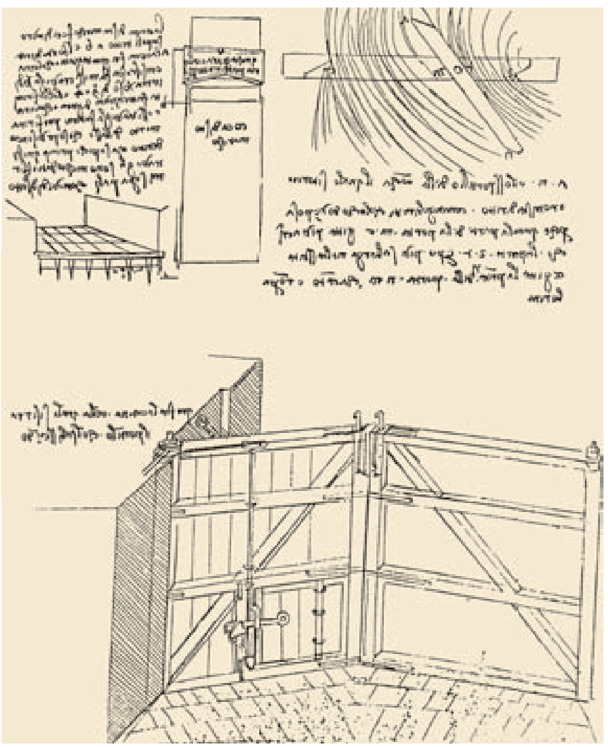




Historická vyobrazení starých plavebních komor v Itálii.

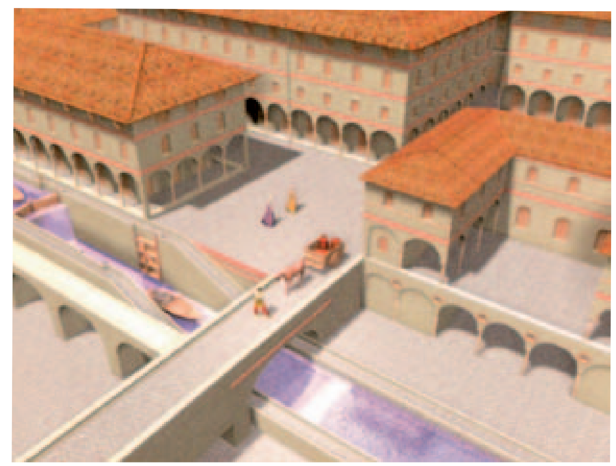
Historical illustrations of the old locks in Italy.

Canal du Midi: stupnice plavebních komor na starém francouzském průplavu je dodnes v provozu. Využívají ji však již jen sportovní a turistické lodi.

Canal du Midi: the flight of locks on the old French canal is still in operation, although currently used for sports and pleasure boats only.

Detail vzpěrných vrat s uzavíratelným otvorem pro přímé plnění a prázdnění podle náčrtků Leonarda da Vinciho.

A detail of miter gate with a butterly valve for direct filling and emptying of a lock by Leonardo da Vinci's sketch.



Rekonstrukce Leonardova návrhu města s kanály, akvaduktem a plavební komorou.

Reconstruction of Leonardo's vision of a town with canals, aqueduct and lock.

Canal du Midi je i dnes cenným prvkem jihofrancouzské krajiny.

Canal du Midi remains a jewel element of Southern France countryside.

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Na starých anglických vodních cestách nejsou žádnou výjimkou plavební tunely, byť velmi omezeného profilu.

A great number of rather narrow profiled canal tunnels were built on old English waterways.

V úzkých tunelech nebylo možno zřídit potahovou stezku. Používal se proto kuriózní způsob pohonu – tzv. legging. Posádka při něm ležela na zádech a „kráčela“ po stěnách a klenbě tunelu.

As the narrow tunnels did not allow any space for a tow path, a rather quaint way of driving – “legging“ – was used: the crew lay on their back and “paced“ walls of the tunnel.

Tradiční narrow boats (monkeys) v plavební komoře britského průplavu Grand Union.

Traditional narrow boats (“monkeys“) pass a lock of the Grand Union Canal.

Provoz na starých anglických průplavech byl vzhledem k obrovskému počtu plavebních komor velmi pomalý.

The enormous number of locks on old English canals reduced inconveniently the flow of commercial traffic.

Původní kamenný průplavní most u Bartonu nad řekou Irwell. Po výstavbě námořního průplavu do Manchesteru, vedeného korytem této řeky, musel být nahrazen otočným průplavním mostem.

The former stone aqueduct over the Irwell near Barton. When the ship canal to Manchester was completed there, it had to be replaced with a turning steel canal bridge.

Akvadukt Pontcysyllte na anglickém průplavu Llangollen.

Aqueduct Pontcysyllte on Llangollen Canal in England.

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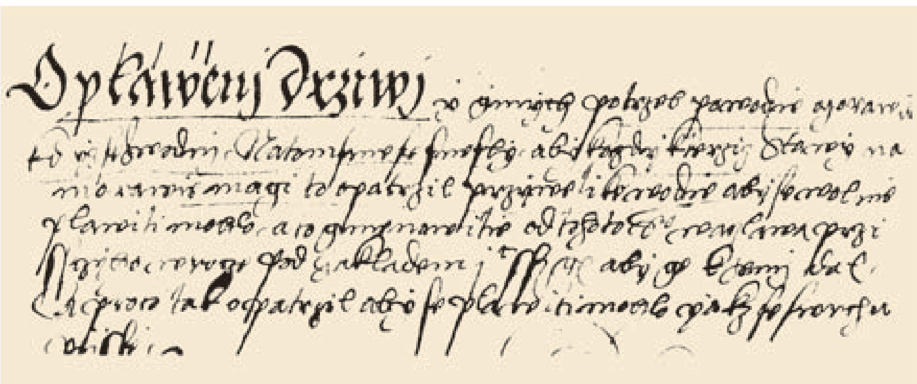
Moravia and the Moravian Gate

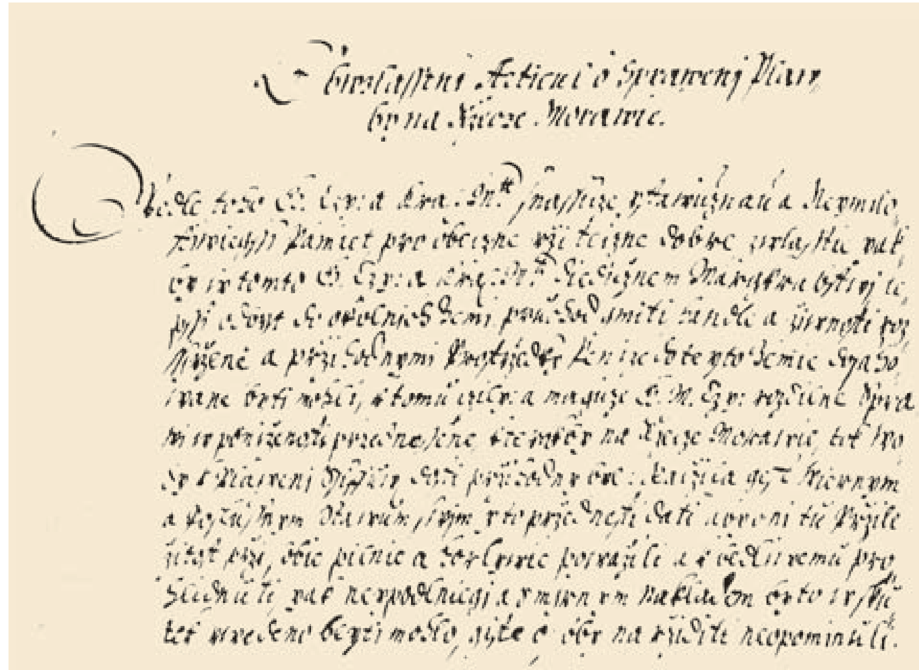
It is surprising that for centuries projects of canals leading to the west and north from the Danube had avoided the easiest route to pass the European watershed – via the unusually low Moravian Gate. By land, the route was used as early as in Neolith for so-called Amber Trail. From its fields on the Baltic amber was shipped along the trail to the far south. Baltic amber was later found in tombs of pharaohs, in Babylonia, in Crete, and in Mycenae. There are also interesting remarks about small boats coming along the Morava all the way to the mouth of the Bečva, i.e. to the immediate proximity of the low watershed. Similarly, on the Oder they used to reach the mouth of the Opava. In its decrees, the Moravian Land Assembly made sure that dams, built for the waterpower utilization, would not prevent boats and rafts from free passing.



"About timber floating on the River Morava, when it gets watered, as we have agreed, all who own shutters on the Morava, must see to it that timber could freely float, i.e. namely from the upcoming St. Wenceslas' Day. Those not providing for the free floating channel as mentioned above will be fined to pay 100 three-scores of sous to the Land."

The Decree of the Moravian Land Assembly from Monday after St. John the Baptist's Day (June 26th, 1542)

Consequently, a special committee for inspection of the bad navigational situation was established on May 11th, 1579. **As early as at the Moravian Land Assembly meeting in 1653, its representatives agreed not only to make the Morava navigable but also to connect it to the Oder. The decree could be considered the first impulse for building the Danube – Oder canal.**



As His Royal and Imperial Highness continuously and most graciously remembers the common wealth of the hereditary margraviate, namely, he likes to see to better and fluent trading with the neighbouring lands, as well as to ease the pass of goods and crafts available there, and to provide such means as to achieve these goals. Since different reports have humbly advised His Royal and Imperial Highness that the Morava River was found rather convenient for boating, he liked to pass it down to his duets and obedient estates for considering and thorough examination in order not to omit immediate employing of certain subjects to execute the task with a minimum cost and delay.

The Special Article on Establishing Navigation on the Morava from 1653

The Assembly indeed did not "omit" anything and delegated a committee from all the involved assembly estates. At the same time, Ferdinand III, advised by the court chamber, addressed a letter to the current Moravian district officer Count Johann from Rottal (dated September 30, 1653 in Regensburg). He announces that at the last conference of the land chamber it was proposed to ship the Alpine salt along the Danube and Morava Rivers instead on horse carts. The emperor obviously liked the possibility of lowering the shipping costs and the consequent rise of the profit. So he sends to Moravia the Italian architect and engineer, Filibert Luchese, to inspect the course of the river and propose a solution how to regulate it for navigation. Having obtained a district officer's patent, Luchese immediately sets off. On February 13, 1654, he already reports back to the Emperor. In his extensive report, he proposes to clear the riverbanks and establish a towpath, as well as to build 15 pools, which would periodically release water in case of drought. On March 9, 1654, the Court Chamber passed the project to the Czech Court Office, with the Land District Officer recommendation to cover all costs by corveé labour. However, the unsettled times never allowed the project to get any further: on April 2, 1657 Emperor Ferdinand III died and his ancestor Leopold I discontinued his efforts. Shortly afterwards, the Osmanian troops burst into Moravia, and when in 1663, the army besieged Vienna, the court probably worried about completely different things.

Ferdinand III., který byl korunován v roce 1627 českým králem a v letech 1637–1657 vládl jako říšsko-německý císař, měl vážný a pochopitelný zájem o rozvoj plavby na řece Moravě.

Ferdinand III, crowned King of Bohemia in 1627, Holy Roman Emperor in 1637–1657, naturally showed a serious interest in the Morava navigation.

Lothar Vogemont's Moravian activities mark another historical milestone. His person as well as his remarkable ideas is mentioned in tracts and essays on numerous European waterway projects. His origin has never been fully clarified. Some sources call him a Lotrine priest, which also matches his surname – "a Vogeso monte", i.e. from the Vosges Mountains. Some assume his origin was Dutch. The only certain thing is that one of his Latin tracts named „Dissertatio de utilitate, possibilitate et modo conjuctionis Danubii cum Odera, Vistula & Albi fluviis, per canalem navigabilem" **(Dissertation on utility, possibility and manner of connecting the Danube with the Oder, Vistula and Elbe Rivers by a navigable canal) from 1700 is the first actual proposal of the connection of the Danube not only with the Oder, but also with the Elbe, i.e. the very first project of a complete interconnection the Danube – Oder – Elbe as perceived today. Meanwhile its routing employed the lowest passes of the European watershed – the Moravian Gate and the relatively low mountain range gaps around Česká Třebová.** The author must have been thoroughly familiar with the details of the river network and terrain along the line dividing the Danube, the North Sea and the Baltic Sea catchment areas.

A more profound examination of the above-mentioned tract, however, leads to a surprising discovery, which slightly complicates the picture of the mysterious Vogemont and his lucid ideas. It impels deeper pondering on the ideas commonly shared 300 years ago. The subtitle of the dissertation suggests a lot: "cum duobus paradoxis demonstratis de motu aquae in fluminibus" [With the explanation of two opposing opinions on water flowing in riverbeds]. What does it actually stand for? Although Vogemont had a correct idea of the easiest routes for crossing the European watershed, he was fatally wrong as for the most convenient manner of its technical realization. More than half of his tract is dedicated to the reasons why water flows in flatland rivers even though the surface – as Vogemont assumes – is horizontal, i.e. it has no incline. He claims that the reason is to be found in the inflowing water of the river feeders: it displaces a certain area and thus makes the water masses move along the horizontal riverbed. He even refers to the contemporary top scientists.

The thing is rather clear. Those are the words of Mr. Gulielmini, a noted mathematician at the university in Bologna, who clarifies the phenomenon in his recent and most commendable work titled "A tract on the meaning of flowing waters", head I, chapter 3, par. 1… Movement of the water stream ahead is based on the physical law, which says that the first cannot take place of the other, unless the place is vacated.

Lothar Vogemont: „Dissertatio de utilitate, possibilitate et modo conjuctionis Danubii cum Odera, Vistula & Albi fluviis, per canalem navigabilem", Notes, par. 2 and 5.

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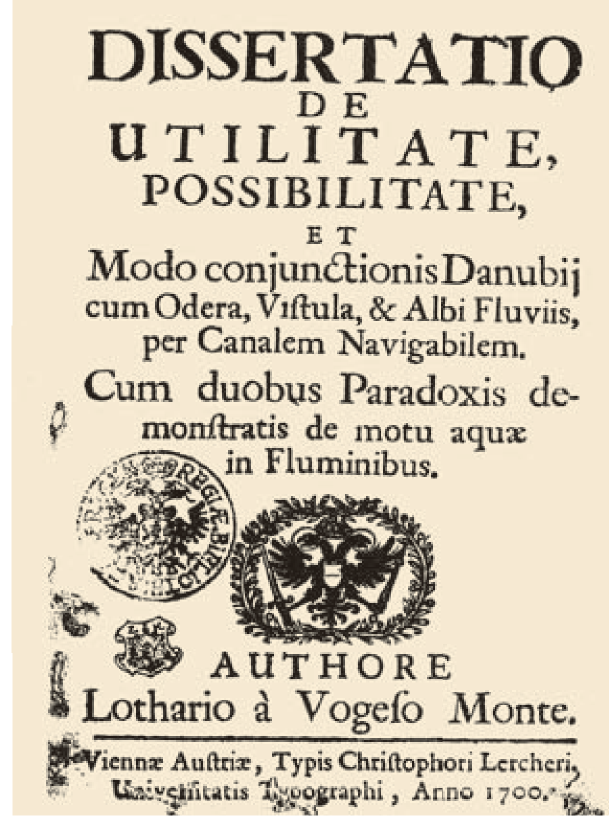
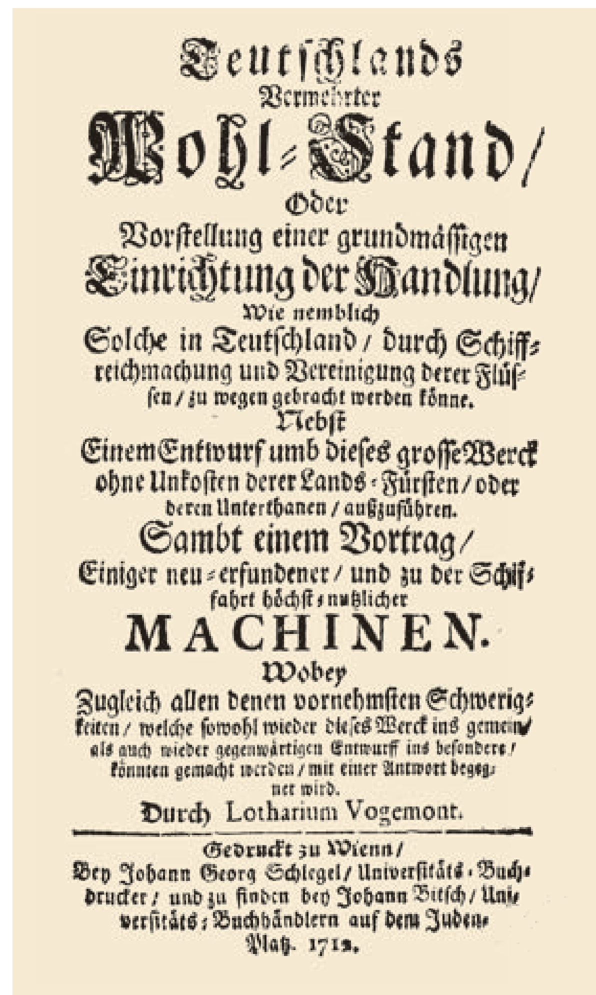


DISSERTATIO
DE
UTILITATE,
POSSIBILITATE,
ET
Modo conjunctionis Danubij
cum Odera, Vistula, & Albi Fluviis,
per Canalem Navigabilem.
Cum duobus Paradoxis de-
monstratis de motu aquæ
in Fluminibus.

AUTHORE
Lothario à Vogeso Monte.

Viennæ Austriæ, Typis Christophori Lercheri,
Universitatis Typographi, Anno 1700.



Teutschlands
Vermehrter
Wohl-Stand/
Oder
Vorstellung einer grundmässigen
Einrichtung der Handlung/
Wie nemblich
Solche in Teutschland/ durch Schiff-
reichmachung und Vereinigung derer Flüs-
sen/ zu wegen gebracht werden könne.
Nebst
Einem Entwurf umb dieses grosse Werck
ohne Unkosten derer Lands-Fürsten/ oder
deren Unterthanen/ außzuführen.
Sambt einem Vortrag/
Einiger neu-erfundener/ und zu der Schif-
fahrt höchst-nutzlicher
MACHINEN.
Wobey
Zugleich allen denen vornehmsten Schwerig-
keiten/ welche sowohl wieder dieses Werck ins gemein/
als auch wieder gegenwärtigen Entwurff ins besondere/
könnten gemacht werden/ mit einer Antwort begeg-
net wird.
Durch Lotharium Vogemont.

Gedruckt zu Wienn/
Bey Johann Georg Schlegel/ Universitäts-Buch-
drucker/ und zu finden bey Johann Bitsch/ Uni-
versitäts-Buchhändlern auf dem Juden-
Platz. 1712.

Mapka z Vogemontova traktátu svědčí o důkladné znalosti území a říční sítě. Pokud jde o vedení trasy vodní cesty, je však její vypovídací schopnost nepatrná.

A map from Vogemont's tract proves thorough knowledge of the territory and the river network, although it shows little of the actual waterway route.

Titulní list Vogemontova latinského traktátu o vodní cestě Dunaj–Odra–Labe z roku 1700.

The title sheet of Vogemont's Latin tract on the waterway Danube–Oder–Elbe from 1700.

Splavňováním toků a stavbou průplavů se Vogemont zabývá také v dalším – tentokrát německém spisu z roku 1712. Jak vyplývá již z titulního listu, slibuje si z uskutečnění tohoto programu zvýšení blahobytu a nabízí k jeho uskutečnění „nově vynalezené vysoce potřebné stroje".

Construction of navigable waterways and canals is the topic of a Vogemont's German tract from 1712. On the title sheet he foresees benefits of the programme in the increasing prosperity, and suggests use of new machinery inventions for its realization.

This mistake, supported by other reasoning and drafts, leads him to a conclusion that water could flow even along a tangent to the Earth globe surface, e.g. it could flow in a "horizontal" canal from the meeting of the Morava with the Dyje to the watershed with no need for construction of a lock cascade. Although the first canals with such locks were built exactly in his time, and Vogemont must have been familiar with their construction (in his tract he refers to the technical solution of the above mentioned French canal du Languedoc), he considered the alternative option with such devices much less convenient.

Strictly speaking, the notion of horizontal surface of flowing water, which Vogemont as well as other contemporary scholars recognized, contradicts Bernoulli's theorem on the rules of fluid flow, and even the law of conservation of energy. Incidentally, Daniel Bernoulli, a significant Swiss mathematician and physicist, who introduced the basic rules of hydrodynamics, was only born in 1700, the year when Vogemont's tract came out. The slips of the "father" of the D–O–E canal thus deserve a little benevolence.

Other projects and partial achievements

Throughout the 18th and in the first years of the 19th century, the vision of the navigable Morava and the canal to the Oder remained a task which many an engineer challenged with ever more sophisticated projects. They also show and increasing trace of foreign influence.

In 1719, Colonel Norbert Wenzel von Linck of Uherské Hradiště fort submitted a proposal how to regulate the Morava for navigation. The map shows also the canal to the Oder, branching off the Bečva at Hustopeče. According to Linck's project, a lock at Rohatec was built in 1722. It is the very first construction of its type in the Czech territory, as the other oldest locks (often mentioned in literature) on the Vltava in Županovice and Modřany were only built between 1729 and 1730. The Lock at Rohatec also proves that Vogemont's ideas of making the flatland rivers navigable through the "horizontal" water surface had been abandoned a mere quarter of a century after issuing of his Latin tract. Approximately at the same time the Olomouc councillor Jan Kryštof Dimbter and Salomon Beer Beckh published their project. Salomon Beer Beckh suggested to maintain the Morava navigability at his own expense, and to establish a towpath on its riverbanks for both people and horses. In exchange, Beckh was granted a privilege of salt shipping along the river all the way to the Napajedla state salt-house. As the example illustrates, making a river navigable meant mainly clearing the banks (shrubbing) to give the ropes enough space, or other towpath alternations in order to allow the barges to be towed upstream. The river stream itself took care of the opposite direction. Such practice was common on most larger "navigable" rivers.

In the following years sighting of the Morava and projects of its regulation for either navigation or flood-prevention purposes are connected with the names of Franciscus Josephus Wieland (1723), J. K. Altomante, Jan Křoupal (1741), and Collonel Brequin (1771).

Jan Rochus Dorfleuthner, a Hodonín wood merchant, deserves probably the highest credit for development of the Morava navigation. In 1780 he drew up plans on making the Morava navigable up to Olomouc. He also offered to finance the works and operate the navigation in exchange for certain privileges. Emperor Joseph II approved of Dorfleuthner's proposal and in 1785 the merchant was granted a privilege to operate the river navigation. Like in the case of Salomon Bekh, it was in fact the popular PPP system (Public Private Partnership) of today. Dorfleuthner's boats carried mainly wood, but reportedly also other substrates: cereals and other agricultural products, salt, craft products etc., and reached as far as to Veselí nad Moravou. During the time, when the company was active, the second Moravian lock was built at the dam in Hodonín. However, the navigation technology could hardly compare to present-day concepts. In good conditions, wooden barges, towed by horses upstream, could carry 30 – 40 tons in the lower section; even smaller vessels, carrying 10 tons, were used upstream from Hodonín. Barges delivered tobacco for a factory in Hodonín also.

Mapa Norberta Wenzela von Lincka z roku 1719 znázorňuje propojení od Moravy přes Bečvu k Odře.

Norbert Wenzel von Lick's map from 1719 shows the canal link from the Morava via the Bečva River to the Oder.

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In the same year (1780), a company operating the Morava navigation was founded and a unified navigation regulations were issued.

The idea of a canal to the Oder reappeared when the French engineer F. J. Maire designed a unified and systematic plan of canals connecting individual rivers to the Adriatic Sea (1785). The draft included also the Danube–Vltava and the Danube–Oder canals. Jan Alois from Hankenstein published a document on making the Morava navigable and negotiations of the Moravian (Versuch über die Schiffbarmachung des Flusses March un Handlung der Mährer). In its response engineer Stošek of the construction directorship designed a complete project of the Morava regulation for navigability.

In 1804 the court councillor Wiebeking carried out his research on the Morava and designed a plan how to adjust the river for navigation and to reduce its flooding.

In 1807 a private company for the Morava navigation was founded to site in Brno. They pondered the idea of connecting the river to the Oder as proposed in the project of the court councillor Wiebeking. The government in Vienna assigned the project to be evaluated by the court councillor engineer Joseph Shemerl, who then produced his own very sophisticated proposal in 1809.

An important milestone of the waterway network development was reached in 1815 when the Congress of Vienna declared free navigation. It was the first step to legal regulations on the international rivers, i.e. rivers emptying to a sea.

Although the time was obviously not short of projects, practically only a certain progress of the Morava navigation was registered, and its primitive standards could no way measure up to inland navigation on canals in Britain, France or Germany. It could hardly aspire to be gradually joining the modern transport system as its independent constituent. Construction of the canal to the Oder and Elbe, which could have become such an impulse and could have meant a more expansive approach to making the Morava navigable, unfortunately stopped at the phase of preliminary considerations. Thus, it was probably quite realistic, when in 1824 the Moravian representatives announced that navigability of the Morava was desirable only if a canal connection to the Oder was to be built.

Stará rytina zachycující řeku Moravu pod zříceninou hradu Devín těsně před soutokem s Dunajem dokumentuje, že čluny byly proti proudu řeky vlečeny koňmi.

The old engraving of the Morava River under the Děvín ruins close to its confluence with the Danube documents that barges were towed upstream by horses.

Stará rytina ze sbírek muzea v Bad Schandau znázorňuje těžkou práci labských „burlaků“ (na Labi se jim říkalo Bomätscher) při vleku člunů proti proudu. (obr. vlevo) Lidská síla se využívala k vlečení člunů na Labi ještě na počátku 19. století, jak svědčí kresba C. E. Sprincka, na které je zachycena řeka u Königsteinu v blízkosti česko-saské hranice. (obr. vpravo)

The old engraving from the collection of Bad Schandau Museum illustrates hard work of towing crews (“Bomätscher“) struggling up the Elbe stream (left). On the Elbe human force was used in barge towing till the beginning of 19th century, as shown in C. E. Sprinck's drawing of the river near Königstein close to the Czech–Saxon border (right).

The age of railway

In 1825, the first train pulled by Stephenson's steam locomotive set off to run the steel rails between Stockton and Darlington in England. This virgin ride practically declared a war on inland navigation and its canals. The first battle of the war attacked the vast network of British canals, which thus paid a paradoxical toll of their primacy. The canal designers were only measuring up to horse carts staggering along uneven roads. The new competition was as unsuspected as it was undefeatable. Even other canals of modest designs could not stand much chance. The French canal network resisted the railway attack slightly better and longer, as it was adapted for barges of larger sizes. The credit here should go to the significant French politician and multiple premier Charles Louis de Saulces de Freycinet. In 1877 – 1879, while in the office of the Minister of Public Works, he enforced the boat type "péniche" carrying 270 tons. The French canal designers of the 19th century had to handle much bigger altitude differences than their British predecessors. The canals ran across mountain ridges – and even the main European watershed – mainly in canal tunnels. The routes crossed large rivers with generously conceived bridges. Even in the demanding conditions all routes were designed rather sensitively, with respect to the landscape character. Some of them, especially when not handicapped with too dense a succession of locks, have kept their traffic significance until today. German, Dutch and Belgian canals, which are usually of a later date, showed even stronger resistance to the railway era. As the builders set their standards truly very high, the canals could naturally become a basis for continuous development of the modern water transport. Larger navigable rivers like the Rhine, Elbe or the Oder, meant another "fortress" never defeated by the railway, as boats carrying several hundred tons were quite common there even in the pre-railway age.

The steam engines found their use on larger rivers as they did on rails. Gradually powerful chain or paddle-wheel steam tugs were introduced. However, the size of a heavy and space-demanding steam engine was a problem when it came to small canal barges. Thus, land traction powered by horses had survived on many a canal until the mid 20th century. Like in France, where horses were later replaced with narrow-gauge electric locomotives. It certainly was very progressive as the first electrificated traction on the canals actually preceded electrification of the railway.

Quite understandably, the wild and state-supported development of railway in Austria-Hungary led to an entire decline of the primitive navigation on the Morava. Its standard was minimally two grades below the standards of the British canals. Coincidentally, the first steam railway line of the monarchy, so called North Railway of Kaiser Ferdinand, ran along the River Morava from Vienna, via Přerov, to Cracow. It was put into service gradually in the 1840s. Naturally, even the idea of the D–O–E canal somewhat receded – as it seemed then forever.

After the railway line was completed, further efforts for the Morava regulations were mostly limited to anti-flood measures. In that context, we should mention the work of Ing. Lindemann from 1846. However, only in 1865 Ing. Michalík presented a commemorative paper on regulation of the Morava from Olomouc to Devín, discussing also its navigability.

The Imperial waterway act from May 30, 1869 marked a breakpoint from the legal point of view. On its basis, the Moravian waterway act could be approved on August 28, 1870. It declared the rivers and streams exploitable for boat and raft navigation a common property.

Slowly it had turned out that the idea of the D–O–E connection was still justified even in the railway age. The news of water transport development in some parts of Western Europe was one of the reasons. In many cases, navigation not only survived the railway, but also started to bloom ever more after the railway criteria had been implemented. **The development took a significant turn when in 1873 Prof. Oelwein and Ing. Pontzen presented the Anglo-Austrian Bank with their project of the D–O–E canal designed for vessels carrying 240 tons.** The route branched off the Danube at Grossenzersdorf, east of Vienna, and ran along the right Morava riverbank to Otrokovice, to follow along the left bank of the Morava and Bečva to Hranice and further on to the Oder valley at Bohumín. The same routing was later copied by most other projects until the formation of Czechoslovakia in 1918. **In 1873 the canal was authorized by both chambers of Vienna's parliament. In the same year the bank got a concession for the canal construction. However, the economic crisis of 1873 postponed its realization. The concession was eventually sold to the North Railway of Kaiser Ferdinand, which thus liquidated its competition. This interference proves two points: firstly, Oelwein and Pontzen's project represented an unomittable threat to the railway; secondly, the competition between the private-funded waterway and the state-favoured railway was far from being fair. It was, in fact, the first purposeful and uncompromising attack on the idea of the canal, which was to recur in different forms many more times in future.**

Vyhlídky malých průplavních člunů, převážejících 25–100 tun nákladu, mohou být názorně ilustrovány na dvou příkladech. Na prvním obrázku z 19. století je člun na Ludvíkově průplavu u Erlangen v Německu (vlečený koněm), na druhém (z prvé poloviny 20. století) podobný člun na průplavu Chesapeake & Ohio u Washingtonu v USA, vlečený mulou. Rychlé vlaky s parními lokomotivami na souběžných tratích napovídají, jaký mohl být budoucí výsledek této nerovné soutěže.

The prospect of small canal barges carrying cargo of 25–100 tons is obvious from the two examples. In the first picture from 19th century a barge on Ludwig Canal near Erlangen in Germany is towed by a horse. The second one, from the first half of 20th century, shows a mule moving a similar barge on the Chesapeake & Ohio Canal near Washington D.C. The fast steam engine locomotives running along imply a soon outcome of the unequal competition.

Drobní rejdaři provozují motorizované čluny typu péniche i na moderních vodních cestách, i když musí čelit silné konkurenci. V každém případě je nutno přiznat, že rozhodnutí ministra Freycineta před téměř 140 lety bylo prozíravé. Snímek zachycuje modernizovaný plavební stupeň na Seině v blízkosti Paříže.

Although facing a strong competition, small ship owners keep on using self-propelled barges of péniche type even today. In any case it is necessary to admit that 140 years ago Minister Freycinet made a truly longsighted decision. The photo shows a modernized dam and lock on the Seine close to Paris.

Staré francouzské průplavy, odpovídající Freycinetovu gabaritu, nabízejí komerční plavbě jen omezené možnosti. Průměrná délka zdrží na Marnsko-rýnském průplavu nedosahuje např. ani 1,8 km.

Old French canals congruent with the Freycinet's parameters offer only limited possibilities of commercial navigation. The average length of pools on the Marne–Rhine Canal does not reach 1.8 kms.


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Vplouvání do úzkých plavebních komor na síti starých francouzských průplavů klade vysoké nároky na zručnost kormidelníků.

Entering narrow locks in the network of old French canals requires top steering skills.

Konvoj lodí vplouvá do průplavního tunelu Mauvages (průplav Marna–Rýn) ve vleku za řetězovým remorkérem.

A convoy of barges enters the canal tunnel Mauvages (Marne–Rhine Canal) in tow of a chain tug.

Malé elektrické lokomotivy, používané na francouzských průplavech, nahradily původní vlek pomocí koní. V dalším vývoji v souvislosti s motorizací člunů však přestal být elektrický vlek aktuální.

On French canals the late tow horses were replaced with small electric locomotives. However, shortly following motorization of barges made the electric hauling redundant.

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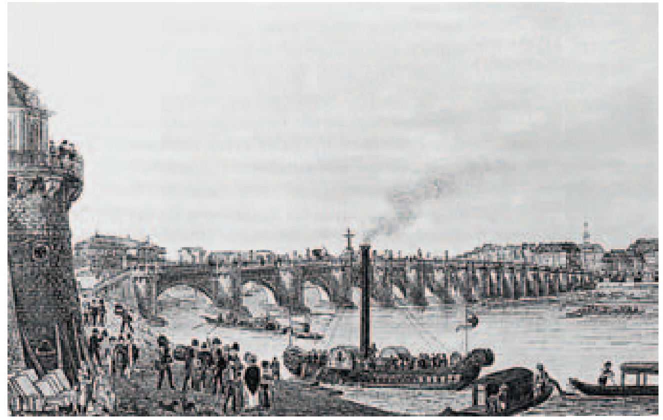
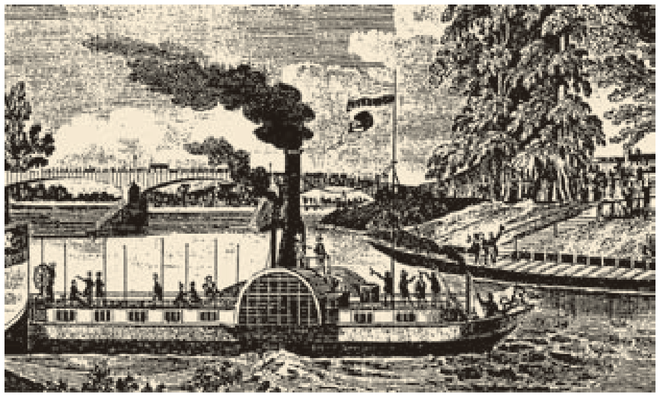
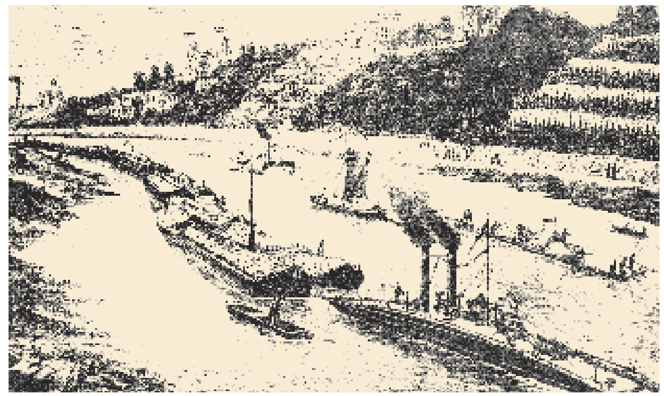


Parník „Franz I." odplouvá za velkého zájmu obecenstva z Vídně do Budapešti. Tato loď zahájila 4. září 1830 pravidelné plavby mezi oběma metropolemi na Dunaji. Vodní doprava na velkých evropských řekách se začala přece jen nesměle bránit vznikající železniční konkurenci.

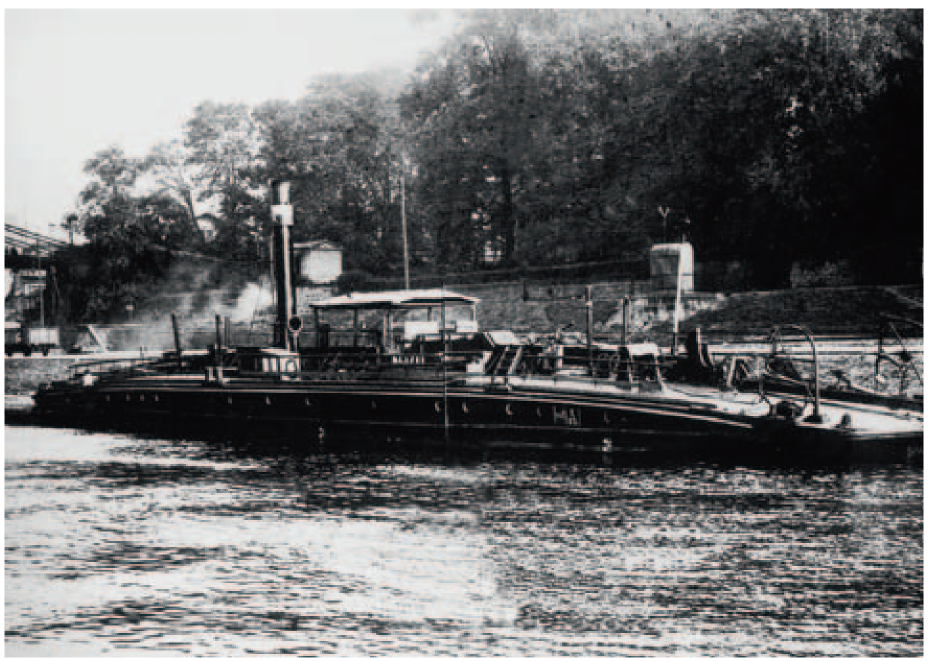
Departure of the steamer Franz I attracted large audiences. Launched on September 4, 1830, the ship operated a regular connection between Vienna and Budapest. Inland steamboat navigation of the major European rivers began to oppose modestly the railways competition.





Na horním Labi se začala rozvíjet pravidelná paroplavba o málo později. Její éru zahájil roku 1837 parník „Königin Maria". Na staré rytině je zachycen při přistání v Drážďanech.

Not much later, in 1837, the vessel Königin Maria launched a regular traffic of passenger steamers on the Upper Elbe River. The engraving captures the steamboat at landing in Dresden.



Prvním českým parníkem na Labi byla loď „Bohemia", spuštěná na vodu v Praze. Od 12. června 1841 obstarávala pravidelné spojení mezi Prahou a Drážďanami.

Bohemia became the first Czech steamer on the Elbe. Built and launched in Prague, she operated the regular line Prague – Dresden.

Řetězový remorkér se závěsem více než 10 malých labských člunů při protiproudní plavbě u Drážďan – obrázek znázorňuje situaci okolo roku 1880. Za povšimnutí stojí samotíží plující člun s pomocnou plachtou.

A chain tug tows 10 small barges upstream the Elbe near Dresden. The picture illustrates the river traffic realia of 1880s. Notice also a barge drifting downstream with an auxiliary sail.

Typický řetězový parník – „Saale 6" na Labi v Magdeburku.

A typical chain tug Saale 6 on the Elbe near Magdeburg.


1076 187 der Beilagen zu den stenographischen Protokollen des Herrenhauses. — VII. Session.

Beschluß des Abgeordnetenhauses.

Gesetz

vom . . . .

betreffend die

Herstellung eines die Donau mit der Oder verbindenden Schiffahrtscanales.

Mit Zustimmung beider Häuser des Reichsrathes finde Ich anzuordnen, wie folgt:

Artikel I.

Die Regierung wird ermächtigt, bei Ertheilung der Concession zum Baue und Betriebe eines für den öffentlichen Fahr- und Frachtenverkehr bestimmten Schiffahrtscanals von einem nächst Wien gelegenen geeigneten Punkte der Donau bis Oderberg, beziehungsweise bis an die Reichsgrenze der betreffenden Unternehmung rücksichtlich dieses Schiffahrtscanals und der zu demselben gehörigen Anlagen, wie Zu- und Ableitungscanäle, Sammelbassins, Hafenplätze sammt Zufahrtstraßen, Lagerplätze und Magazine, die nachstehenden Begünstigungen zu gewähren

a) Die Befreiung von der Einkommensteuer, von der Entrichtung der Couponsstempelgebühren, sowie von jeder neuen Steuer, welche etwa durch künftige Gesetze eingeführt werden sollte, während der Bauzeit und auf die Dauer von vierzig Jahren vom Tage der Eröffnung des Betriebes auf dem ganzen Canale an gerechnet;

b) die Befreiung von den Stempeln und Gebühren für alle Eingaben, Verträge und sonstigen Urkunden zum Zwecke der Capitalsbeschaffung, sowie des Baues und der Instruirung des Canals bis zum Zeitpunkte der Betriebseröffnung;

c) die Befreiung von den Stempeln und Gebühren für die erste Ausgabe von Actien- und Prioritätsobligationen mit Einschluß der Interimsscheine, sowie von der bei der Einlösung von Liegenschaften und Wasserrechten auflaufenden Uebertragungsgebühr.

Artikel II.

Insoweit die Anlage und der Betrieb des Canals die Anwendung des Expropriationsrechtes nothwendig macht, kann dasselbe der Unternehmung zur Herstellung des Canals und der zu demselben erforderlichen Anlagen (Artikel I) nach Maßgabe der folgenden Bestimmungen eingeräumt werden:

1. Bei der Expropriation von Liegenschaften ist in Ansehung der Beurtheilung des Umfanges der Expropriation, des Expropriationsverfahrens und der Regelung der Entschädigung nach denjenigen Bestimmungen vorzugehen, welche für die Anlage der mit Dampfkraft betriebenen Eisenbahnen gelten.

Titulní list návrhu zákona týkajícího se „Zřízení průplavu, spojujícího Dunaj s Odrou". Text začíná slovy: „Se souhlasem obou komor Říšského sněmu ukládám následující" a pokračuje nejdříve výčtem daňových a dalších úlev, jež je vláda zmocněna udělit koncesionáři, který průplav vybuduje a bude jej provozovat (příloha 187 ke stenografickému protokolu z jednání horní komory Říšského sněmu dne 28. března 1873).

"The Act of Foundation of the Canal between the Danube and Oder" begins: 'With the consent of the houses of the Imperial Assembly I impose the following…' It continues with a list of tax and other exemptions, which the government grants the concessionary that was to build and operate the canal (an appendix to the shorthand record of the Upper House of the Imperial Assembly from March 28, 1873).


1170 230 der Beilagen zu den stenographischen Protokollen des Herrenhauses. — VII. Session.

Bericht

der

Eisenbahncommission des Herrenhauses

über die

Regierungsvorlage, betreffend die Herstellung eines die Donau mit der Oder verbindenden Schiffahrtscanales.

Die Regierung legte dem hohen Abgeordnetenhause einen Gesetzentwurf zur Erbauung eines Schiffahrtscanales vor, welcher die Donau mit der Oder verbinden soll. Auf österreichischem Gebiete würde der Canal eine Länge von circa 36 Meilen erhalten, und wenn derselbe von Seite Preußens bis zur Oder fortgesetzt und außerdem auch noch die hiezu nöthigen Flußregulirungen vorgenommen würden, so würde dadurch die längst gehegte Idee, das Schwarze Meer mit der Nord- und Ostsee zu verbinden, zugleich auch mit zur Ausführung gebracht werden.

Ist es möglich, auf diesem projectirten Canale, welcher vom regulirten linken Donauufer unweit Schwechat ausgehend, durch das Marchfeld, am rechten Ufer der March bis oberhalb Napagedl, wo er die March übersetzt und an deren linkem Ufer weiter über Leipnik und Weißkirchen geführt und nachdem er die Wasserscheide zwischen Hustopetsch und Kunewald überstiegen, bis an die Landesgrenze bei Oderberg geführt werden soll, für gewisse Güter, wie Bruchsteine, Ziegeln, Holz, Erze u. s. w., welche die Eisenbahnfrachten nicht vertragen, sehr niedere Frachtsätze zu erzielen, so würde derselbe allerdings jene Länderstrecken, welche er durchzieht, in einer wohlthätigen Weise beleben und befruchten können.

Das hohe Abgeordnetenhaus hat das von der hohen Regierung vorgelegte und von hervorragenden Wasserbautechnikern des In- und Auslandes gut geheißene Project sammt dem beigegebenen ausführlichen Motivenberichte eingehend geprüft und in dem Gesetzentwurfe mehrere Aenderungen vorgenommen, welche sich zum Theile auf eine präcisere Bestimmung einzelner Punkte, theils aber auf eine größere Sicherstellung und Wahrung von Privatinteressen beziehen, welche durch den Bau des Canales geschädigt werden könnten.

Das genannte hohe Haus hat sonach diesen Gesetzentwurf mit den vom Ausschusse beantragten Aenderungen, mit denen sich auch die hohe Regierung einverstanden erklärte, in seiner Sitzung vom 28. März in zweiter und dritter Lesung angenommen.

Bez zajímavosti není ani příloha 230 ke stejnému protokolu, tj. Zpráva železniční komise horní komory, ve které se přijetí zákona doporučuje beze změn. Postoj železnice byl tedy vstřícný. Nakonec to však byla přece jen Severní dráha, která výstavbě zamezila.

The appendix 230 to the same report, i.e. Report of the Upper House Railways Committee, approves of the act with no objection. Although their attitude was accommodating then, it was the Northern Railway which later prevented the plan from its realization.

The D–O–E corridor guaranteed by law

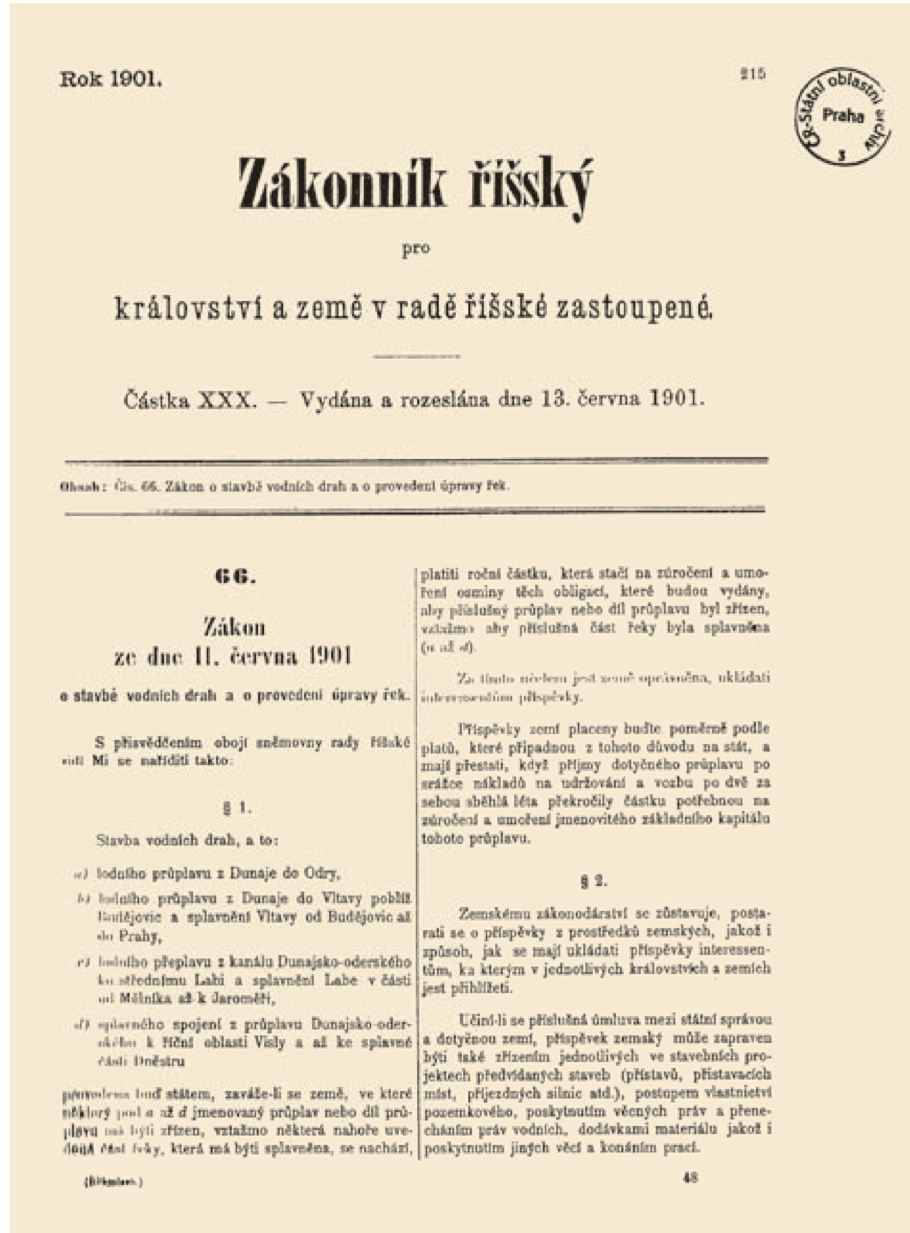
In 1893, the Ministry of Trade in Vienna established a department of research and construction of canals, which drew up a project of the Danube–Oder canal and proposed its connection to the Middle Elbe as well as to the Vistula and the Dniester. The project already took into account barges carrying 600 tons, as they dominate the Danube, Elbe and Oder of that time. The department work also more precisely outlined the orientation on a modern concept of the waterway and other concrete steps.

At the beginning of the 20th century, these activities led to political efforts for enforcement of the so-called waterways act. On March 16, 1900, a meeting of the Chamber of Trade and Commerce in Prague demanded that the Middle Elbe and the Middle Vltava were canalized, and the canal Danube–Oder–Elbe was built in order to expand the transportation infrastructure. The demand was justified by the fact that the Czech Lands would have to share construction costs of strategic railways in the Alps. In his speech from the throne at the Chamber of Deputies from February 4 of the same year, Franz Joseph I explicitly expressed the interest in navigation and faster regulation of rivers as a part of the government's political objectives. In the imperial council the deputies of the Czech National Liberal Party supported the idea of the D–O–E canal construction unambiguously; the others rather differed as their interests in canal building and river canalization clashed with concerns for land amelioration. The canal idea was then supported also by deputies of Lower Austria, Silesia and Galicia.

Development of waterways in the Czech Lands was actively advocated especially by the Czech National Liberal deputies Ing. Jan Kaftan and JUDr. Václav Šílený. They proposed to establish a fund for building canals from the budget overplus of 22 mill. crowns a year. In March 1901, in cooperation with the deputies of Lower Austria, Silesia and Galicia, they designed an outline of the canal construction and river navigability act. However, the government created their own concept of the act. After suggestion proceedings, which emphasized more profound river regulations for agricultural reasons, the waterways act was presented to the Imperial Assembly.

At the waterways act parliamentary hearing in May 29 – June 1, 1901, the Czech deputies tied their assent to construction of the costly Alps railway to acceptance of the waterways act. **After a boisterous discussion, the waterways act was eventually accepted at the voting rate of 198 : 46, while 181 deputies were absent. The Reichsrat recognized the act on June 10, 1901 after a much more matter-of-fact discussion, and it was signed on June 11, 1901.**

The estimated costs of the waterways construction, as included in the Act from June 11, 1901 "of construction of waterways and regulation of rivers", are listed in the following chart:



Rok 1901. 215

Zákonník říšský

pro

království a země v radě říšské zastoupené.

Částka XXX. — Vydána a rozeslána dne 13. června 1901.

Obsah: Čís. 66. Zákon o stavbě vodních drah a o provedení úpravy řek.

66.

Zákon
ze dne 11. června 1901

o stavbě vodních drah a o provedení úpravy řek.

S přisvědčením obojí sněmovny rady říšské vidí Mi se nařiditi takto:

§ 1.

Stavba vodních drah, a to:

a) lodního průplavu z Dunaje do Odry,

b) lodního průplavu z Dunaje do Vltavy poblíž Budějovic a splavnění Vltavy od Budějovic až do Prahy,

c) lodního přeplavu z kanálu Dunajsko-oderského ku střednímu Labi a splavnění Labe v části od Mělníka až k Jaroměři,

d) splavného spojení z průplavu Dunajsko-oderského k říční oblasti Visly a až ke splavné části Dněstru

provedena buď státem, zaváže-li se země, ve které některý pod a až d jmenovaný průplav nebo díl průplavu má býti zřízen, vzažmo některá nahoře uvedená část řeky, která má býti splavněna, se nachází,

(Biehmisch.)

platiti roční částku, která stačí na zúročení a umoření osminy těch obligací, které budou vydány, aby příslušný průplav nebo díl průplavu byl zřízen, vzažmo aby příslušná část řeky byla splavněna (a až d).

Za tímto účelem jest země oprávněna, ukládati interessentům příspěvky.

Příspěvky zemí placeny buďte poměrně podle platů, které připadnou z tohoto důvodu na stát, a mají přestati, když příjmy dotyčného průplavu po srážce nákladů na udržování a vozbu po dvě za sebou sběhlá léta překročily částku potřebnou na zúročení a umoření jmenovitého základního kapitálu tohoto průplavu.

§ 2.

Zemskému zákonodárství se zůstavuje, postarati se o příspěvky z prostředků zemských, jakož i způsob, jak se mají ukládati příspěvky interessentům, k nimž v jednotlivých královstvích a zemích jest přihlížeti.

Učiní-li se příslušná úmluva mezi státní správou a dotyčnou zemí, příspěvek zemský může zapraven býti také zřízením jednotlivých ve stavebních projektech předvídaných staveb (přístavů, přístavacích míst, příjezdných silnic atd.), postupem vlastnictví pozemkového, poskytnutím věcných práv a přenecháním práv vodních, dodávkami materiálu jakož i poskytnutím jiných věcí a konáním prací.

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Titulní list vodocestného zákona z roku 1901.

The title sheet of the Waterways Act adopted in 1901.

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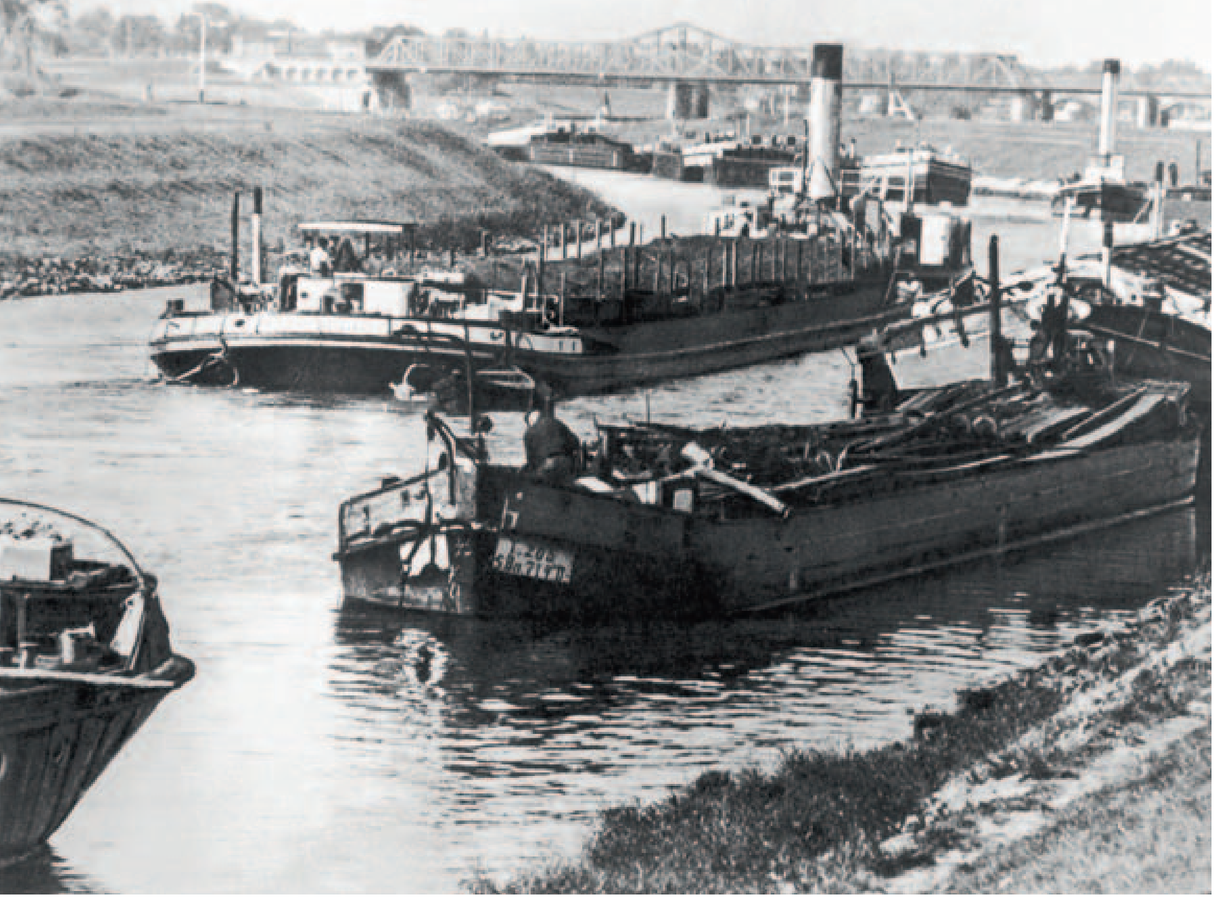
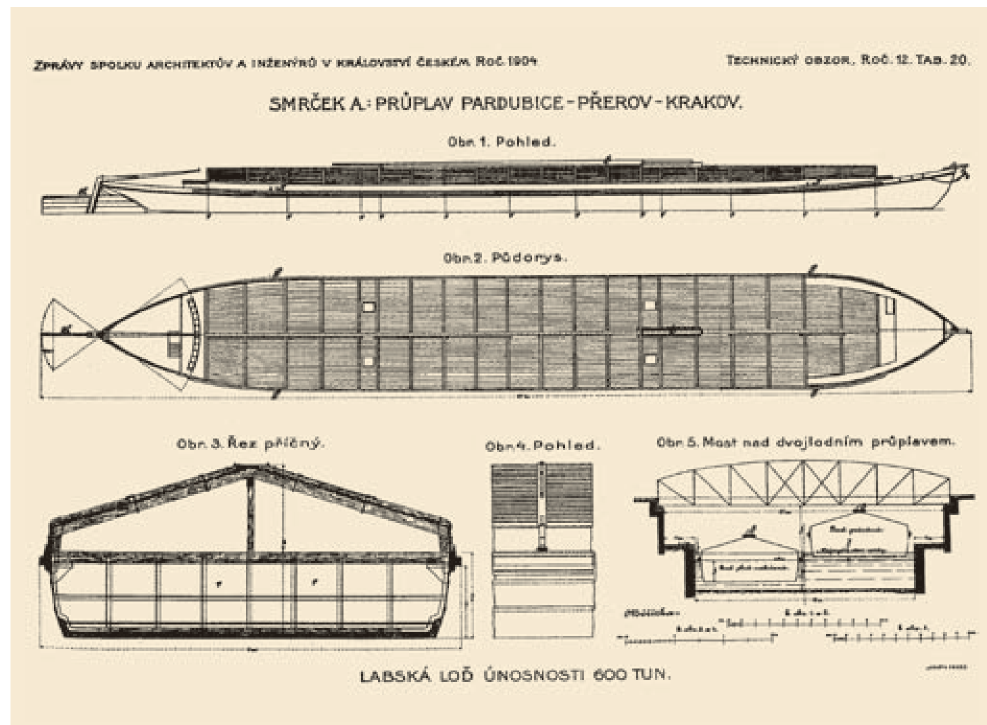


Plavební ruch na Odře ve Vratislavi v době největšího rozkvětu vlečné plavby. Většina oderských člunů neměla – na rozdíl od labských a dunajských – kryty, které byly při převažující přepravě uhlí a rud zbytečné.

The prime time of steam tugs and towed barges on the Oder in Wrocław. In contrast to the Elbe and Danube barges, the Oder ones usually sailed without hatch covers, redundant in coal and ore transportation.

Labské vlečné čluny s typickými prkennými kryty nákladních prostorů a bočnokolesový remorkér na Labi v Magdeburku – ukázka lodí, přizpůsobených dominující vlečné technologii před sto lety.

The Elbe barges with the typical planked hatch covers and a paddle-wheel steamer on the river in Magdeburg. An example of the prevailing river fleet from 100 years ago.



Generální plán labského člunu o nosnosti 600 tun. Těmto člunům, resp. stejně velkým dunajským člunům (které se lišily jen štíhlejší konstrukcí) měly být přizpůsobeny plánované průplavy v rakousko-uherském mocnářství.

General design layout of the Elbe barge carrying 600 tons. These barges (and similiar ones of more convenient water lines, which navigated the Danube), set parameters of the planned Austrian-Hungarian canals.

Waterway	Length (kms)	Estimated final costs (mill. crowns)	Costs average (crowns/kms)
The Danube–Oder canal	288,0	140,0	486 100,-
The Danube–Vltava canal between Korneuburg and České Budějovice	205,0	146,9	716 600,-
Canalization of the Vltava from České Budějovice to Prague	177,4	112,1	631 900,-
Connecting the Danube–Oder canal to the Elbe at Pardubice	188,3	129,2	686 100,-
Canalization of the Elbe from Mělník to Jaroměř	194,5	102,0	524 400,-
Connecting the Danube–Oder canal to the Vistula and Dniester Rivers	537,2	212,2	395 000,-

The waterways were designed for the Danube type of vessels of the length 67 ms, width 8.2 ms, carrying 600 tons at the draft of 1.8 m.

The chart documents some interesting interrelations. It should be noted that the largest part of the proposed waterway network was to be found in the territory of the present Czech Republic. Only its smaller parts fell to Lower Austria and Galicia of the time, only a tiny part to Silesia, or Upper Austria. **It clearly proves that Czech politicians understood well the meaning of waterways for the Lands of the Czech Crown and its economy. Purposefully – and by all means successfully – they advocated their development. It is also necessary to mention that according to contemporary estimations the average costs of the Danube–Oder canal were calculated lower than e.g. the costs of canalization of the Elbe from Mělník to Jaroměř, while the total costs differed only by 30%. The Elbe canalization up to Jaroměř had been almost completed before WWII; had it been not for the war and the following forced interruption of the waterway construction works, its realization would have been completed a long time ago (without significant demands on common budgets). Thus the often-recited clichés of "extremely costly canal" seem quite unsubstantial. The act assigned the realization of the programme to begin in 1904 and finish 20 years later.**

I při zavádění stále výkonnějších parních vlečných remorkérů nezmizely z Labe a Odry plachty. Remorkéry totiž zvládaly větší závěsy proti proudu než po proudu, takže část člunů musela poproudní plavbu absolvovat samotíží. Při tomto způsobu plavby byla pomoc větru vítaná, jak svědčí snímek z Odry (počátek 20. století).

The ever more efficient steam tugs on the Elbe and Oder towed large trains upstream. However, the manoeuvrability of the train limited the number of barges towed downstream. Numerous barges thus used an auxiliary sail to drift downstream. The photo shows a skilful use of wind power on the Oder at the beginning of 20th century.

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The construction works were to be carried out by the state under the condition that the country of the site would share the building costs with one eighth of the sum needed for the interests and debentures amortization issued for the construction purposes. The contributions were to be paid proportionally according to the payments falling on the state; the system should remained in operation until the time when the waterway income (after the maintenance and operations costs of two successive years have been subtracted) exceeded the interest bearing amount and the depreciation of the fixed capital of the waterway.

The contributions could be also settled by covering costs of the supporting constructions like ports, embankments, communications etc., by assignment of estate and land ownership, as well as water rights, by material supplies, and providing other things or services.

The Act counted on a single work management, which was to be advised by a board of professionals and others, interested in the canal. Half of the advisory board would be appointed by the government, the other half by the concerned land committees. The board membership should take into account the interests of the trade, industry and commerce, as well as those of agriculture, forestry, and work force.

The act authorized the government to determine the final conduct and technical design of the waterway construction. Any variation of the original programme was only allowed in the form of a new act, and only after having heard out all committees of the concerned lands.

Authority of completed waterways was to be granted to the state. The same should assign and collect dues and charges for using the waterways and the adjacent premises. The charges should especially reflect needs and concerns of a local production with an appropriate rate adjustment.

The Act also counted on regulation of all innavigable rivers, which constitute a single waterway network with the waterways in construction, and which are essential either for supplying the waterways with water, or for the floating solids, which they bring to the navigable sections. Their regulation was to start by the set out of the canal construction the latest. In addition, by a special law, the state would raise its contribution to the melioration fund.

The construction works were to employ local people as well as the local industry.

The act enabled covering of the waterway construction costs from an accepted loan, and authorized the government to draw maximum of 250 mill. crowns every year from 1904 to 1912, 75 mill. out of which could be used for the related regulations.

The Ministry of Trade was to carry out the Act. At every construction opening a minister of trade, in accordance with a minister of the interior would appoint trade supervisors to overlook the respective construction, excavation or water operations.

To achieve the objectives determined in the Waterways Act, other legal regulations were adopted, namely the Regulation of the Ministry of Trade from October 11, 1901, which established the Directorship for Construction of Waterways and the Waterway Advisory Board. **The directorship started its work in 1902 and sited in Vienna. Later its branch offices open also in Prague (1903), Cracow (1905) and in Přerov (1907).** The directorship had a technical and an administrative departments, which together were supposed to prepare and carry out the waterway construction. They could establish special building managements controlled by distinctive regulations.

Ředitelství mělo technické a správní oddělení, jimž příslušelo společně připravovat a provádět stavbu vodních cest. K tomu mělo možnost zřizovat podle potřeby zvláštní stavební správy s působností upravenou zvláštními předpisy.

By the rule of the above-mentioned regulation the Waterway Advisory Board was founded on February 4, 1902. It was to submit reports and propose independent projects related to construction and operation of the waterways. 20 of the board members were appointed the concerned land committees: the Czech, Galician, Moravian and Lower Austrian Land Committee appointed 4 members each, the Upper Austrian and Silesian ones 2 members. Another 20 were appointed by the minister of trade in accordance with the other concerned ministries. Trade supervisors appointed by the minister of trade were also members of the board. Each member was to have their substitute.

The Directorship for Construction of Waterways drew up a building programme for the first stage (1904–1912) with the budget of 185.3 mill. crowns. They assigned a number of studies concerning vessel types, canal cross-sections, types of locks, bridges, aqueducts, and they carried out a lot of fieldwork. The international competition to design a 36 metre boatlift at Újezd (south from Přerov) was one of the significant events of the preparation procedures, announced on April 30, 1903. Although later, the idea of the high lift was abandoned in favour of smaller locks, the "Přerov competition" has kept its all-European (if not world-wide) significance for the progress in the waterway building engineering. The following chapter is dedicated entirely to this event.

Unfortunately, the actual observance of the plan set out by the Waterways Act fell rather short of the original expectations. The main reason of the modest results is to be seen in its politicized character: it was mainly a compromise in exchange for votes of the Czech deputies supporting the Alps railway realization. On December 11, 1911, when the railway project was already completed, the Vienna government officially abandoned the waterway development programme previously guaranteed by the Waterways Act. Instead they came up with an extensive project of river regulations. It included the Alpine lands, already fitted with their railways. Their construction was paradoxically allowed through the support connected with passing of the abandoned Waterways Act concerning mainly the Czech Lands. The Moravian Land Assembly did not agree to the proposal and insisted on realization of the Danube–Oder canal and river regulations as agreed in the Waterways Act. The Czech deputies of the Imperial Assembly in Vienna did not agree either. Prof. Ing. Antonín Smrček spoke on behalf of all the Czech deputies from Moravia at the meeting of March 28, 1912. In accordance with the Moravian Land Assembly resolution from March 9, 1912, he called for immediate pursuit of the waterway construction as agreed in the act from 1901. In the end, the government proposal did not pass and the construction of waterways could continue. However, the on-coming First War interrupted all the works. The consecutive breakup of the Danube Monarchy then shattered all legal norms and regulations passed in the time of its existence.

Nevertheless, it would be unfair not to list at least the modest results of the plan realization. Still in the time of the monarchy, some locks and dams of the Middle Elbe between Mělník and Jaroměř were prepared and built (locks and dams in Hadík, Obříství and dam in Hradec Králové). Others were under construction and later finished in the first years of the Czechoslovak Republic, like locks and dams in Lobkovice, Kolín, Poděbrady and in Nymburk (to be precise, we should mentions even the dam in Předměřice above Hradec Králové, which broke down in 1932 and had to be rebuilt later). Especially interesting is to compare them with the locks and dams on the Lower Elbe (their construction was guaranteed by a previous programme of the Committee on canalization of the Elbe and the Vltava in Bohemia). In the latter case, collapsible dams with frames and needles (or shutters, respectively) were built (perhaps even for economic reasons), although they were operation-intensive and did not allow winter navigation. The projects carried out within the Waterways Act, on the other hand, used modern compact constructions, which – with few exceptions – have worked until today. Thus, the Waterways Act introduced also qualitative changes to the waterway engineering. Moreover, some of the top architects of the time carried out design of the individual projects.

Parní kolesové remorkéry, které představovaly špičku technického vývoje v době bojů o vodocestný zákon, dosluhovaly ještě v šedesátých letech 20. století, jak svědčí snímek německého remorkéru, proplouvajícího Děčínem na Labi. Historie se však v té době již ubírala jinými cestami.

Paddle-wheel steamers represented the top end of technological progress during the fights over the Waterways Act. They served on till 1960s as you see in the picture of a German tug passing through Děčín on the Elbe. However, the history then went quite elsewhere.

Souběžně s výstavbou plavebních stupňů se již na vodních cestách v bývalém Rakousko-Uhersku začala uplatňovat sdělovací a informační technika, tj. „vodní linky“. Byl to jistě pokrok, byť ze současného hlediska budící nejspíše úsměvy.

Along with the construction of locks and dams, the Austrian-Hungarian waterways were fitted with communications technologies called “water lines”. In the light of today the technology victories of the time may seem a little pettish.

Výstavba plavebních stupňů na Labi v letech 1901–1917

Construction of locks and dams on the Elbe River (1901–1917)

Zakládání vodní elektrárny u stupně Nymburk.

Power station at Nymburk – foundation works.

Hotový jez s vodní elektrárnou v Nymburku (vlevo) a plavební komorou (vpravo) je příkladem modernějšího přístupu k výstavbě. Místo jezu se sklopnými slupicemi byl již zřízen tabulový jez systému Stoney.

The completed Nymburk dam on the Elbe with a powerhouse (left) and a lock (right) – an example of a new construction concept: solid lifting gates (the system Stoney) substituted collapsible frames.

Staré (již neexistující) zdymadlo v Hadíku na Labi nad Mělníkem.

The former lock and dam in Hadík on the Elbe near Mělník.

Betonáž dna velké (vlakové) plavební komory v Dolních Beřkovicích.

The large main lock at Dolní Beřkovice adapted for trains of barges – finishing of the concrete bottom.

Téměř dokončené plavební komory v Dolních Beřkovicích v roce 1905.

The nearly finished locks in Dolní Beřkovice in 1905.

Pohled na dokončené plavební komory v Dolních Beřkovicích (1907).

A view of the completed locks in Dolní Beřkovice (1907).

Jímka středního pole jezu v Dolních Beřkovicích (1907).

A cofferdam of the middle dam opening in Dolní Beřkovice (1907).

Montáž slupic středního pole jezu v Dolních Beřkovicích (1907).

Mounting of frames in the middle dam opening at Dolní Beřkovice (1907).

Dokončený hradlový jez v Dolních Beřkovicích (1907).

The completed dam with frames and needles in Dolní Beřkovice (1907).

Hradlový jez v Dolních Beřkovicích v zimě.

A winter view of the dam with frames and needles in Dolní Beřkovice.

Stavění i vyhrazování hradlových jezů bylo velmi pracné (Dolní Beřkovice, 11. března 1908).

Frame raising at Dolní Beřkovice on March 11, 1908. Raising of collapsible frame dams was extremely difficult.

Hradlový jez v Dolních Beřkovicích sloužil až do roku 1972.

The dam with frames and needles in Dolní Beřkovice remained in operation until 1972.

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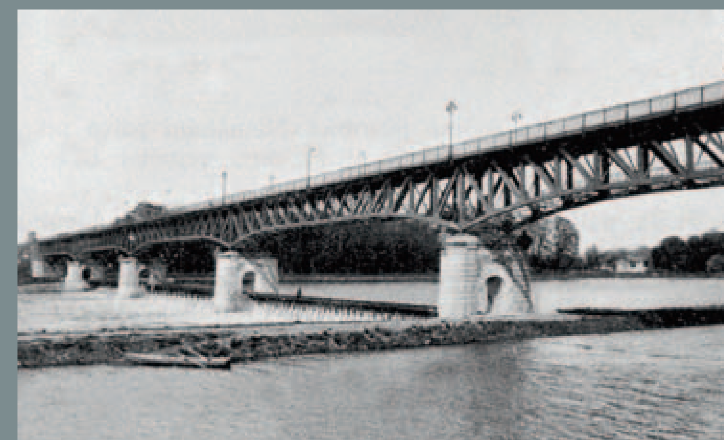
Výstavba plavebních stupňů na Labi v letech 1901–1917

Construction of locks and dams on the Elbe River (1901–1917)



Zkouška sklápění slupic hradlového jezu ve Štětí (1906).

Trial lowering of frames at the dam with frames and needles in Štětí (1906).

Hradlový jez ve Štětí s Dénilovým rybovodem.

The dam with frames and needles in Štětí equipped with a Dénil fish ladder.

Hradlový jez ve Štětí z horní vody (1909).

A downstream view of the dam in Štětí (1909).

Výstavba plavebních komor v Roudnici nad Labem (1909).

Construction of locks in Roudnice on the Elbe (1909).

Těměř dokončené plavební komory v Roudnici nad Labem (16. dubna 1910).

The nearly completed locks at Roudnice on the Elbe (April 16, 1910).

Dokončený hradlový jez v Roudnici nad Labem (1912).

The completed dam with frames and needles in Roudnice on the Elbe (1912).

Hradlový jez ve Štětí z dolní vody (1909).

An upstream view of the dam in Štětí (1909).

Celkový pohled na zdymadlo ve Štětí.

A general view of the locks and dam in Štětí.

Hradlový jez ve Štětí sloužil až do výstavby nového jezu v roce 1970.

The dam with frames and needles in Štětí remained in operation until 1970 when replaced.

U jezu v Českých Kopistech byla použita ve dvou jezových polích hradla, v jednom stavidla.

The dam in České Kopisty with three openings: two of them fitted with needles, the latter one with shutters.

Vztyčené slupice hradlového jezu (systém Schwarzer) v Lovosicích (29. září 1914).

Raised frames during the construction trial of the system Schwarzer needle dam in Lovosice (September 29, 1914).

Jezy na Labi byly až do dvacátých let doplňovány i vorovými propustmi – např. jez v Lovosicích.

Until 1920s the River Elbe dams were fitted with raft sluices – like the dam in Lovosice.

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Přerov competition

Going back in time to the competition in 1903 is actually not a trip to history. The above-mentioned Přerov competition of the best canal lift design became an inspiration for projects, which outran their time by many decades, and some of them were fully appreciated only today. Let us first specify the term boatlift, which may not be too common. Along with the lock – which invention literally marked the beginning of the real canal history – there is another way of lifting and lowering the vessel to overcome high elevation differences. It is not based on filling and emptying of a lock chamber, its principle being rather mechanical. To be precise, the category of boatlifts should include even the earlier-mentioned slipways, which would make the boatlift mechanisms older than the lock chamber system. Nevertheless, we will not be precise as that and assume that the modern canal lift only appeared when its inventor cleverly applied Archimedes Principle, i.e. that an object immersed in a fluid experiences a buoyant force equal to the weight of the displaced fluid. In other words, it is more convenient to lift or lower a caisson filled with water – with a boat or without it – than the actual boat. Thus, the caisson weight remains the same all the time and could be appropriately balanced. Therefore, for both lowering and lifting of the caisson, only a slim force is needed to overcome the mechanical friction on either vertical or inclined trail. Quite paradoxically, less force is needed to operate a boatlift designed for vessels carrying hundreds or thousands of tons than for a regular lift in a block of flats. According to the above-described principle, the first design of a modern vertical boatlift was probably drawn by James Anderson, who published a project of such a double boatlift in Edinburgh in 1794. The solution dealt with two mutually balanced caissons hung on conjoint ropes led through pulleys. After less successful experiments with the system at Targebigge, England, its first successful implementation occurred on the Grand Western Canal (England) in 1834–1867. There were 7 boatlifts built on the canal, although only for vessels carrying 8 tons. In the following years the number of canal lifts kept increasing, however, they remained rather rare when compared to the locks. By the end of 19th century, 31 of them were in operation.

Nevertheless, they proved suitable even for rather large vessels, and especially convenient for big elevation differences, when they easily substituted a cascade of several locks. At the outbreak of the 20th century, the carrying capacity of lifted vessels had caught up with the lock system, and outdone it in terms of the overcome rise. As an example, we can point out the vertical flotation boat lift at Henricheburg on the German canal Dortmund–Ems; it was designed for barges carrying up to 700 tons, while overcoming the elevation difference of 16 ms. Finished in 1899, it worked faultlessly for 64 years and today – next to a parallel, more sophisticated navigation device – it is a historical sight. In its time, it was certainly a progressive and very new solution, setting example for other designers.

Therefore, the Přerov competition was quite understandable. To overpass the 36-m difference at the Přerov lock and dam for the same vessels as in the case of Henrichenburg – that meant a world record. Without a lift, the waterway would have need 4–6 closely-consecutive locks, all built with the top fall of the time.

The competition was generously funded indeed. The Minister of Trade, laird Gall kept in mind the success of other competitions – for the best locomotive for the line Manchester–Liverpool from April 20, 1829: the prize of 6,000 florins went to the excellent locomotive of George Stephenson. Also, the Semmering mountain locomotive design, treated in the international Vienna competition from April 23, 1903, promised attractive prizes of 100,000, 75,000, and 50,000 K.

The Minister appointed following members of the international jury:

1) Wilhelm Ast, a k.k. court councillor and construction director of the North Railway of Kaiser Ferdinand in Vienna.

2) Armand de Bovet, a vice-president at Société francaise de navigation et des constructions navales, administrateur délégué at Société générale de touage er remorquage in Paris.

3) Rudolf Doerfler, a k.k. court counsellor, a professor of engineering at k.k. German Technical University in Prague.

4) Leveson Francis Vernon-Harcourt, a professor of civil engineering at the University College in London.

5) Alexander Hermann, a head construction counsellor of the Royal Prussian Canal Administration in Münster.

6) Karel Hochenegg, a k.k. head construction counsellor and professor of electrical engineering at the k.k. Technical University in Vienna.

7) Dr. Alois Riedler, a royal chamber government counsellor, member of the Prussian House of Lords, professor of engineering at the Royal Prussian Technical University in Berlin.

8) Sigmund Taussig, a k.k. court counsellor, construction director of the Port Construction Department at the Danube Regulation Committee in Vienna.

9) Albert Vojtěch Velflík, a professor of bridge and railway construction engineering at the Czech Technical University in Prague.

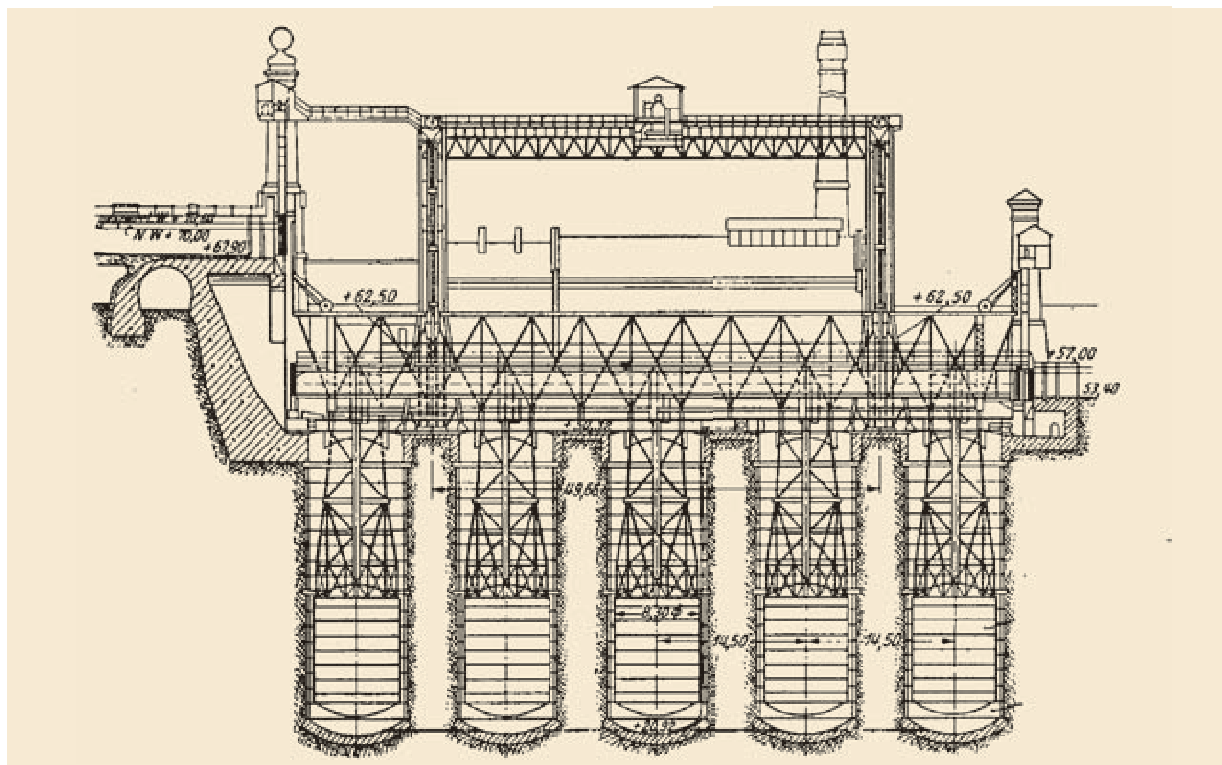
From the lecture of Prof. Albert V. Velflík
at the Association of Architects and Engineers in the Czech Kingdom
on November 25, 1904

Soudobá kresba pokusného lodního zdvihadla u Tardebigge (Worcester & Birmingham Canal). Zdvihadlo bylo uvedeno do provozu v roce 1808.

A contemporary drawing of the experimental boatlift at Tardebigge (Worcester & Birmingham Canal). The lift came into operation in 1808.

Plovákové lodní zdvihadlo Henrichenburg na průplavu Dortmund–Ems v Německu, uvedené do provozu v roce 1899, bylo určeno pro lodě o nosnosti 700 tun. Sloužilo 70 let. Dnes nahrazuje jeho funkci nové zdvihadlo a paralelní plavební komora. Staré zdvihadlo je konzervováno jako technická památka.

The flotation canal lift Henrichenburg on the Dortmund–Ems Canal in Germany. Since 1899 it was used for barges up to 700 tons. 70 years later it ceased its service in 1970 and was declared an industrial monument. The present day traffic uses a new lift and a parallel lock.



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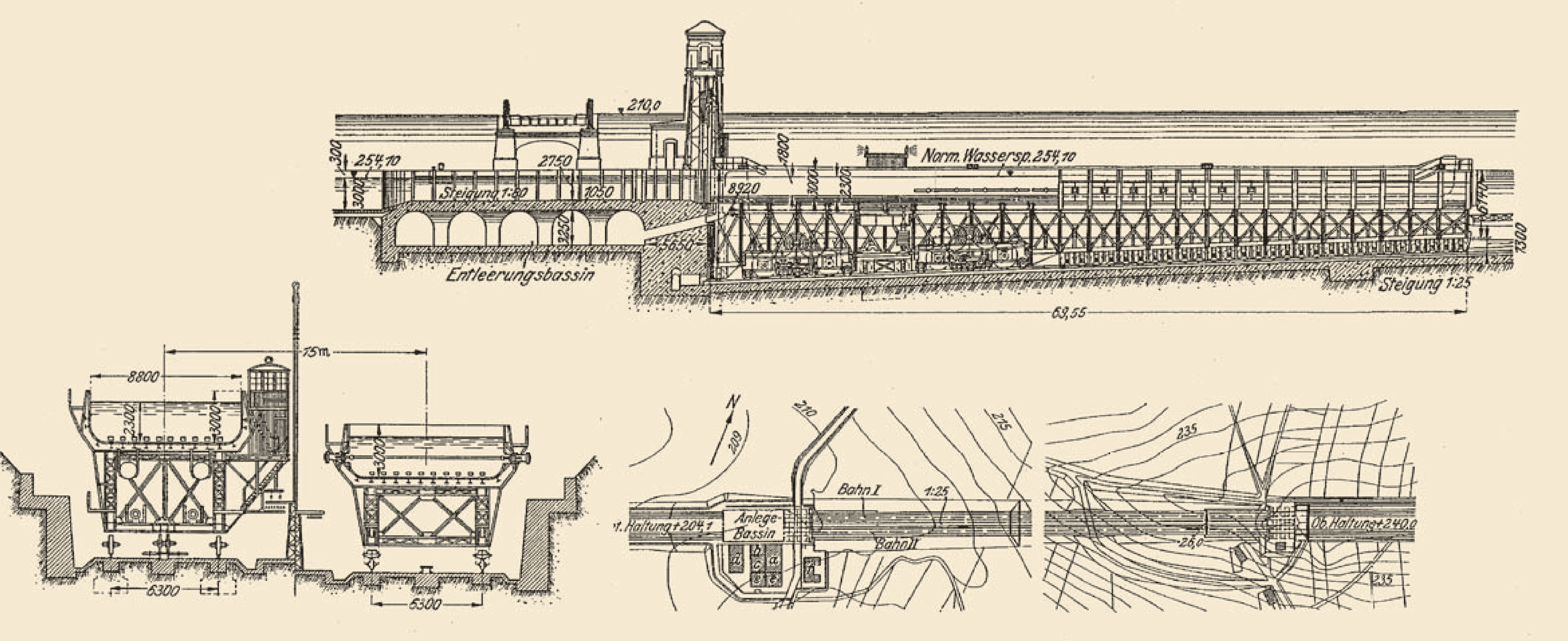

Vítězný návrh přerovské soutěže – dvojitá lodní železnice „Universell“ – přinesl svým autorům odměnu 100 000 K.

The winning design of the Přerov competition – the inclined two-track plane „Universell“ designed for the Danube–Oder Canal – earned the authors 100,000 K.

The worthiness of the competition is clear from the line-up of the international jury: it included almost all the top European experts, who had ever meant anything in the waterway development. The prize money amount corresponded fully with the interest: 231 competing designs entered the competition. Their authors were using all currently recognized principles of overpassing such a high fall, as well as entirely original solutions and never-tested ideas. There were vertical and inclined boat lifts counting on the caisson being moved along the rails (inclines), so called “boat railways”. Some experts proposed to substitute the boatlift with and extremely high lock, equipped with variously arranged saving basins, which were less water volume demanding in the process of locking. According to the decision of the international jury, the first prize was awarded to the project of the inclined two-track plane by five Czech machinery factories, which entered the competition under the name Universell. Both of its caissons ran its own track with a 4 % incline. They were electrically – not mechanically – counterbalanced. The second prize went to the project of a rotating cylindrical lift Habsburg, submitted by the association of Austrian and German authors. The third prize was not awarded, however, the jury suggested to the Ministry a buyout of several designs and some special prizes.

In the course of the following design works, the idea of a high-rise solution at Přerov was eventually abandoned and the attention concentrated on a lock solution, which divided the fall into reasonably high locks and dams.

Nevertheless, the Přerov competition was far from useless. First of all, it drew attention to certain advantages of lifts. The eventuality of their use kept re-appearing throughout the following hundred years of investigating options for the D-O-E connection as it kept provoking designers to seek more optimal solutions. It is quite certain that it became an important milestone in the evolution of world hydrotechnical constructions, as some of the progressive competing designs were executed in other place and time, often decades after the actual competition. The winning project of the inclined two-track plane was a clear inspiration for the inclined plane Ronquiéres on the Charleroi–Brussels Canal in Belgium. Finished in 1968, it was designed for larger vessels carrying up to 1,500 tons, also its fall is quite large: 68 ms.

The caissons of the Belgian track are balanced mechanically – each is connected to its own counterweight with a rope. The principle of electrical counterbalancing got its use at the Krasnoyarsk incline on the Yenisey, which is even closer to original of the winning project. It works vessels carrying up to 2,000 tons. By coincidence, it was

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Šikmé lodní zdvihadlo Ronquièˆres v Belgii pro lodě o nosnosti 1500 tun bylo dokončeno v roce 1968 a nezapře svůj vzor v lodní železnici „Universell“ z přerovské soutěže, která proběhla o více než půlstoletí dříve.

The inclined two-track inclined plane for barges up to 1,500 tons at Ronquirèˆs in Belgium, completed in 1968, features direct links to its model project „Universell“ – the Přerov competition winner of half a century prior.

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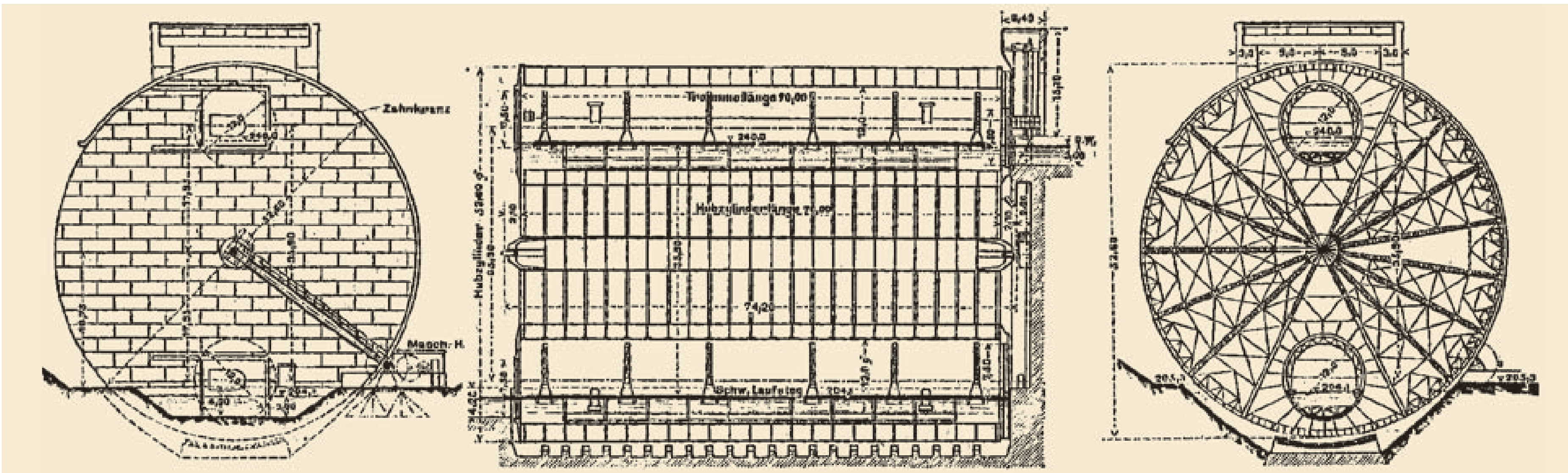
completed also in 1968. It surpassed a fall of little more than 100 ms. At the same time the principle was used at the inclined plane of the dam Orlík on the Vltava River, designed by Ing. Libor Záruba. In this case, only concrete foundations were carried out; the unfinished incline was intended for vessels carrying up to 300 tons.

The second awarded project have not been forgotten either. The rotating lift with a robust cylinder floating in a special basin inspired the company MAN, which in 1906 registered for the competition treating a design of the canal lift Niederfinow on the Havel–Oder Canal, which incidentally dealt with the same rise as Přerov. The canal designers then decided for a flight of four locks, while leaving enough space for later lift solution to be built as a parallel navigation device. This lift was eventually raised in 1934, although the rotating principle was not used, as the designers preferred a vertical lift with counterweights, i.e. a well-proven, largely popular type. The rotating lift finally premiered in Scottish Falkirk in 2002. "The Falkirk Wheel" surpassing the difference of 25 ms, is designed for small vessels. Its two caissons are not in a floating cylinder, but in robust rotating arms, so that all the construction weight and weight of the water in caissons (approximately 14,000 tons) transfers to two bearings. The lift was constructed under Millennium plans for reconstruction of old canals in order to support tourism and economy of the adjacent regions. The Queen Elizabeth II herself opened the facility, so the authors of the project could show off this slightly extravagant engineering and design wonder.



The Přerov inspiration could be easily traced even in the designs of locks with storey-arranged saving basins (Minden, 1915 or Anderten, 1928, both on the Central Canal; Uelzen on the Elbe Lateral Canal, under construction, etc.). The competing project registered as "Magnetkraft" offers far the most bizarre context. It counted with a boat railway, which caisson was not trailed along on a complicated truck; it was meant to slide along a rather steep slope of 10 % with the help of electromagnets. The principle of today's high-speed railways moving on the electromagnetic "cushion", like the system Transrapid, was actually proposed 100 years ago in order to treat an engineering solution of a waterway.

A number of proposed projects dealt with vertical lifts with counterweights. Today, such type is the most commonly used construction surpassing high elevation differences especially in case of larger vessels. At that time, though, the solution did not impress the jury much. Quite paradoxically, the competition for the design of a canal lift at Přerov, and thus the D-O-E project, have contributed tremendously to the development of waterway constructions worldwide while the project itself has never been realized.

Návrh otočného lodního zdvihadla, který získal v přerovské soutěži druhou cenu a odměnu 75 000 K, byl podán pod heslem Habsburg.

A design of a rotating cylindrical lift (registered as Habsburg) awarded the second prize and 75,000 K in the Přerov competition.

Nové otočné lodní zdvihadlo ve skotském Falkirku bylo dokončeno v roce 2002, tedy téměř za 100 let od podání návrhu pod heslem Habsburg. Od tohoto návrhu se liší jednak tím, že nevyužívá efektu plovoucího bubnu, který by funkci značně zjednodušil, jednak mnohonásobně menší velikostí proplavovaných lodí.

The Falkirk Wheel in Scotland was completed in 2002, i.e. nearly 100 years after the Přerov competition where the rotating lift Habsburg was registered. Unlike its model it does not use a floating cylinder, and was designed for pleasure boats of much smaller dimension.

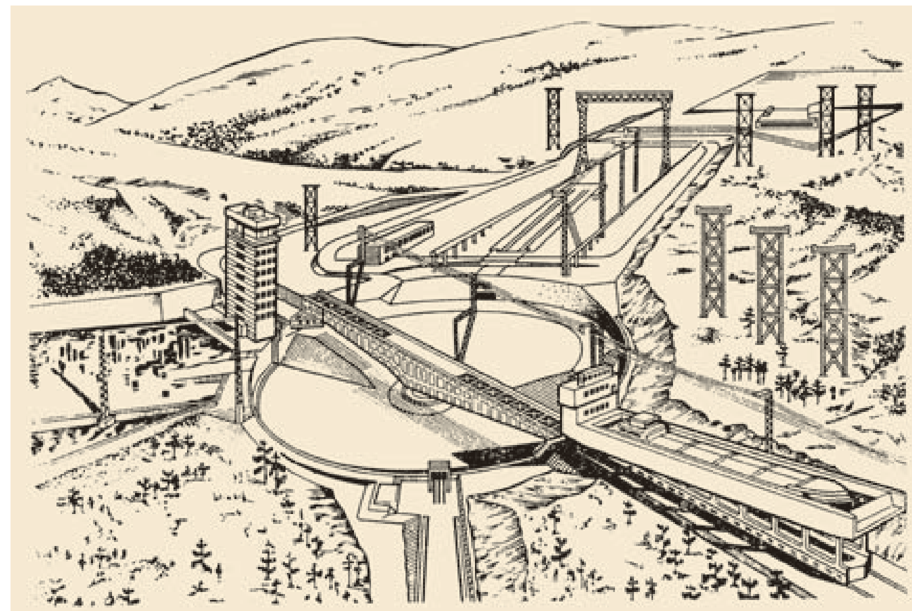


Schéma šikmého lodního zdvihadla Krasnojarsk na Jeniseji s točnou na vrcholu dráhy, které bylo dokončeno v roce 1968. Zřízení točny a sestupné dráhy si vynutilo silné kolísání horní hladiny.

A draft of the inclined plane at Krasnoyarsk on the Yenisey River with a turntable at the summit of both trackways, completed in 1968. The solution handled significant water level fluctuation in the upper reach.

Šikmé lodní zdvihadlo na Jeniseji v Krasnojarsku převzalo z vítězného návrhu přerovské soutěže princip elektrického vyvážení. Je určeno lodím o nosnosti 2000 t. Překonávaným spádem 101 m je nejvyšším zdvihadlem tohoto typu na světě.

The inclined plane of Krasnoyarsk Dam was inspired by electrical balancing of the „Universell" incline from the Přerov competition. Designed for vessels of 2,000 tons, with the rise of 101 ms, it is the highest incline in the world.

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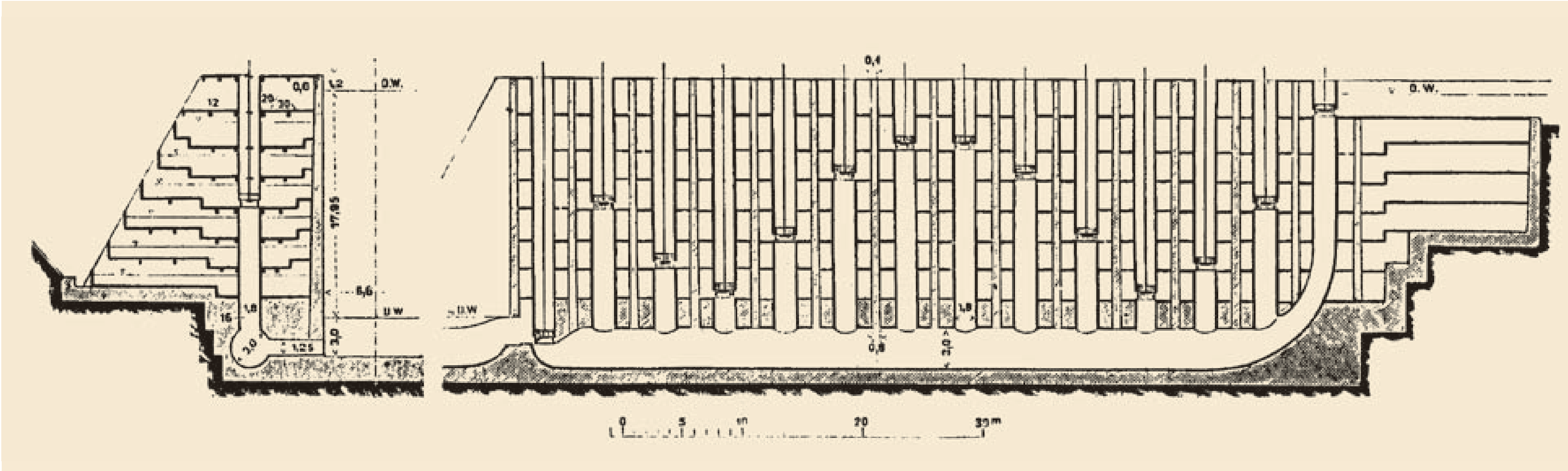

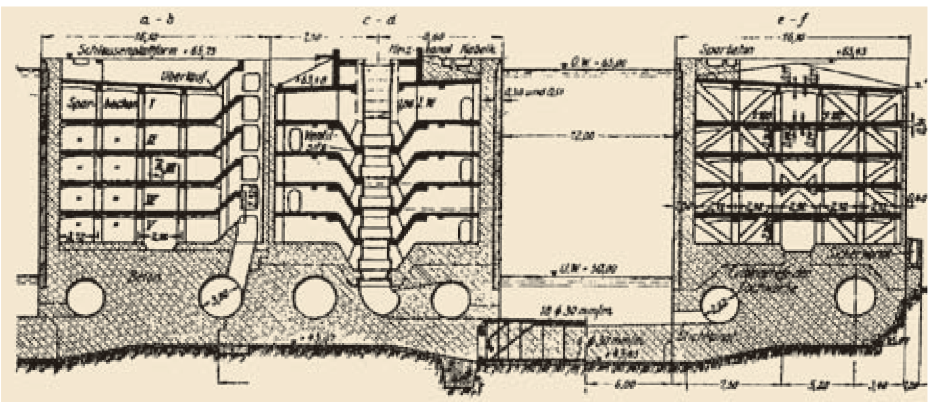

Návrhu, podanému v přerovské soutěži pod heslem „Pourquoi vouloir faire aller les bateaux sur les rails?“ (Proč bychom měli nutit čluny, aby jezdily po kolejích?), vyslovila porota pouze zvláštní ocenění. Nejedná se vůbec o lodní zdvihadlo, nýbrž o mimořádně vysokou plavební komoru s etážovými úspornými nádržemi. Dnes bychom jej cenili nejspíš daleko příznivěji, neboť jeho autoři správně vycítili, že správnou cestou vývoje lodní železnice nebudou.

The design registered in Přerov as "Pourquoi vouloir faire aller les bateaux sur les rails?" [Why should the barges be made to ride the rails] was not a boat lift as such but a very high lock with storey arranged saving basins. It was awarded a special prize of the jury. The design would be probably more appreciated today, as the authors' instinct to abandon inclines has proved correct in the future development.

Plavební komory s etážovými úspornými nádržemi Anderten na Středozemním průplavu v Německu jsou nesporně poplatné návrhu, podanému v přerovské soutěži pod heslem „Pourquoi vouloir faire aller les bateaux sur les rails?“ Plavební komora byla dokončena roku 1928.

A cross section of the Anderten lock with storey saving basins in Germany (Central Canal) featuring clear inspiration in the design registered in Přerov as "Pourquoi vouloir faire aller les bateaux sur les rails?" The lock was completed in 1928.

Pohled na dvojitou plavební komoru Anderten na Středozemním průplavu. Nad úroveň horní plošiny vystupují jen strojovny uzávěrů úsporných nádrží, které jsou běžnému pozorovateli zcela skryty.

A view of the double-lock of Anderten. The upper deck shows machinery rooms with a device controlling cylindrical valves of saving basins, otherwise hidden to the nonexpert eye.

Destiny of the Waterways Act in Czechoslovakia

Right after the new Czechoslovak Republic was established, no significant legislative changes related to the realization of Danube–Oder–Elbe took place, as the new republic mostly accepted the respective legal regulations. At first, only slight competence adjustments appeared: development of waterways became a competence of the Ministry of Public Works, the former Prague branch office of the Viennese Directorship for Construction of Waterways became the Directorship for Construction of Waterways itself.

The generous programme of waterway development enacted in the Waterways Act from 1901 was supposed to continue even under the new political establishment. However, it went on rather incoherently. The individual water projects were being built without outer or mutual continuity and according to casual political pressures. **The technical solution of the D-O-E waterway drew on the previously proposed routing with one difference: the Danube join-point was no longer planned close to Vienna but rather at Devín. Thus, the routing thoroughly respected the Czechoslovak territory and remained independent on Austria. At this transitional stage, a new legal regulation was being prepared in order to substitute the imperial Waterways Act. Such regulation had not appeared until June 11, 1919, when the Act n. 33 was adopted on competences of waterway constructions, and later the Act n. 50/1931 from March 27, 1931 on the state fund for making rivers navigable, construction of ports and reservoirs, and for waterpower utilization.**

According to the act from 1931, a state fund was established at the Ministry of Public Works, which was to provide for works and constructions concerning navigability and canalization of namely stated rivers, development of ports and reservoirs, as well as other constructions intended fully or partially for waterway purposes, or for purposes of waterpower utilization in terms of constant electrification of the country, river regulations etc. The act treated rules of fund operations, level of amounts at its disposal, as well as the way each land will contribute to the costs of construction works carried out on their territory. The act determinated that in 1931–1942 the state is to present the fund with 70 million crowns.

Since 1931 the fund was supposed to receive a complete water power tax from the water projects, which had been built by the state, or with its support, which were to be built from this fund, with its participation or support, half of the water power tax from all the other water projects, and contributions of lands, regions, municipalities, coops and interested subjects.

In order to carry out its tasks, the fund was allowed to contract a loan of 948 mill. crowns in approximate yearly amounts of 79 mill. in 1931–1942, which was secured by the state.

Since 1931 until the final redemption of the loan, the fund was entitled for gross proceeds of water management construction operations and works, carried out by the state or the fund, and also proceeds of allotments, properties and rights obtained in order to realize such constructions, increases and other proceeds of the fund assets, as well as donations, bequests and other voluntary contributions to the fund. The money, which were not used in the respective year were to stay in the fund and their increase to be passed on the fund. On the day of the act legislation (January 1, 1931), all other acts, regulations, and orders, which did not comply with the act, were abated.

An important change from the Waterways Act of 1901 was the fact, that the act of 1931 only treated "preparation works for artificial waterways", i.e. for preparation works of canals, but not for their realization. Thus, the whole project of the Danube–Oder–Elbe waterway was basically sidetracked since the whole waterway was meant to be tackled as an entirely artificial canal. According to then common opinions, the Morava and Oder, both flatland rivers, were considered not able to become navigable, as their even streams do not allow construction of higher locks and dams. Consequently, almost all the money went to navigability works on the Elbe and Vltava Rivers. To be fair, we ought to mention construction of the lock and dam at Koblov on the Oder, which belonged to the canal route and was realized in 1934–1937 according to the act of 1931. A memorial plaque at the dam said that it was 'the first lock and dam on the Danube–Oder canal'. The dam does not exist any more as in the times of frenetic socialist building of bright future, it was damaged by reckless mining so much, it had to be taken down.

However, concentration of all financial support on the Elbe and Vltava had some positive, although indirect, effect on the D-O-E project. First, it allowed continuous work on the Middle Elbe, which in the stretch Mělník–Pardubice represents an access route to the actual canal. In the brief time between the wars, this section featured 7 locks and dams under construction, which were completed shortly afterwards: at Přelouč, Kostelec nad Labem, Brandýs nad Labem, Lysá nad Labem, Kostomlátky, Srnojedy and Čelákovice. The lock and dam Klavary was nearly finished as well. In the section of Hradec Králové, the dam Smiřice was established; at the same time the lock and dam at Střekov on the Lower Elbe was built, which completed canalization of the section. Also the Hradištko lock and dam construction began to be finished only during the war.

Secondly, it was proved that realization of modern waterways could proceed continuously and at remarkable pace. Had the investment resources been targeted on the stage construction of the D-O-E connection, the branch from the Danube to the Oder could have been finished by the beginning of WWII. Unfortunately, the history has no ifs.

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Vodní díla na Labi, vybudovaná v letech 1918–1938

Construction of locks and dams on the Elbe River (1918–1938)

Zdymadlo Srnojedy pod Pardubicemi vybudované v letech 1933–1937.

The lock and dam in Srnojedy near Pardubice, built in 1933–1937.

Zdymadlo Přelouč, vybudované v letech 1921–1927.

Lock and dam at Přelouč (built in 1921–1927).

Zdymadlo Kolín, dokončené v roce 1925.

Lock and dam at Kolín was completed in 1925.

Zdymadlo Lysá nad Labem, vybudované v letech 1933–1935.

Lock and dam at Lysá nad Labem (built in 1933–1935).

Zdymadlo Čelákovice, vybudované v letech 1934–1938.

Lock and dam at Čelákovice (built in 1934–1938).

Zdymadlo Brandýs nad Labem, vybudované v letech 1933–1936.

Lock and dam at Brandýs nad Labem (built in 1933–1936).






Stavba zdymadla Klavary byla zahájena v roce 1934 a dokončena až po rozpadu Československa (1940).

Construction of the lock and dam at Klavary (1934–1940) was finished after the extinction of the first republic.

Zdymadlo Poděbrady, dokončené roku 1925.

The lock and dam at Poděbrady. The project was completed in 1925.

Zdymadlo Kostomlátky, vybudované v letech 1933–1937. Bylo již čtvrtým ze stupňů, jejichž výstavba byla zahájena současně, tj. v roce 1933.

The lock and dam Kostomlátky, built in 1933–1937, was the last of the four projects launched at the same time in1933.

Zdymadlo v Kostelci nad Labem bylo vybudováno v letech 1928–1932.

The lock and dam at Kostelec nad Labem (built in 1928–1932).

Zdymadlo Lobkovice, dokončené roku 1922.

The lock and dam at Lobkovice. The project was completed in 1922.

Masarykovo zdymadlo u Střekova v blízkosti Ústí n./L.bylo dokončeno v roce 1936.

Masaryk lock and dam at Střekov was completed in 1936.

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Tomáš Baťa, velký zastánce vodní cesty D-O.

Tomáš Baťa, a convinced supporter of the Danube–Oder Waterway.

Tomáš Baťa was one of those who attempted to diminish the unfavourable impacts of the act, largely discriminating Moravian interests. As a convinced supporter of the prompt construction of the Danube–Oder–Elbe waterway, he initiated independent research studies, which documented feasibility and purposefulness of the navigable Morava River (provided by the renowned company Záruba-Pfeffermann), as well as opened a path to financing of at least the first stage of the D-O-E interconnection from the above-mentioned state fund. Unfortunately, this initiative did not achieve the desired objective, as the authorities stubbornly claimed that the Morava could not be made navigable and thus a parallel canal was needed. Therefore, eventually the matter had been settled with a compromise of a small-profile solution, so-called Baťa Canal from Otrokovice to Rohatec. The waterway was built in 1934–1938 in relationship with an irrigation system. The company Baťa financed half of the costs of the navigation part, evaluated as 13,339,000 crowns. The other half of the navigation part was covered by the Ministry of Social Affairs as a project of "productive care for the unemployed". The waterway of total 51 kms in length was fitted with 14 locks, which sizewise corresponded with the French "Freycinet gabarit". The barges were of the same length and width as the French type "péniche", although without the relevant carrying capacity (270 tons at the draft of 1.80 ms) and carried only 150 tons at the admissible draft of 1.20 ms. The navigation of the canal opened on December 2, 1938, the main shipped substrate being lignite from the mines of the Baťa company at Rohatec to the plant heat station in Otrokovice. Even though there were suggestions to prolong the isolated small waterway down south to the Danube, they were of no concrete concept. In any case, it is to be noted that navigation on Baťa Canal was the second truly serious attempt for transport utilization of the Morava after the 150 years old Dorfleuthner's project. It was also an attempt much more technically sophisticated (although still very modest in the light of the 20th century needs). Unfortunately, the time of commercial employment of Baťa Canal was rather short. Due to war damage and the later nationalization, the shipping of lignite ceased after WWII and the transport was confined to gravel sands, in addition only in the section between Staré Město and Otrokovice (later Kvasice and Otrokovice). In 1960s any commercial utilization of this small and completely isolated waterway ceased entirely.

Future development finally proved indefensibility of the official attitude claiming the Morava unsuitable as a part of the interconnection D-O-E. The irony had it that in the time of the first republic the very first, practically ready-made, navigation dams on this river were built for irrigation or other, extra-navigation purposes. Those were dams in Kroměříž, Spytihněv and Nedakonice. The route of the D-O-E water corridor was not left only in preparation stage as had been enacted by the act of 1931.

The defensive diction of the act was opposed by other entities, like the Central Office of Czechoslovak Commercial and Trade Chambers, which struggled for the fastest possible engagement of Czechoslovakia as an inland country in the

European network of modern and reliable waterways. Also notable were activities of the Association of the Danube–Oder Canal. It was established on the initial impulse of Ostrava industrial circles, which in 1937 donated 1 million crowns for the prompt preparation of the canal project. The constitutive assembly took place on February 5, 1938, its founding members being lands, municipalities and industrial enterprises.

K potahu člunů na Baťově průplavu se používalo nejprve koní, později malých traktorů. V říčních úsecích sloužily ovšem k vlečení motorové remorkéry.

Barges on Baťa Canal were originally towed with horses, later replaced with small tractors, while motor tugs did the towing on the river sections.

Nákladní člun a remorkér na Baťově průplavu.

A cargo barge and a tug on Baťa Canal.

Proplavování plavební komorou na Baťově průplavu Spytihněv v roce 1938.

Passing through the lock Spytihněv on Baťa Canal in 1938.

Plavební komora na Baťově průplavu u Starého Města.

The Baťa Canal lock at Staré Město.

Křížení Baťova průplavu s říčkou Veličkou u Strážnice bylo řešeno v jedné úrovni. Aby se kolísání hladiny této říčky nepromítalo do průplavních zdrží, byly na obou stranách zřízeny plavební komory. Potahová stezka křižuje Veličku mostem. Inspirace starými francouzskými průplavy je u tohoto objektu zcela zřejmá.

Crossing of Baťa Canal with the brook Velička near Strážnice was single levelled. Lock chambers on both sides eliminated the impact of the brook water level fluctuation on the pools. The towpath crosses the Velička with a bridge. The inspiration in old French canals is quite obvious.

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Křížení Baťova průplavu s řekou Moravou u Vnorov (nad soutokem s odlehčovacím ramenem) bylo řešeno rovněž úrovňově. Čluny zde byly přes řeku vlečeny zvláštní lanovkou.

Another level solution – the crossing of Baťa Canal and the Morava at Vnorovy. Barges were run across with a special cableway.

Jez s vodní elektrárnou na řece Moravě u Kroměříže z roku 1925 neměl původně s vodní cestou nic společného. Jeho zdrž je však pro její vedení – podle současného pojetí – dobře využitelná.

A dam with a hydropower plant on the Morava near Kroměříž from 1925 was in no connection with the waterway; however, the current concept suggests its pool is quite suitable to run it.

Vodní dílo u Spytihněvi na řece Moravě s vodní elektrárnou vytváří vhodnou zdrž pro vedení vodního koridoru D-O-L. Tato zdrž je součástí Baťova průplavu.

A dam with a hydropower plant on the Morava near Spytihněv creates a befitting pool to run the D-O-E water corridor. The pool is a part of Baťa Canal.

Vodní dílo na řece Moravě u Nedakonic, zřízené v rámci závlahového programu a Baťova průplavu (1938).

A dam on the Morava near Nedakonice was built in 1938 as a part of Baťa canal and an irrigation programme.

The D-O-E waterway and Greater Germany

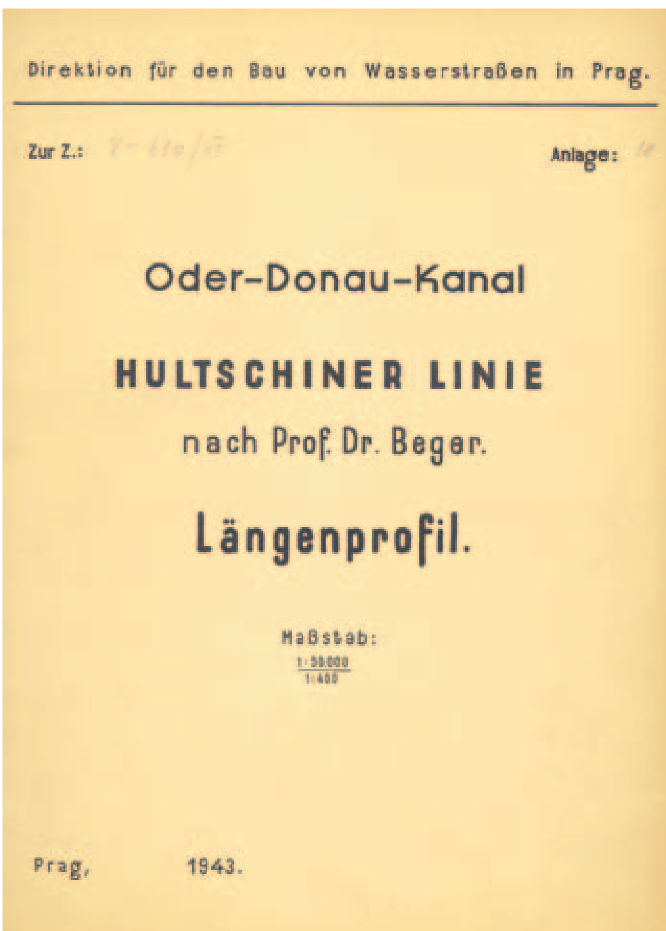
In the end, the strongest political efforts for realization of the project had to come from the outside, i.e. from Germany: after the "Anschlus" of Austria in March 1938, the Reich waterway network integration was its life priority. Due to serious political crisis in Czechoslovakia (the Munich Agreement in September 1939, autonomy of Slovakia and establishment of labile Czecho-Slovakia one month later) the Czech side was under an intense German pressure. Eventually it led to the German-Czech-Slovak Protocol, signed on November 1938, which treated the manner of realization of the Oder–Danube Canal and its Elbe branch. **The first meeting of the Committee for Construction and Operation of the Danube–Oder Canal took place as early as on November 20, 1938. Within the preparation procedures a new project of the waterway was drawn. The construction was estimated to last 6 years, the costs were to reach 500 mill. RM**. To overcome the rise there were 27 double locks proposed of the dimensions 225 x 12 ms. Later, when canal lifts were inserted, the number of locks and lifts between the Danube and the Oder came down to 16–19. However, the high canal lifts forced the route of the canal through some rather demanding terrain.

The bottom width of the canal was to spread to 32 ms, the surface width to 45 ms, the depth of some sections was reaching 4 ms; the design took already into account vessels carrying 1,000 tons. The German side insisted on the original routing branching off the Danube at Vienna.

The adopted protocol created a kind of a paradox situation: Czechoslovakia was forced by a hostile country to carry out a project, which was crucial for development of the local

V souvislosti s přechodem na zdvihadlové řešení ve čtyřicátých letech stojí za zmínku, že prof. ing. Karl Beger z německé technické univerzity ve Vratislavi navrhl ve své studii z roku 1943 nové vedení trasy od Bohumína po vrcholovou zdrž okolo Hlučína. Trasa by se zcela vyhnula poddolovanému území ostravské pánve, střídaly by se na ní však hluboké zářezy s vysokými akvadukty přes příčná údolí. Podélný profil „hlučínské linie" v úseku Bohumín–Pustkovec s 40 m vysokým stupněm u Šilheřovic svědčí o tom, k jakým extrémům dobová obliba lodních zdvihadel sváděla.

A switch to lift solution in 1940s and its popularity lead to some extreme solutions. Prof. Ing. Karl Beger's German study of Technical University in Wrocław (from 1943) outlined a new route leading from Bohumín to the summit pool round Hlučín. The route entirely avoided the quarried area of Ostrava basin, however, deep cuts alternated with high aqueducts crossing the valleys. The longitudinal section of Bohumín–Pustkovec part of "Hlučín line" shows a 40-m high lift at Šilheřovice – as well as problems of this solution.



Direktion für den Bau von Wasserstraßen in Prag.

Zur Z.:

Anlage:

Oder-Donau-Kanal

HULTSCHINER LINIE

nach Prof. Dr. Beger.

Längenprofil.

Maßstab:

1:50000

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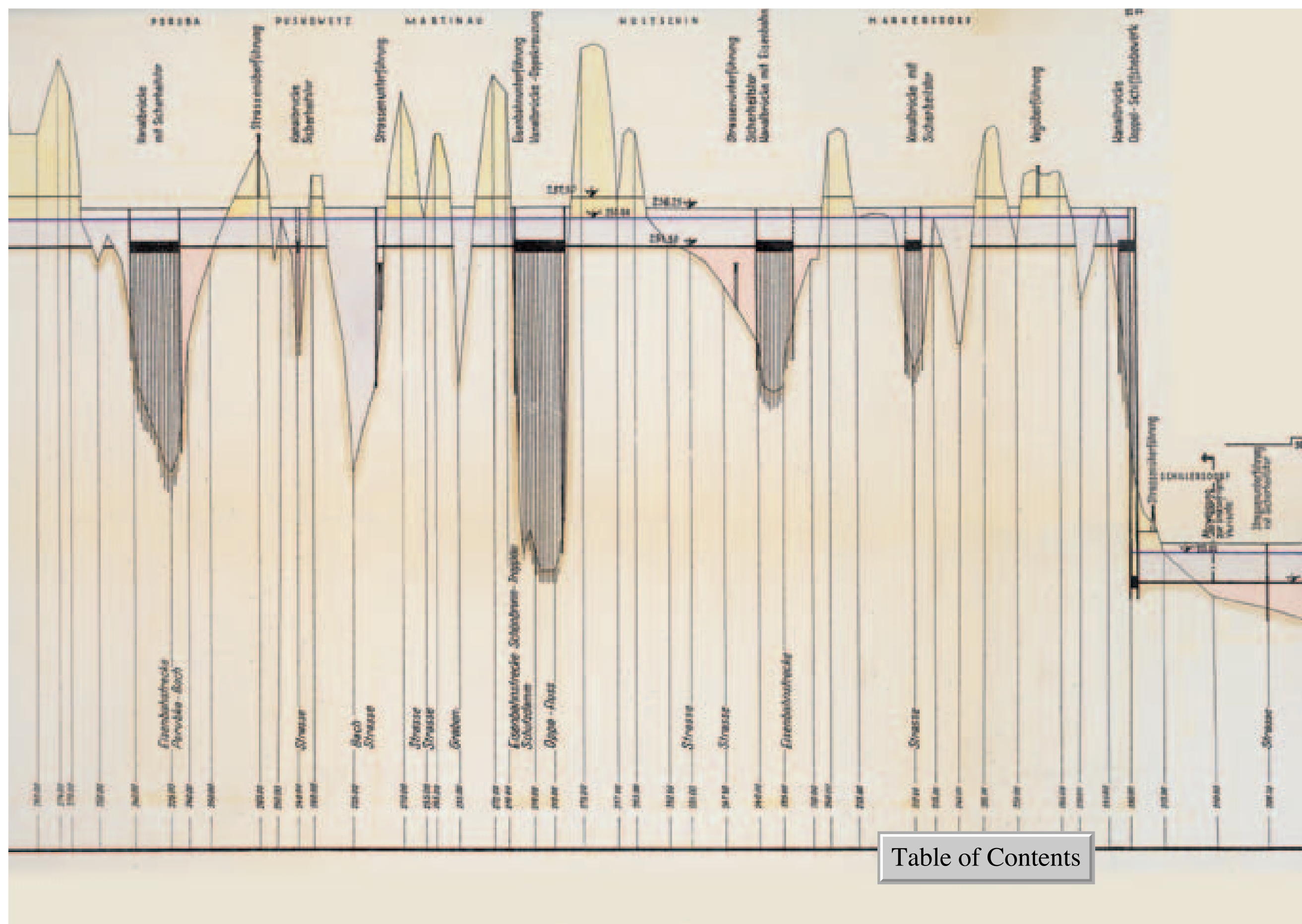
Prag, 1943.



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transport infrastructure in Czechoslovakia, and which the local irresolute politicians had been postponing. That might be the reason why today the protocol of the actual construction initiation remains practically unknown.

The groundbreaking ceremony of the Oder–Danube Canal took place on the eve of the second war: on December 8, 1939 near Kędzierzyn in the contemporary Poland. However, the works proceeded only very slowly forward as the final plans of the canal routing had not been finished yet. The works commenced even at the other end of the waterway at Vienna. The 6-km channel, which was then excavated, is today used for recreation. As an advance, the area got even the port in Lobau. Nevertheless, the war prevented completion of some larger integrated part of the interconnection. In 1942, almost all larger water management construction works ceased and only construction and maintenance works pursuing important public interests and protecting traffic on the navigable rivers were allowed to continue. Finally, in 1943, even the geological research, geodesy, and design works were suspended as well. The war naturally set back the continuous construction of the access section of the canal between Mělník and Pardubice; although the construction of the last lock and dam below Kolín at Velký Osek was actually launched, it was later discontinued. The only lock and dam was completed at Hradištko. Thus, as of 1944, regular running navigation could be operated all the way to Kolín.

Slavnostní výkop průplavu Odra–Dunaj se uskutečnil 8. prosince 1939 u obce Nowa Wieś v blízkosti města Kędzierzyn. Tento významný okamžik byl, bohužel, poznamenán přítomností předních nacistických pohlavárů.

Groundbreaking for the Oder–Danube Canal on December 8, 1939 near Nowa Wieś close to Kędzierzyn; unfortunately, this significant moment got stigmatised by the presence of top Nazi officials.

Místo slavnostního výkopu dnes. Na Hlivický průplav navazuje širokým ústím 6 km dlouhý úsek vodní cesty Odra–Dunaj, používaný jako odbočka k přístavu chemického kombinátu v Kędzierzynu.

The place of the groundbreaking ceremony today: the Gliwice Canal connects with a wide mouth of a 6-km stretch of the Oder–Danube Canal – a branch canal for the chemical factory in Kędzierzyn.

Nedokončené úseky průplavu na rakouském území jsou využívány pro rekreaci.

Unfinished parts of the canal in Austria are presently used for recreation.

Jediným jezem na Odře byl jez u Koblova, dokončený v roce 1937.

The only dam built on the Oder was completed close to Koblov in 1937.

V průběhu druhé světové války (roku 1944) byla dokončena výstavba zdymadla Hradištko na Labi.

Construction of the lock and dam Hradištko on the Elbe was finished during World War II in 1944.

Výstavba zdymadla Velký Osek na Labi byla zahájena roku 1940. Během války však postupovala velmi pomalu, takže k jejímu dokončení došlo až v roce 1952.

Construction of the Elbe lock and dam Velký Osek started in 1940; as the work proceeded quite slowly during the war, it had not been finished until 1952.

The project in the time when "tomorrow meant yesterday already"

It looked like the end of the war finally brought a favourable atmosphere for the continuous realization of the D-O-E interconnection. Within the new borderlines, the friendly Poland replaced Germany in the north part of the route. It was expected to be only a matter of the nearest years if not months when the works would restart again. Also, the above-mentioned Association of the Danube–Oder Canal played an important role in the post-war years. In April 1946, they drew the Memorandum of the Danube–Oder Canal and presented it to the government, parliament, economic entities, and other authorities or interested people. One month later, they suggested international funding of the project.

In 1948, in order to bring the project into line with the new politically economic situation, they proposed establishment of the national enterprise The D-O-E Canal. Upon this proposal, the economic council applied a questionnaire to find out if the possibility of the canal construction still remained. The published results revealed that from the point of economy, rentability, technical feasibility and financing, the project had lost none of its topicality, and that its national economic impact is undeniable.

After the communist coup, though, all these activities were doomed. The politically economic orientation of the country had changed completely as well as the priorities. The tight dependence on the Soviet Union and an emphasis on heavy industries made the project of the D-O-E waterway quite redundant, if not detrimental. Thus the state appointed entities, which were to safeguard its realization, were systematically disassembled, while the private efforts and activities were being suppressed.

As of the decree n. 4/66 from January 29, 1949, the Minister of Engineering dismissed the Directorship for Construction of Waterways in Prague without any adequate substitution. Although the Canal Department joined the Water Management Office of the Ministry of Engineering and later, in 1952, to the newly established Water Management Development Centre in Prague, by ruling of the government decree n. 206 from August 26, 1952, all preparation works on the canal were terminated anyway. Formally it was only "a temporary solution", but in fact it was for good, as until now, they have never been revived in their original range. Activities of the Association of the Danube–Oder Canal were being administratively restrained. Eventually, as of December 31, 1959, the association was "consentingly" dismissed – the Ministry of Finance did not allow the people's committees to pay membership dues, plus the voluntary organizations and assemblies as corporate bodies were being liquidated. It is highly advisable to keep remembering these events, as the current opponents of the project do not hesitate to call it "communist" to score some extra political points. They either gamble on the events of half a century ago being largely forgotten, or

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neither they are aware of the real circumstances. A petty, quite insignificant exception from the preparation works ban (including research and studies) was initiated at the end of 1950s by the former Council for Mutual Economic Assistance (COMECON), which was involved in complex utilization of the Danube from Devín to its Black Sea estuary in respects of energetic, navigation and irrigation. In terms of the project, Czechoslovakia was assigned to investigate the navigation connectivity of other countries of the Council to the Danube. Thus, Hydroprojekt Brno produced "A Study on the Navigation Connection of the Danube with the Oder, Vistula and the Canals of GDR" [Studie plavebního spojení Dunaje s Odrou, Vislou a průplavy NDR]. When completed the study was again set aside. Nevertheless, it brought a certain break-through in the existing opinions on the concept of the Danube–Oder waterway, as it compared three variants of routing: the canal variant (corresponding with the earlier concept of the canal thoroughly separated from the rivers), the river variant (using maximum of the Morava and Oder Rivers), and the Váh variant (in the route Komárno–Žilina–Bohumín). The comparison proved the river variant to be the winner, which realization had been promoted – without any larger success, though – by Tomáš Baťa in 1930s. At last it was infirmed that the D-O-E waterway had to be a canal totally separated from rivers, which had prevailed for centuries, most probably due to blind accepting of British mini-canal examples of the 18th and 19th centuries. The major credit for the opinion change goes to the lifelong work of Ing. Josef Hruška; the director of the Morava River Administration in Uherské Hradiště understood his river very well and worked selflessly, and in the post-war years even in secret behind his superiors' back, to make it navigable. He showed that since the Morava River dams, which had been built for various purposes like irrigation or waterpower utilization (the above-mentioned dams of Kroměříž, Spytihněv, Nedakonice, and Hodonín), in fact created ready sections of the waterway, the parallel routing of the canal along the river was quite redundant.

He also initiated another pool above the dam at Bělov, which completed the continuous cascade of the Morava River. Today, his work remains mostly unrecognized.

The river variant counted on partial employment of the Oder in the Ostrava area. Even there, the river regulations necessary in order to compensate mine subsidences, allowed to build or at least prepare parts of the waterway route, including the dam in Ostava-Lhotka. However, authors of the concept had to work almost conspiratorially, as they could not reveal that they were working on the future waterway.

The State Water Management Plan from 1953 became the only document, which actually acknowledged the idea of the D-O-E canal in the 1950s and 1960s. Although it specified principles of the complex utilization of water resources, it remained a mere outline plan with no concrete terms or deadlines.

Only the atmosphere of the Prague Spring melted a little the ice clutching any serious efforts to revive at least the research work. Upon the government decree n. 222/1966, as well as the order of Directorship of Water Resources, Hydroprojekt Praha presented a study "The Danube–Oder–Elbe Canal Interconnection – the General Solution 1968" [Průplavní spojení Dunaj–Odra–Labe – generální řešení 1968]. "The General Solution" was supposed to re-evaluate the project of the Danube, Oder and Elbe interconnection, including the problems of the bordering rivers between Czechoslovakia and Poland. The General Solution treated the canal interconnection as a complex navigation and water-management project, which aimed at realization of efficient waterway as much as at solution of water management problems. Especially transfer of the Danube water to the water insufficient areas in the Morava and Oder basins appeared very up-to-date. According to the General Solution, the canal route was employing the current riverbeds to the highest possible extent. It was an extreme hardly acceptable today, rather contradictory to the earlier "canal" solution. The canal sections were proposed only for summit parts and wherever the routing through the riverbed was not efficient. Another extreme of the contemporary notion of the waterway functions originated in megalomaniac ideas of volumes of water transfer, in uncritical extrapolation of constantly increasing water demands, as well as in the belief in the "limitless possibilities" of the socialist economy.

The destiny of General Solution in the years to come was marked by the period of "real socialism". In the same atmosphere the government passed the decree n. 169/1971, which assigned the competent authorities to protect the territory of the future canal as defined in the General Solution, so that uncoordinated investment ventures in the area would not prevent or excessively raised the costs of its realization. Even though at first sight such government decree may be considered rather advanced as it recognizes the importance of the project as well as the work of engineers which took part in the General Solution, in fact, the reasons of the decree authors were quite different: once more it meant suspension of preparation and research works, and postponing any thoughts of concrete deadlines of its realization to the far and unspecified future. As nobody could claim the project uneconomical, or useless, it was much easier to recognize its benefits and freeze its realization at the same time. The foxy decision silenced all eventual protagonists of the project: the route was territorially protected, as the government acknowledged the need for such project without a question. It is quite remarkable how such "freeze" became more efficient than the buyout of the concession by the North Railway of Kaiser Ferdinand at the end of 19th century. It is also remarkable that the policy has proved to be working until today.

The unsuccessful trials to revive systematic preparation of the D-O-E interconnection were rather in harmony with the "care" for continuous development of the waterways according to the earlier programmes. Even the unambitious goals of the act from 1931 were utterly abolished. All attention was almost exclusively devoted to construction of hydropower plants, i.e. single-purpose high-rise energetic facilities without navigation devices. The canalization of the Middle Elbe – so remarkably advancing before the war – ceased entirely, although Pardubice, the start point of the D-O-E interconnection, seemed to be within a hand's reach. The only exception – the lock of Pardubice – was required to regulate the discharge situation, when new housing estates on the left Elbe bank were to be raised. Similarly, construction of the new dam Štětí on the Lower Elbe was not caused by needs of the water transport.

Jez na Odře ve Lhotce byl dokončen v roce 1967.

A dam on the Oder in Lhotka, completed in 1967.

Impulsem pro výstavbu zdymadla na Labi v Pardubicích, dokončeného v roce 1969, nebyly zdaleka snahy o soustavné pokračování splavňovacích prací na středním Labi. Přesto je tento stupeň do jisté míry symbolický – na jeho zdrž má již navazovat vlastní vodní koridor D-O-L.

The lock and dam on the Elbe in Pardubice has a symbolic meaning. Finished in 1969, it was by no means step to make the Elbe navigable; nevertheless, its river pool should join the actual D-O-E corridor of the future.

Za náhradu starého jezu ve Štětí moderním segmentovým jezem v roce 1970 vděčí vodní doprava tepelné elektrárně Mělník. Bez spolehlivého jezu, který může udržovat hladinu celý rok, by pro tuto elektrárnu nebylo možno zajistit odběr chladicí vody.

A new power plant in Mělník brought along replacement of the old dam in Štětí with a modern one, equipped with radial gates. The inland navigation can thus enjoy advantages of a reliable dam, which guarantees a sufficient supply of cooling water.

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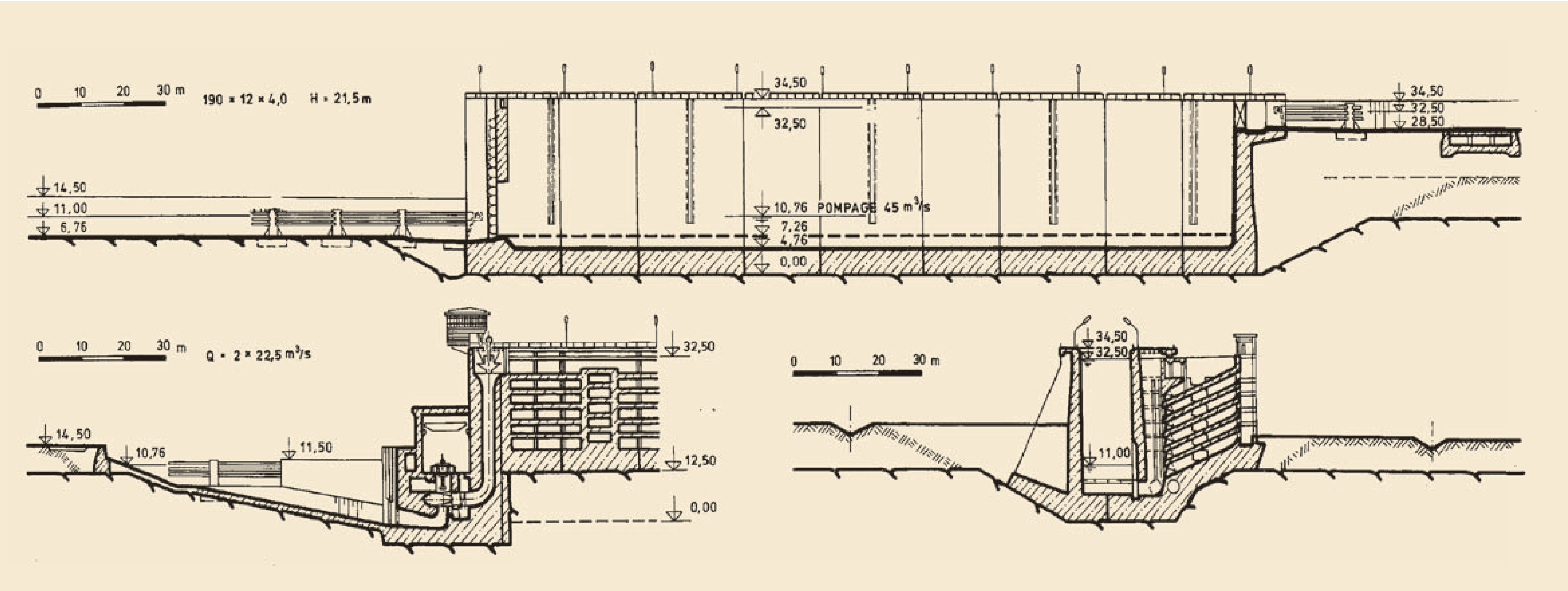

Ukázka pečlivě zpracované dokumentace v rámci „generálního řešení“ z roku 1968.

An example of a thorough documentation for the “General Solution“ from 1968.

To stay objective, we must not skip few of the positive aspects of the period, which sometimes indirectly or unwillingly supported the D-O-E interconnection ideas in the times of the political fogging.

The dynamic development of the Danube navigation in 1950s–1980s indicated the great potential of the waterway. Its exploitation implied sooner or later realization of the connecting waterways. Since 1975, the opportunities of inland navigation proved even more clearly on the Elbe, as it joined the combined transport of energetic coal by railway and water from North Bohemian coalfields to the power plant in Chvaletice. Considering the short distance, the water transport was less convenient pricewise than the railway solution, therefore the reason was the insufficiently conducting railway capacity on the lines along the Elbe. After the sharp decrease in demands for the railway service in 1990s, the water transport came to a halt again. It implied a notion that it was economically inefficient, while it was actually the railway, not the navigation, which was the pricy partner of the collaboration.

The Chvaletice project also called for some modernization touch-ups on the Elbe waterway – namely for replacement of the old dams with with frames and needles (or shutters) with new modern constructions and for modernization of the secondary locks of the waterway. Hydrostatic weirs were used in four dams: at Dolní Beřkovice (1974), Roudnice nad Labem (1972), České Kopisty (1971), and Lovosice (1972). In 1970, a new movable weir with radial gates was built in Štětí nad Labem, closely followed by modernization of secondary locks in Dolní Beřkovice (1974), Štětí nad Labem (1973), Roudnice nad Labem (1975), České Kopisty (1971) and Lovosice (1977). The effective length was extended to 85 ms and new upper falling gates installed allowing a combined filling of the lock. In 1973, the original Middle Elbe dams in Hadík and Obříství (1919–1912) were replaced with a single modern sector gate dam. Construction of the locks of Veletov and Týnec nad Labem was especially important, as it pushed the ending point of the river navigability from Kolín to Chvaletice, i.e. closer to the spot where the Elbe should connect to the D-O-E water corridor. **Despite only a single missing lock and dam – in Přelouč – to reach Pardubice, the spell was not to be broken yet.**

Zdymadlo Týnec na Labem z roku 1975 umožnilo prodloužení středolabské vodní cesty až k přístavu chvaletické elektrárny. Jez má tři pole s podpíranými klapkami. Jeho dokončení však znamenalo opět konec prodlužování vodní cesty.

With the lock and dam Týnec nad Labem from 1975 the Elbe was navigable up to the port of Chvaletice power plant. The dam has three openings with falling gates supported by hydraulic cylinders. After that any further extension of the waterway was interrupted.

Historický jez na Labi ve Veletově byl postaven v polovině 16. století a sloužil k plavení dřeva a k využití vodní síly ve starých mlýnech. Krátkou dobu sloužil i moderní plavbě po výstavbě nové plavební komory na pravém břehu.

The historical Elbe dam in Veletov was built in the mid 1500s because of timber floating and old water mills. After a new lock was added on the right bank, it temporarily served the modern navigation purposes.

Nové zdymadlo v Obříství na Labi z roku 1973 nahradilo dva původní jezy v Hadíku a Obříství z let 1910, resp. 1912.

In 1973 the new Elbe lock and dam in Obříství replaced two former dams and locks in Hadík and Obříství from 1910, 1912 respectively.

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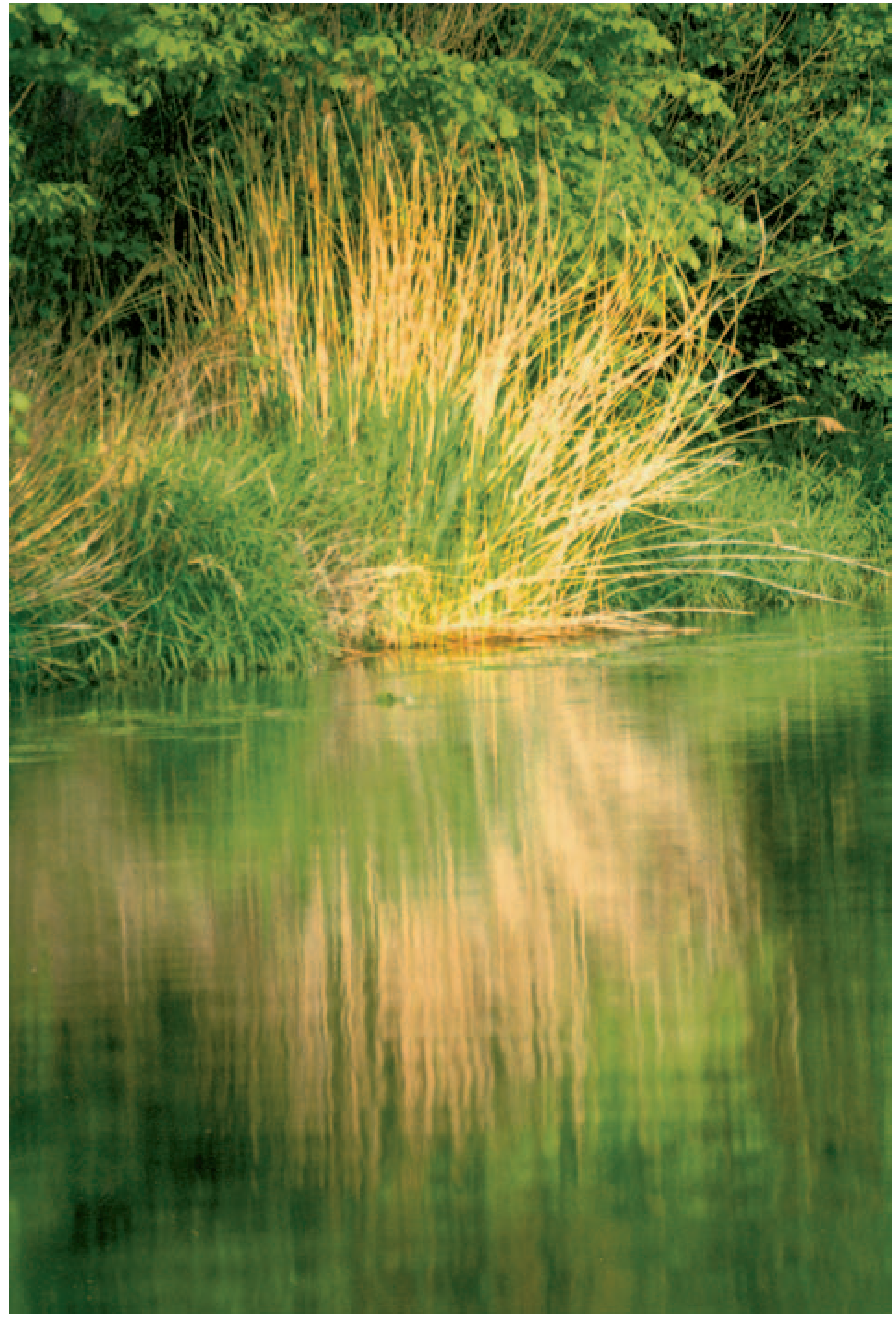

Modernizace historického stupně Veletov na Labi v roce 1975 spočívala v instalaci sedmi „balených“ klapek na koruně jezu a v dostavbě plavební komory. Dnes vytváří zdrž tohoto stupně spolu se starými říčními rameny harmonický celek.

Modernization of the historical dam in Veletov on the Elbe in 1975 meant installation of seven falling gates on the dam crest, and finishing of the lock. Today the pool of the weir and the old river branches join in harmonious unity.

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Modernizace jezů na dolním Labi v letech 1970–1973

Modernization of dams on the Lower Elbe (1970–1973)

Nový sektorový jez, plavební komory (u levého břehu) a vorová propust (u pravého břehu) v Dolních Beřkovicích.

A new sector gate dam, locks (left bank) and a raft sluice in Dolní Beřkovice.

Nový sektorový jez v Dolních Beřkovicích (1973).

A new sector gate dam in Dolní Beřkovice (1973).

Nový segmentový jez ve Štětí (1970) a plavební komory u levého břehu.

A new dam with radial gates in Štětí (1970) with the left bank locks.

Nový sektorový jez v Roudnici nad Labem (1972).

A new sector gate dam in Roudnice nad Labem (1972).

Nový sektorový jez v Českých Kopistech (1971).

A new sector gate dam in České Kopisty (1971).

Nový sektorový jez v Lovosicích (1972).

A new sector gate dam in Lovosice (1972).

Modernizace malých plavebních komor na dolním Labi v letech 1970–1977

Modernization of small (secondary) locks on the Lower Elbe (1970–1977)

Modernizovaná malá plavební komora v Dolních Beřkovicích (1974).

A modernized secondary lock in Dolní Beřkovice (1974).

Modernizovaná malá plavební komora ve Štětí (1970).

A modernized secondary lock in Štětí (1970).

Malá plavební komora v Roudnici nad Labem v průběhu rekonstrukce (1975).

The secondary lock in Roudnice nad Labem under reconstruction (1975).

Malá plavební komora v Roudnici nad Labem. Plnění komory se urychluje přepadem přes klapková horní vrata (1975).

A secondary lock in Roudnice nad Labem. The overfall over the falling gate accelerates filling of the lock.

Modernizovaná malá plavební komora v Českých Kopistech (1976).

A modernized secondary lock in České Kopisty (1976).

Horní ohlaví a nová svodidla modernizované malé plavební komory v Lovosicích (1977).

The upper gate and new guide walls of the modernized secondary lock in Lovosice (1977).

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If the fast and continuous forwarding of construction works on the Middle Elbe before WWII is a proof of feasibility of such stage advancing even on the route of the actual D-O-E water corridor, then the contribution of the brief coal-transporting episode should be viewed similarly. It showed that with properly designed parameters and progressive technology of navigation, a particularly higher transport capacity could be reached: the State Water Management Plan estimated the capacity of simple and quite small locks of the Middle Elbe for 2.5 mill. tons/year, in the time of energetic coal shipping, the rate reached even 5 mill. tons/year, while the vessels were almost exclusively employed in one direction only and there were still considerable capacity reserves.

Přeprava energetického uhlí na Labi ukázala možnosti a zejména vysokou výkonnost moderní vodní dopravy a napověděla, jakou výkonnost a kvalitu (zejména z hlediska vlivů na životní prostředí) by mohl nabídnout i vodní koridor D-O-L.

Transport of coal along the Elbe demonstrated the capacity of modern navigation; it suggested the quality and efficiency of the transport as well as the environmental benefits which the water corridor D-O-L would guarantee.

Pohled na přístav elektrárny ve Chvaleticích. V popředí kolesové vykladače, uprostřed velká opravárenská loděnice.

Chvaletice port delivering coal to the power plant. High capacity bucket wheel devices (front) and a large repair shipyard (centre).

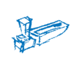
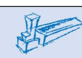
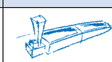
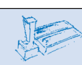
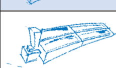
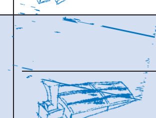
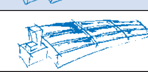
Vykládka energetického uhlí z tlačného člunu ve chvaletickém přístavu. Kapacitní zařízení umožnilo vyložení více než 1000 t uhlí za necelou hodinu.

Unloading of a barge with coal in Chvaletice port. The capacity device enabled unloading of over 1,000 tons per hour.

Europe is getting interested

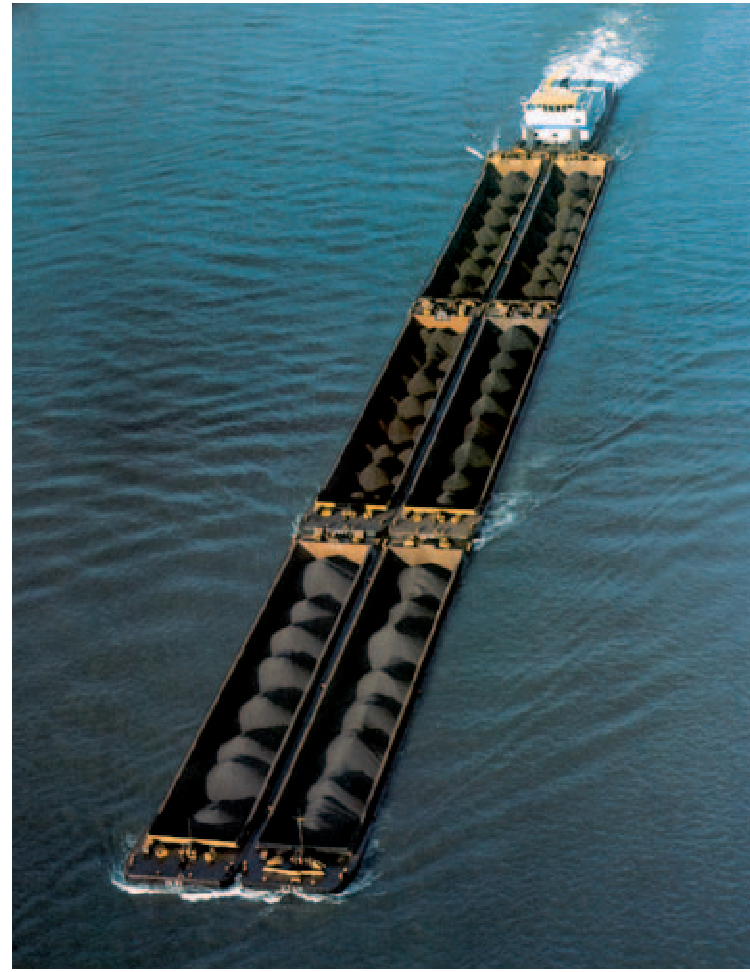
In a contrast to the hesitant attitudes towards the water corridor D-O-E in the post-war Czechoslovakia, the all-European institutions treated the project as well as the systematic development of waterways as such quite differently. In the first place, it is necessary to mention activities of the United Nations Economic Commission for Europe in Geneva. As early as in 1959 the organization set an advanced goal of creating a unified waterway network of Europe. To succeed, they were ready to make especially two arrangements: integration of so far completely separated systems of the West and Southeast European waterways, and unification of the basic parameters of the unified network. International classification of European waterways was to become the instrument of such unification; it was first drawn in 1961, to be amended in 1992.

The new international waterway classification from 1992 has played a crucial (and until now perhaps not properly appreciated) role in development of their network. The waterway parameters thoroughly reflect a modul principle. It took into account that there is no point in applying wider or longer vessels on the larger waterways but rather wider and longer pushed convoys consisting of units of unified parameters. Such modul system corresponds with the traditional technology of pushed navigation in the USA. Its expansion was long prevented by conservative attitudes of navigation practicians. Owing to the classification, it is nowadays possible to head gradually for a completely homogenic waterway network of international importance, as the base unit (a pushed barge) has constant dimensions from the class Va up. The higher classes differ in number of barges

Category	Class	Self propelled vessels and barges Main parameters					Pushed convoys Main parameters					Minimum bridge clearance	Symbol in maps
		name	max. length L(m)	max. beam B(m)	draft T(m)	dead-weight d(t)		lenght L(m)	beam B(m)	draft T(m)	deadweight d(t)	H(m)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Waterways of international importance	IV	Johann Welker	80 - 85	9,5	2,5	1000 - 1500		85	9,5	2,5 - 2,8	1250 - 1450	5,25 or 7,0	
	Va	large Rhine vessels	95 - 110	11,4	2,5 - 2,8	1500 - 3000		95 - 110	11,4	2,5 - 4,5	1600 - 3000	5,25 or 7,00 or 9,10	
	Vb							172 - 185	11,4	2,5 - 4,5	3200 - 6000		
	VIa							95 - 110	22,8	2,5 - 4,5	3200 - 6000	7,0 or 9,1	
	VIb	3)	140	15,0	3,9			185 - 195	22,8	2,5 - 4,5	6400 - 12000	7,0 or 9,1	
	VIc							270 - 280	22,8	2,5 - 4,5	9600 - 18000	9,1	
								195 - 200	33,0 - 34,2	2,5 - 4,5	9600 - 18000		
	VII							275 - 285	33,0 - 34,2	2,5 - 4,5	14500 - 27000	9,1	

Schematická tabulka klasifikace evropských vodních cest.

A chart of the European waterways classification.



Tlačná souprava na dolním Rýně je složena ze šesti standardních člunů, z nichž je možno sestavit i menší soupravy se čtyřmi, dvěma či dokonce s jediným člunem. Modulový systém tak usnadňuje vytváření velkých provozních jednotek o nosnosti přes 10 000 t na velkých řekách, nijak však nenarušuje homogenitu sítě vodních cest, která je složena z vodních cest různých tříd.

A pushed convoy on the Lower Rhine consists of a push boat and six standard barges, which can combine into smaller convoys of 4, 2 or even a single barge. On the big rivers the modular system enables lining of large operation units carrying over 10,000 tons, while it does not affect the network homogeneity, which includes waterways of different categories.

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engaged in the pushed convoy. Only so-called regional waterways (class I to III) do not apply the modul system. However, it concerns only small waterways, which will not be further developed. The class IV represents a certain transient type.

The modul selection was based on the width 11.4 ms, which is far the most convenient for vessels on the European network. Firstly, most of the existing locks of European waterways are 12 or 24 ms wide, which could be optimally employed by the vessels of 11.4 ms. Secondly, the other reason is implied by the increasing role of container transport, which requires a tight fitting of the standard containers to the boat cargo area.

The classification is rather permissive of drafts, as it allows exceptions depending on local circumstances. The bridge clearance is marked by different calibres suitable for transport of two, three or four container tiers; any intermediary calibres are not supposed to be used.

According to UNECE, the final integration of the network was to be achieved through realization of three navigation connections:

- the waterway Rhine – Main – Danube,
- the waterway Danube – Oder – Elbe,
- and the waterway Oder – Vistula – Dnieper, or rather a fundamental modernization of the already existing, although old-fashioned waterways between these rivers.

In order to evaluate the economic efficiency of the projects, it was proposed to establish international expert committees for each of the above-mentioned interconnection, so Groups of Rapporteurs. The most active of the groups – the Group of Rapporteurs for the waterway Rhine – Main – Danube – began its work in 1964, to complete it in 1970 by presenting an economic study supporting the economic validity of the waterway connection. The through-navigation between the Rhine and Danube Rivers opened in September 1992. Its increasing volumes prove the group's estimations correct and realistic.

The coastal countries of the last interconnection have showed the least understanding for the goals set by the UNECE entities: their competent group of rapporteurs has not been appointed yet.

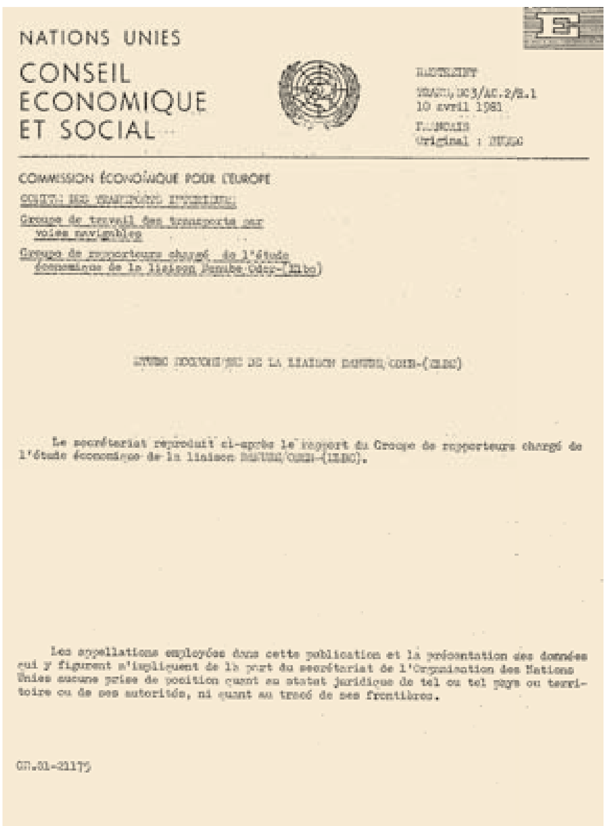
Při výstavbě průplavu Mohan–Dunaj byly aplikovány parametry třídy Vb podle mezinárodní klasifikace. Je tedy průjezdný pro tlačné soupravy, složené ze dvou standardních člunů a tlačného remorkéru. Existují ovšem i jiné provozní možnosti, např. používání motorových nákladních lodí tlačících před sebou standardní člun. Takové soupravy jsou na průplavu časté.

The Main–Danube Canal construction applied the international classification parameters Vb, thus being passable for pushed convoys of two standard barges and a push boat. Other operation possibilities include a combination of a self-propelled vessel and a standard barge. On the canal, such convoys are quite common.

We should naturally be mostly interested in the results of the Group of Rapporteurs for the waterway Danube – Oder – Elbe, which began its work concurrently with the first group, in 1964. The results were summarized in the "Economic Study of the Connection Danube – Oder – (Elbe)", which was issued as an official document UN-ECE TRANS/SC3/R1. The document was fully completed and submitted only in 1981, as the work of the group was rather slow and cumbersome. It was marked with political controversies, which had nothing to do with the actual contents of their work, related to diverse opinions on recognition of the former German Democratic Republic and asking its delegation to participate in the proceedings. When in 1973, the country was admitted to UN, the group's activities finally took a favouring turn. The study proved the need and economic purposefulness of the project; consequently, it was recommended to take further preparation steps towards its realization, which were supposed to be provided – as namely stated in the conclusion – by the former Czechoslovakia.

Recommendation or future cooperation in the economic, financial and legislative field:

1) *The results of the research attest technical feasibility, economic efficiency and purposefulness of the D-O-E navigation connection, namely in its first stage, i.e. connection of the Danube with the Oder...*
2) *Considering the international character of the interconnection, the realization of the project must take into account not only interests of the countries on the route of project (Austria, Poland, Czechoslovakia), but also those, which are about to acquire direct and indirect benefits from the new waterway.*
3) *Establishment of the waterway will proceed in three stages...*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CONSEIL ECONOMIQUE ET SOCIAL

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Groupe de travail des transports par voies navigables
Groupe de rapporteurs chargé de l'étude économique de la liaison Danube-Oder-(Elbe)

[illegible]

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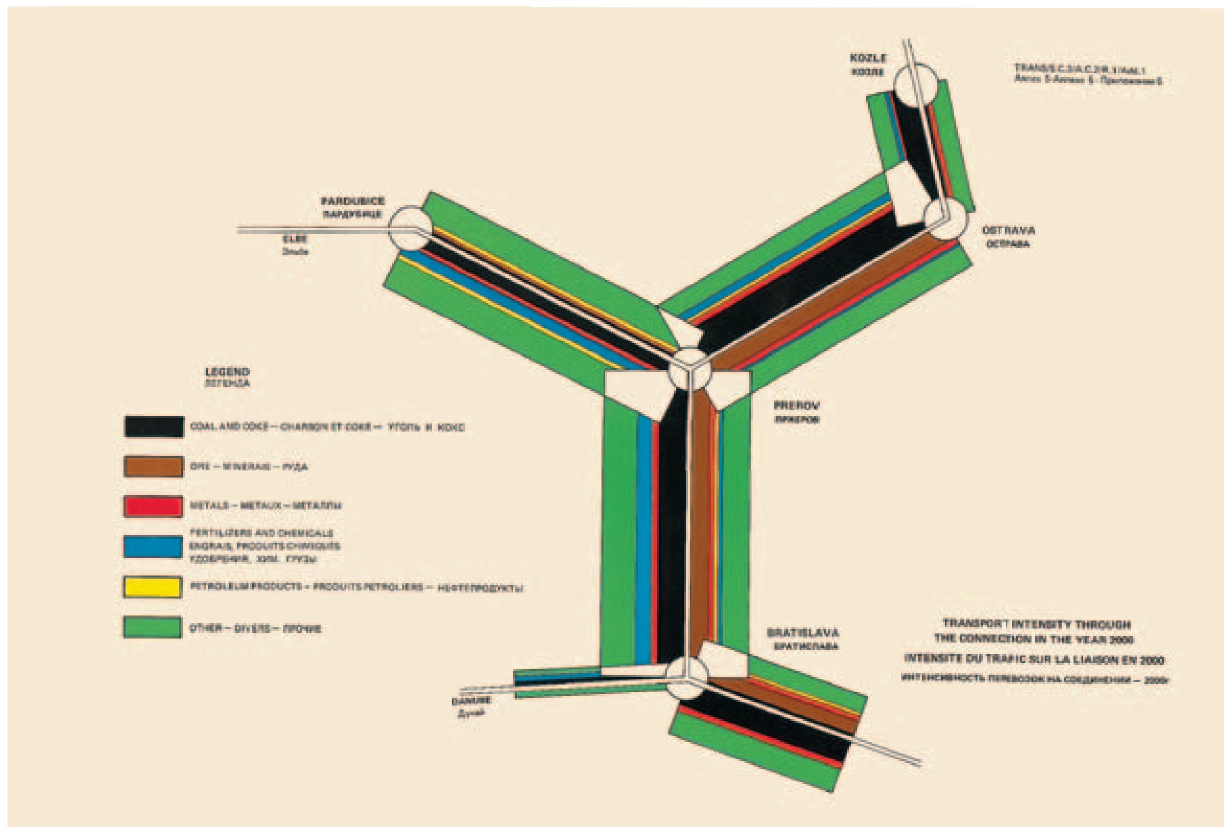
Titulní list ekonomické studie propojení Dunaj–Odra–Labe z roku 1981.

A title sheet of the economic study of the Danube–Oder–Elbe connection.



„Pentlogram", znázorňující očekávané zatížení vodní cesty D-O-L, sestavený na základě práce mezinárodní skupiny zpravodajů EHK/OSN. Mezinárodní anketa ukázala, že nejzatíženějším úsekem mezi Dunajem (Bratislavou) a Přerovem by mohlo procházet až 40 mil. t zboží ročně. Dnešní odhady jsou mnohem opatrnější.

A diagram of the future D-O-E waterway traffic density according to a research of the International Rapporteur Group with ECE/UNO. The survey showed that the busiest part between Bratislava and Přerov would transport up to 40 mill. tons per year. However, the later estimation is a little more modest.

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4) In terms of each stage, it is suggested to treat specific problems...and start trilateral negotiations...while respecting regulations already adopted in bilateral agreements.

5) With regard to the final act of the Conference on Security and Co-operation in Europe, especially to the chapter "Industrial co-operation and projects of common interest", the Report Group suggests that three countries of the interconnection, with a possible participation of other interested countries, draw basic data for preparation of an interstate agreement of future co-operation, and that is as soon as possible after the entities of UNECE have published the document.

6) The report group then recommends that Czechoslovakia, through which the prevailing part of the interconnection route is to be led, approached the countries that co-operated on this study with a relevant initiative.

Conclusions of the document UNECE TRANS/SC3/105, New York 1981

It is necessary to point out, that until today, 26 years after the quoted recommendations were published, the response of the addressee state of the document, i.e. the Czechoslovak Republic, currently Czech and Slovak Republics, has been zero. Neither the following UNECE recommendations, contained in the amended economic study from 1993 (Document TRANS/SC.3/R.160 from September 7, 1993) have provoked any other initiative.

The Czech Republic, the country which was about to play the lead in promotion and preparation of the project, remains bewilderingly passive. It rather sharply contrasts with other significant signals from the international field worth brief mentioning.

In 1993, the entities of EU worked up the Outline Plan of European Inland Waterways Network, which set priority projects, which were necessary to improve networks of the member countries, namely, to integrate individual parts of this network. The plan covers even the interconnection D-O-E, although at the time of the document issuing neither Austria, nor Czech or Slovak Republics and Poland were members of EU. Thus, the plan clearly defined the all-European importance of the project. **Naturally, the emphasis on better configuration of the European waterway network was clearly pronounced even in the admission protocol, on the base of which the Czech Republic entered the EU. As a matter of course, the document includes the D-O-E project into the perspective transport network of EU member countries.**

Similarly, the prominent role of the D-O-E waterway was accentuated in the European Agreement on Main Inland Waterways of International Importance (AGN). Prepared by an expert working group appointed by UNECE, it was enacted in Geneva on January 19, 1996. In the name of the Czech Republic it was signed in Helsinki on June 23, 1997, to come into operation on July 26, 1999 (Notification of the Ministry of Foreign Affairs n. 163/1999). The agreement pronounces a coordinated plan of development and construction of the European inland waterway network of international importance, i.e. the network of waterway category E. Ratification of the AGN agreement the signatory parties confirmed their intention to realize the respective waterways within their programmes. The waterway Danube–Oder–Elbe is an assigned concern of the Czech Republic.

The AGN agreement divides European main inland waterways into three categories:

- Trunk waterways
- Other main waterways
- Branch waterways

The hierarchy reflects in the coding each route, while the main arteries are marked with a two-digit numbers of whole tens.

Two trunk waterways cross the Czech territory:

- Route E 20 runs in the Elbe from the North Sea via Hamburg, Magdeburg, Ústí nad Labem, Mělník all the way to Pardubice, and then along the lower part of the D-O-E waterway from the Elbe to the Danube.
- Route E 30 starts from the port complex of Świnoujście–Stettin and runs through the Oder River from Stettin via Wrocław to Koźle and on, along the remaining part of the D-O-E waterway to Přerov. From there, together with Route E 20, it leads to the Danube.

According to the AGN agreement, the actual D-O-E interconnection must be considered a missing link, which construction is imperative.

According to the AGN agreement, the waterways of the category E must conform to the class Va parameters, or at least to the parameters of class Vb in the case of new waterways under construction in routes of missing links. At the same time it is recommended that the newly built waterways (canals and canalized rivers) guarantee a constant admissible draft of 2.80 ms. For rivers with fluctuant water levels, it is imperative to guarantee the admissible draft of 2.80 ms for minimum 240 days per an average water year (within the terms of classification, local exceptions are allowed). The AGN agreement also emphasizes the operational reliability of the E category waterways and requires a practically all-year-round navigation with the exception of those in unfavourable climate, like in the central and northern part of Russia or in Finland. Such regions cannot prevent the yearly navigation breaks because of hardly superable ice situations.

The need to complete the European waterway network with the D-O-E interconnection was acknowledged even at the conference of European ministers of transport in Rotterdam on September 5-6, 2001. The conference was targeted at expeditious all-European cooperation on development of free and economically potent inland water transport.

Representatives of governments of European countries and of international organisations and observers from other countries having an interest in inland waterway transport…, Recognising the important safety and environmental advantages of inland waterway transport and convinced of a common interest in fostering its growth and its integration into the multimodal transport system, so that it can contribute to the reduction of congestion – especially in road transport – and ultimately make the transport sector compatible with sustainable development…, Noting that, although progress has been made, there are still obstacles to the development of inland waterway transport which are related to inadequate infrastructure, legal procedures and lack of harmonisation of fiscal, social and economic conditions for fair *competition as well as of technical regulations, professional requirements and administrative procedures,*

Hereby endorse the following objectives and actions…

- *to foster the growth of inland waterway transport and increase its share in the transport of goods;*
- *to further improve the sustainability, safety and efficiency of inland waterway transport;*
- *to create a transparent and integrated Pan-European inland waterway transport market based on the principles of reciprocity, freedom of navigation, fair competition and equal treatment of the users of inland waterways…*

To achieve these objectives, Pan-European co-operation between governments and international organisations must be intensified with a view to carrying out the following actions…

…To develop a modern, environmentally respectful and efficient waterway infrastructure network as a prerequisite for the promotion of inland waterway transport, as well as for the improvement of sea-river transport,

…To support the efforts of the governments concerned to develop the connections between the Danube, the Oder and the Elbe.

From the Declaration adopted by the Pan-European Conference on Inland Waterway Transport adopted in Rotterdam 5-6 September, 2001

The indirect, although quite obvious support of the D-O-E waterway project could be traced in the White Paper titled "European Transport Policy for 2010: Time to Decide". The Transport White Paper adopted by the European Commission on 12 September 2001. It recognises the great potential of inland navigation as an alternative transport mode for freight, in particular road transport, and consequently has a great interest in developing inland waterway infrastructure. It highly recommends to eliminate the bottlenecks of the network, reconstruct non-used waterways and built missing routes.

The D-O-E project remains an alive idea in UNECE. The so-called Blue Paper from 1998, which treats listing of norms and parameters of the main European waterways of class E (TRANS/SC.3.144), indicates the D-O-E canal as a 'missing link'. Similarly, the document TRANS/SC3/2002/1 from 2002, concerning the crucial bottlenecks and missing links of the category E waterways, marks the part of missing links in Austria, Poland, Slovakia and the Czech Republic with 'the Connection Danube–Oder–Elbe (E 20 and E 30)'.

Lastly, in the changes to the European Agreement on Main Inland Waterways of International Importance, adopted by the UNECE Working Party on Inland Water Transport on October 20, 2005, i.a. the article 2 was extended of the second paragraph, which suggests:

'Contracting Parties are called upon to establish national action plans and/or bilateral or multilateral agreements, such as international treaties, guidelines, memoranda of understanding, joint studies or any other similar arrangements, aimed at elimination of existing bottlenecks and completion of missing links in the network of E waterways crossing the territories of countries concerned.'

Last but not least, let us remind you that the D-O-E project is explicitly mentioned in the admission agreement between the Czech Republic and the European Union.

Dohoda AGN požaduje i zásadní zvýšení spolehlivosti vodní dopravy. Plavební přestávky jsou přípustné jen při zcela extrémních meteorologických podmínkách. V zimě se třeba požaduje – v mezích technických možností – udržování volné plavební dráhy i tam, kde dochází k zámraze. Odstávky za účelem údržby a oprav je třeba zkrátit na minimum, případně zcela vyloučit.

The AGN agreement requires a substantially increased safety of navigation. Navigation breaks are to be acceptable in severe weather conditions only. For instance, in winter it demands maintaining of ice-free passage whenever technically possible. Maintenance and repair breaks should be cut down to minimum, or eliminated entirely.

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Roudnice nad Labem – jez a horní plavební kanál.

Roudnice nad Labem – the dam and the upper approach.

Waterways of the new Czech Republic

A less careful observer of historical development may have grown assured, after having read the previous lines, that the realization of the D-O-E water corridor project must be nearing now: **from the initial ideas, often jotted with mistakes and naivety, over the political struggles at the beginning of the last century and authoritative decisions of the should-be thousand year Reich just before the WWII disaster, which eventually buried much more than this project, across the time of socialism building, we found ourselves in a situation, when the uniting Europe recognizes the need of such interconnection and is ready to support it. The chances of its realization were favoured even by the new economic and political atmosphere in Central Europe after the fall of the communist system, and especially after admission of the Central European countries to the EU. Also the breakup of the Czechoslovak federation brought about new aspects. The Czech Republic is no longer a Danubian country, and has lost a dependable contact with the European navigation network. That should provoke efforts for compensation of such handicap and initiation of concrete steps towards the D-O-E water corridor realization.** However, the optimistic expectations have proved wrong. Taking into account the situation inside the Czech Republic, who ought to play the role of a primary mover, we come to significantly different conclusions. **If you return few pages back, to the time after 1948, i.e. more than half a century ago, you will notice the thoroughness of dismantlement of both official and private structures which were supposed to support and carry out preparation and realization of the project. Until today, they have never been restored.**

The fact that after 1949 the waterway development was transferred to the competences of the water resources management, where it has been on the fringe of interest, has brought about especially negative impacts. The water resources management itself later became inferior in the frame of other resorts, like energetic, agriculture, forestry, and finally the environment. **Such decision seems to be about as absurd as having the Ministry of Environment look after development of motorway network. Had that been the case we would have hardly had a single kilometre of motorway to drive on. Speaking of driving: where would a driver get using the gas and brake pedal at the same time? As the Ministry of Environment seeks to promote untouched nature, i.e. slow down development, construction of any transport infrastructure certainly involves contradictory efforts. Nevertheless, in the case of waterways such competence mistake has occurred and consequently, for many years, paralyzed attempts for any progress.**

A partial breakthrough in the frost of waterway development (although not directly concerning the D-O-E project) came only with the act n. 114/1995 from May 25, 1995. It amended conditions of inland waterway navigation and scope of competences of ministries and other authorities within the sector. The question of waterways was finally separated from the water management issues, and their development fell into the scope of the Ministry of Transport.

The act allowed a final definition of a clear conception treating waterway development on the Czech territory, i.e. the "Programme of assistance to development of water transport in the Czech Republic till 2005" appeared, which became a ground for the later Government Decree n. 635/1996. However, this decree did not bring any progress in the matter of the D-O-E project. It rather modestly claimed the need of preparation for the first stages of the interconnection, namely making the Morava navigable from the Danube, and the Oder navigable from Koźle to the Czech territory. Yet, the realization schedule was left untreated again. In addition, even though the explanatory report of the government decree quoted the UNECE documents, they did not mention that the documents had clearly proved economic efficiency and usefulness of the interconnection from the transportation point of view. Instead they presented the government with foggy statements of 'unconvincing transportation necessity' of the project.

The first stage of making the Oder and Morava Rivers navigable up to Ostrava and Hodonín, respectively, must involve collaboration with Poland, Slovakia and Austria. Therefore, it is necessary to officially pronounce such mutual interest and according to the result then set for cooperative preparation and economic evaluation of the projects. Realization of the projects is not estimated to happen before 2005. Until then it is necessary to protect the project in the guiding part of ground plans.

The Danube–Oder–Elbe canal interconnection has been previously treated in detail in technical studies, namely within so-called General Solution of the Danube–Oder–Elbe canal interconnection, which was drawn by an expert group under the auspices of the UNECE in 1960–70s. In terms of these technical studies, the considered D-O-E canal has been territorially protected in guiding parts of ground plans of higher territorial units.

The UNECE has pronounced the D-O-E canal interconnection a project of European significance; in 1994 the Economic Comission for European Inland Transport of UNECE adopted the final document of the economic study on the D-O-E interconnection from 1993, while appointing all the concerned countries, i.e. Czech Republic, Slovakia, Austria and Poland, to participate in its realization.

The investment costingness of the project, together with its current unconvincing transportation necessity designates realization of the project (as a whole) to the farther horizon, when the Oder and Morava Rivers have been gradually made navigable.

In the context of the above-mentioned, it is advisable to retain the protection of the Danube–Oder–Elbe canal interconnection route in guiding parts of ground plans of higher territorial units.

Abstract from the explanatory report to the Decree of the Government of the Czech Republic n. 635/1999

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Modernizované plavební komory v Roudnici na Labi.

The modernized locks at Roudnice on the Elbe River.

The tactic of the explanatory report differs little from the policy of 1971, when the efforts for actual preparation of the D-O-L interconnection got entirely suppressed. If it is not possible to overrule the project with real evidence, it is quite enough to declare that its route will be 'territorially protected', in order to be carried out in the 'farther' time horizon. That is on the better chance. One has lately received signals of attempts to abolish the territorial protection of the D-O-E route. Until today, preparation of the 'first stages' as by course of the government decree n. 635/1996 has not advanced much. The situation has not improved even after April 1, 1998, when the Ministry of Transport of CR established a state budget organization of the Directorship of Waterways of CR, which was to continue work of the former Directorship for Construction of Waterways, abolished in 1949. The organization has been still seeking its original mission and authority. Extending the navigability of the Elbe from Chvaletice to the immediate proximity of the lock and dam Přelouč has been the only more significant progress step so far. The extension was achieved by deepening of the riverbed in order to create a sufficiently deep, although mostly one-way, navigation channel. **In 2007, as a sequence of this section, works should have started on the Přelouč II short lateral canal with a lock, which should bypass the Elbe rapids as well as the old listed Přelouč dam. This way an uninterrupted waterway on the middle Elbe from Pardubice to Mělník, i.e. to the spot where the D-O-E water corridor will be connected, should be ensured in the near future. This expectation, though, was authoritatively put to a termination by the Ministry of the Environment by cancelling the already granted exception for building the Přelouč II water project, which actually stalled the already long expected launch of the construction. This even happened after concluding a tender for the main contractor. The date of 30 March 2007, when this happened, will certainly enter the history of Czech waterways as the "Black Friday" of the Elbe navigation.**

Finishing the navigation of navigable waterways on the middle Elbe would definitely be beneficial for Czech water transport, although it would not solve its major problem – the non-existence of a quality approach to modern waterways of the EU states. The regulated Elbe between Ústí nad Labem and Magdeburg is an unreliable waterway with restricted admissible drafts and so it cannot offer a quality approach according to current views in any case. This is also proven by a long-term stagnation of international transport on the Elbe, which could be characterized by the volume of traffic at the border section of this river at Hřensko. The last decade has even witnessed the change from stagnation to perceivable and continuous decline, which is not due to the lack of interest from the side of carriers, but rather due to continuous lowering of the capacity of the Elbe vessel fleet. The economic situation of Czech ship owners is even more difficult due to unsuitable navigability of the Elbe and has deteriorated to such an extent that it does not enable them to purchase new, more modern vessels. Therefore the vessel fleet gets older and available tonnage lowers. Since 1989, Czech shipyards have not had practically a single significant order from Czech ship owners and so this – once important – sector of Czech engineering deteriorates even faster than the Elbe water transport itself. The absolute downfall is prevented only thanks to orders from abroad so far. Some of them are even for river-sea vessels. Demanding delivery of outstandingly large vessels – although sometimes they are just bare hulls, the so-called cascos – via the Elbe waterway attracts attention of inhabitants as well as the media, but is actually another proof of the looming collapse of the Czech water transport. Talking about a nearing collapse might seem over-pessimistic, especially after thinking about the progress achieved on the canalized section of the Elbe waterway – its quality is currently comparable to the most modern European waterways in the whole section between Ústí nad Labem and Chvaletice, particularly thanks to the effort of the technicians. Due to inconsequence and slowing down to stalling its development in the past decades, the Elbe remains more or a torso, a kind of "favorable conditions for navigation" island, cut off from any consistent network. **Even 100 years after the Waterway Act was approved, it was neither managed to prolong the navigability of the Elbe to the natural terminal in the vicinity of Pardubice, nor to initiate a sufficient momentum for continuous improvement of the Elbe navigability in the Czech Republic or neighboring Germany. Should the Elbe remain just a way for delivering extra large products of Czech shipyards or a sought after tourist route offering views of romantic banks of the Elbe and the Vltava from the decks or river cruisers?**

Should modern water transport on this operationally perfect and high capacity transport way become just an exotic sight? Modernizing large locks on the lower Elbe are in sharp contrast with this situation. They began already in 1976, but the implementation came much later – Dolní Beřkovice (1987), Štětí (2003), Roudnice (2003), České Kopisty (2004), and Lovosice (1998). The vast modernization of the lower-Elbe locks, including the Střekov water project, was finalized then.

The atmosphere of the threatening crisis of water transport in the Czech Republic means the issue of a quality connection to European waterways is changing into a struggle for life. Therefore it is necessary to connect the Czech Republic to the Danube as fast as possible, which means to start the first stage of construction of the D-O-E water corridor, i.e. to repair the asyntrophy that began on the edge of the 1930s. Steps to implementation of this project have been more than reluctant so far, though. Only at the end of 2003 the Ministry of Transport of the Czech Republic ordered a feasibility study of a waterway between the Danube and the south of Moravia. Its credibility was undermined right after the works began by the ministry itself by a peremptory statement that it was by no means the first stage, but a fully independent aim that had nothing to do with the D-O-E water corridor, although its route, longitudal section, parameters and necessary consequences to the upcoming stages were identical. Might it be presumed that neighboring Austria and Slovakia (i.e. countries, whose territories should host at least 90 % of the total length of the first phase) would provide their territories for a project that is in sole interest of the Czech Republic without having a guarantee of immediate sequence of the other stages? Well, only after creating a continuous waterway to the Oder and the Elbe, these countries, as well as other European countries, can expect adequate benefits. **Presuming that neighboring countries would be willing to co-finance a "separate" Czech project even though the Czech party would be issuing statements that the future phases were out of question would be absolutely na ve. Similarly, the support from the EU funds would be more than difficult to get with this approach. The official Brussels viewpoint of the D-O-E water corridor is positive on the one hand, but on the other hand it is accompanied by a stern warning that the connection of the Czech Republic with the Danube has a chance of gaining financial support only as its first stage.**

It is necessary to mention a probably favorable change in circumstances brought about by the change of the political regime after 1989. That year opened the door for entrepreneurial activities once again, as well as for establishing various associations that would promote the intention of building the D-O-E water corridor – following in the footsteps of The Danube-Oder Canal Asso-

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Modernizace velkých plavebních komor na dolním Labi v letech 1987–2004

Modernization of main locks on the Lower Elbe (1987–2004)

Kompletně modernizované zdymadlo Dolní Beřkovice. Na snímku je sektorový jez, velká a malá plavební komora – obě přizpůsobené soudobým požadavkům.

The entirely modernized lock and dam at Dolní Beřkovice. The photo shows the reconstructed dam with sector gates, the main and the secondary locks, both adjusted to the current requirements.

Kompletně modernizovaný stupeň Štětí. Na snímku je segmentový jez, velká a malá plavební komora – obě přizpůsobené soudobým požadavkům.

The entirely modernized lock and dam at Štětí. The photo shows the new dam with radial gates, the main and the secondary locks, both adjusted to the current requirements.

Velká plavební komora v Dolních Beřkovicích dokončená v roce 1987. Na snímku vlevo jsou náhradní vrata, instalovaná na malé plavební komoře.

The main lock at Dolní Beřkovice. The reserve gate installed on the secondary lock is on the left.

Motorová nákladní loď vyplouvá z modernizované velké plavební komory ve Štětí.

A self-propelled vessel is leaving the modernized lock of Štětí.

Modernizace velké plavební komory v Roudnici nad Labem (2003).

The main lock at Roudnice nad Labem during reconstruction.

Zdymadlo České Kopisty v době rekonstrukce velké plavební komory (2004).

The lock and dam at České Kopisty during the reconstruction of the main lock (2004).

Horní ohlaví a svodidla modernizované velké plavební komory v Českých Kopistech.

The upper gate and a guiding wall of the modernized main lock at České Kopisty.

Kompletně modernizované zdymadlo Lovosice. Na snímku je v pozadí sektorový jez a v popředí velká a malá plavební komora.

The entirely modernized lock and dam at Lovosice. The photo shows (in the backround) the reconstructed dam with sector gates, the main and the secondary locks.

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Současná plavba na dolním Labi

Inland navigation on the Lower Elbe of today

Již dnes je běžné používání poměrně velkých tlačných souprav. Díky modernizovaným plavebním komorám se nabízejí další možnosti zdokonalení této technologie.

Relatively large convoys are already quite common today. Modernized locks allow further improvement of the technology.

Vlečné remorkéry a tradiční čluny na Labi již vymizely. Vlečná technologie pomalu dožívá již jen v kombinaci motorová nákladní loď a jeden vlečný člun.

Tugs and tow barges have disappeared from the Elbe. Towing technology survives only in combining self-propelled vessels with one barge in tow.

Kajutové osobní lodě nejsou náročné na ponor. Příliš jim proto nevadí omezené hloubky na Labi pod Střekovem.

River cruisers are usually shallow-going. Their operation is therefore not so much complicated by limited depths on the Elbe River in Germany.

Labská vodní cesta je využívána také pro expedici mimořádně velkých jednotek – i říčně-námořních lodí – z českých loděnic.

The Elbe waterway is also used for expedition of extremely large units – including river-sea vessels – produced in Czech shipyards.

ciation's activities from 1938-1959. **The first real attempt to reignite the interest in implementation of the D-O-E water corridor was the establishment of the ETMAS joint-stock company on 9th April 1989, i.e. in the air of the nearing change of the political climate. This company was founded because of the initiative of 64 leading Czech, Moravian and Slovak companies. Its statute contained clear passages about promotion, preparation and construction of the Danube – Oder – Elbe waterway. The company initiated creating the international Working Partnership for the D-O-E Canal (ARGE DOEK}, which was established on 9th April 1993. Important subjects from the neighboring countries, the Vodohospodárska výstavba Bratislava state-owned company and the Wiener Hafen GmbH, entered the partnership as co-founders. The partnership concentrated mainly on gathering relevant information about the project. The passage about promotion, preparation and construction of the Danube – Oder – Elbe waterway was deleted from its statute due to the decision of the general meeting as of 1994, though.** Therefore the same year witnessed the establishment of the Waterways Foundation which was later transformed into a Grassroots Support Organisation called Navigation and Waterways. This GSO focuses its activities in the Czech Republic and elsewhere on waterways development promotion, which includes the development of the D–O–E corridor. During the ARGE DOEK activities, it became apparent that it would be necessary to establish a relatively tightly controlled and stable association of legal entities. This happened on 4th July 1997 when the Danube–Oder–Elbe Association with the seat in Prague was founded. It needs to be said that the most active members of the association have been the Austrian ones. One of the goals of this association and companies aimed at promoting waterways is increasing awareness about this intention in political circles as well as general public and creating a certain discussion platform for the exchange of opinions – it is quite clear that some of them can oppose each other, but the most important thing is that they should not be based on unsubstantiated knowledge of the issue or on unnecessary emotions. If the support of the project has been non-continuous and little efficient both in official and unofficial circles so far, the same cannot be said about the opposite activities. There is no doubt that the D-O-E waterway project has never been favored by the mighty railway lobby and is treated similarly by the now also very mighty highway lobby. Fifty years of unwritten embargo on the project after 1948 brought about guesses and legends that do not help the prestige of the project at all either. The most often repeated legends are the ones about conflicts with the environment that usually lead to almost grotesque situations.

THE GOVERNMENT OF THE CZECH REPUBLIC

DECREE
OF THE GOVERNMENT OF THE CZECH REPUBLIC

as of May 17th, 2006, No 561
on the Spatial Development Policy of the Czech Republic

The Government

I. a p p r o v e s the Spatial Development Policy of the Czech Republic included in the part of the IIIrd material, reference number 661/06 (thereinafter, only "Policy");

II. i m p o s e s
1. to the Government members and heads of the other central administrative authorities
   a) to take into consideration the Policy when elaborating conceptual documents within the competence of the Ministries and authorities managed by them,
   b) to fulfil the tasks determined by the Policy,
   c) to cooperate with the Minister for Regional Development on elaboration of the Report on the Policy application,
2. to the Minister for Regional Development
   a) in cooperation with the ministers concerned and with heads of the other central administration authorities to submit the Report on the Policy application, and the updated draft of the Policy to the Government before December 31st, 2008,
   b) to provide the publication of that decree in the Official Gazette of the Government to be at the disposal of regional and municipal authorities,
3. to the Minister for Regional Development in cooperation with the Vice-premier and the Minister of Transport, Ministers of Environment and Agriculture that they create a joint committee in which the regions concerned should be represented for the purpose of feasibility and purposefulness verification of the protection of the area along the canal connection Danube – Odra – Labe and to submit the recommendation of the commission mentioned to the Government before December 31st, 2007;

III. r e c o m m m e n d s
1. to governors of regions and to the Mayor of the city of Praha
   a) to take the Policy into consideration when procuring the planning documentation, and then elaborating conceptual documents,
   b) to cooperate with the members of the Government, as well as with heads of the other central state administration authorities,
      ba) when fulfilling the objectives determined by the Policy,
      bb) when elaborating the Report on Policy application,
   c) to cooperate with members of the Government within the joint committee the objective of which is to examine the feasibility and purposefulness of the of the protection of area along the canal connection Danube – Odra – Labe,
2. to the mayors of municipalities, to take the Policy into consideration when procuring the planning documentation of municipalities and when elaborating conceptual documents.

To be realized by:
Members of Government, heads of the other central administration authorities.

Notice to:
Governors of regions, the Mayor of the city of Praha.

Prime Minister
Ing. Jiří P a r o u b e k , in his own hand

Activities of various associations can master very little, though, especially in the atmosphere of the official approach still in place – the one based on sterile "route preservation" and permanent delays of concrete action. The critics of the project are not even satisfied with such obstructions and often push for overriding the preservation of the area, often in very weird ways. One of such attempts was for example the decree of the Government of the Czech Republic No. 561 of 17th May 2006 with an innocent name – "Regional development policy of the Czech Republic". This decree urges "the Minister for Local Development in cooperation with the Deputy Prime Minister and the Minister of Transport, Minister of the Environment, and Minister of Agriculture to establish an interdepartmental committee with representation of affected regions to examine the reality and expediency of the preservation of the area of the Danube – Oder – Elbe canal connection and submit the recommendation of the committee to the government by 31st December 2007." The way how this point was "smuggled" into the decree is bewildering, particularly if taking into account quoted international documents and commitments of the Czech Republic, including the text of the Treaty of Accession to the EU on the one hand, and absence of any relevant foundations justifying the abandonment of the area of preservation on the other hand. Quite a few more resolutions were issued by the Czech Government as well as by the Parliamentary Assembly of the Council of Europe, but without any actual conclusions aimed at implementation of the D–O–E water corridor (p. 386 and p. 389).

It is sometimes said that history does not make sense and the D-O-E water corridor case is a prime example that this applies even now. So it might be the best option to leave the history behind and move towards the more important issues that can be briefly characterized as follows:

- **if** the D-O-E project is purposeful from today's point of view and whether it should be implemented or not;
- **what** shape it should take and which functions it is to fulfill;
- **how** it will influence the nature, environment, social atmosphere, and other important spheres;
- **when** it is necessary to begin its implementation;
- **how** high costs will it require, how should they be obtained and how they will be paid back.

The most important answer is the one for the basic question, i.e. if the project is economically and ecologically purposeful, efficient and necessary. If the answer reads yes, a logical follow-up must be: well, why not now? This question has never been asked in the past 50-60 years, though. And those who often repeat how much they are for implementation of the project, only some time in the future, must definitely be overjoyed thanks to it.

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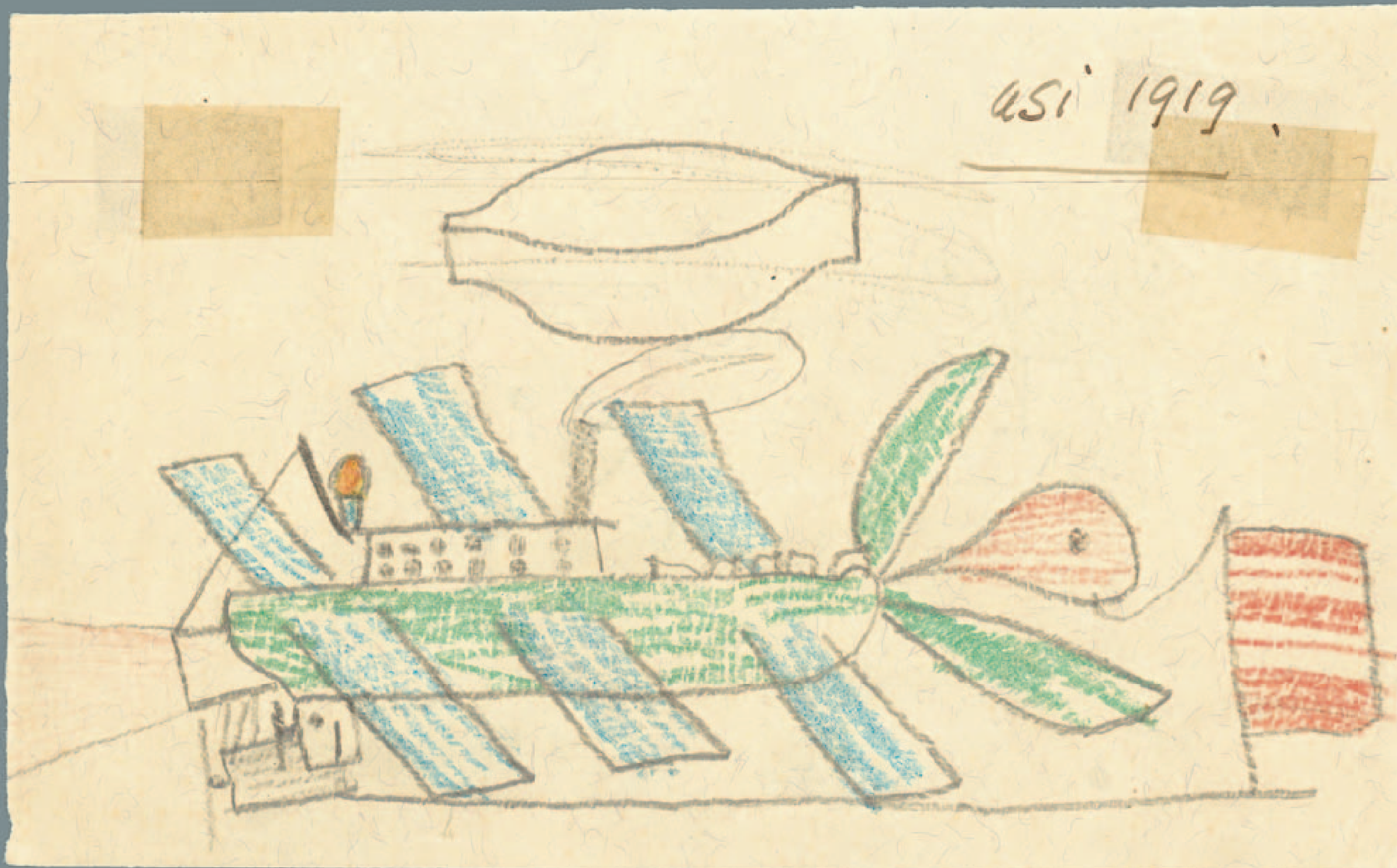

Kamil Lhoták

Nothing is stronger than an idea whose time has come.

Victor Hugo

Dnešní skutečnost a pohled do budoucnosti

Current situation and an outlook for future

III

Historie nabízí příklady a zkušenosti, které jsou pro vysvětlení současného stavu i pro pohled do budoucna velmi cenné. Proto jsme jí věnovali nemalou pozornost. Otázku, jaký význam je možno přisuzovat vodnímu koridoru D-O-L v současnosti či v budoucnosti, znalost historického vývoje řeší jen částečně. To platí také pro otázku obecnější. Má pomalá vnitrozemská vodní doprava v Evropě ještě ekonomický význam v době, kdy v dopravním systému dominuje rychlá a pohotová silniční doprava a ke slovu se hlásí i vysokorychlostní železniční expresy nové generace?

We have paid a great deal of attention to history. It offers examples and experience quite indispensable for understanding the present as well as for an outlook for future. However, the problem of current or future significance of the D-O-E corridor will not be fully solved only through profound knowledge of history. The same applies to the more general question: whether the slow inland navigation will compete in the system dominated by the fast and prompt road transport, closely followed by the next generation high-speed railways?

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Development of water transport in Europe

The answer is likely to be found in the countries, where water transport has not only kept in step with its competition but has been able to employ all its advantages, as well as offer entirely new possibilities, unknown in the past.

An analogical question could be asked in terms of contemporary and future role of waterways, which existence and further development is an omnipotent condition of water transport. In this case, the response has to originate from much larger scope. **Unlike railways and motorways, waterways are not mere traffic routes. They offer many other functions, which significance compares to the transport one, and at times, proves even more important.**

Role jednotlivých doprav při přepravě nákladů v zemích EU. Graf uvádí podíly na přepravním výkonu v tkm.

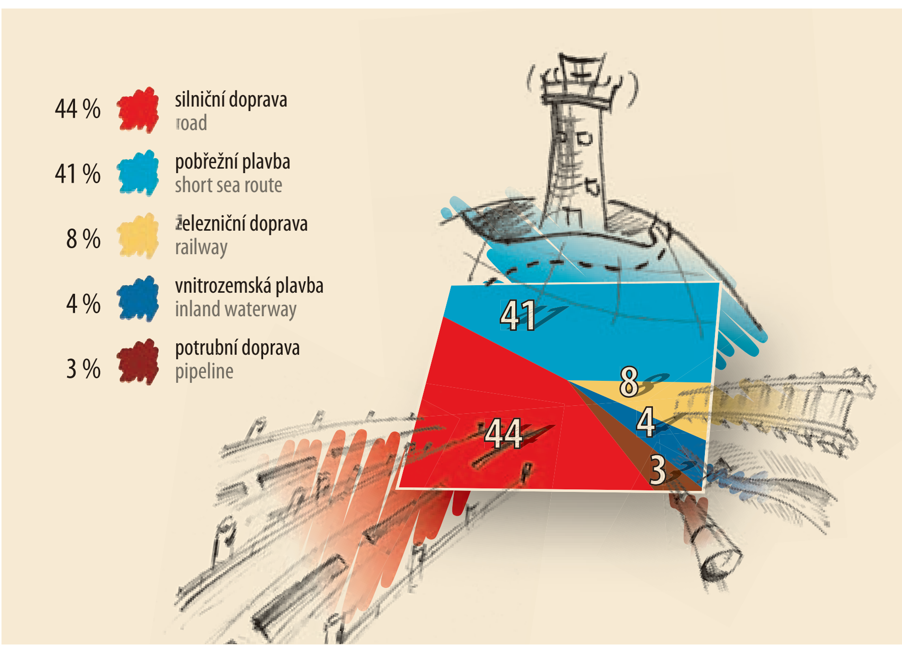
Modal split of freight transport in EU (1999). The graph shows the shares on total transport performance in ton-kms.

Říčně-námořní loď s nízkou nástavbou na řece Trent ve Velké Británii.

A low-profile river-sea ship on the River Trent in Great Britain.

The relative importance of individual types of transport in cargo transportation is characterized chiefly by their percentage share of the total transportation output in ton kilometres. The unit is a multiple of the cargo weight in tons transported along a trajectory in kilometres. When evaluating importance of each transport type and the respective tendencies, it is imperative to result from situation in economically advanced countries with modern transport systems. In case of the Czech Republic, it is the best to consider the situation in member countries of EU before the 2004 expansion, i.e. before it was entered by countries, which yet do not match the criteria. According to the data from 1999, including all the EU members, the share of inland navigation was 4 % of transportation output. The figure seems to be very low only at first sight. In the same year, the railway, persistently considered the spine of the transport system, reached only 8 %, even though all the countries feature it, while inland waterways could be found only in some of them. If halting of the bustling growth of road transport – and its alarmingly negative impact on the environment (emissions, noise, water pollution and accident casualties) is the EU transport policy priority, the role of water transport in order to achieve such goal, is indispensable.

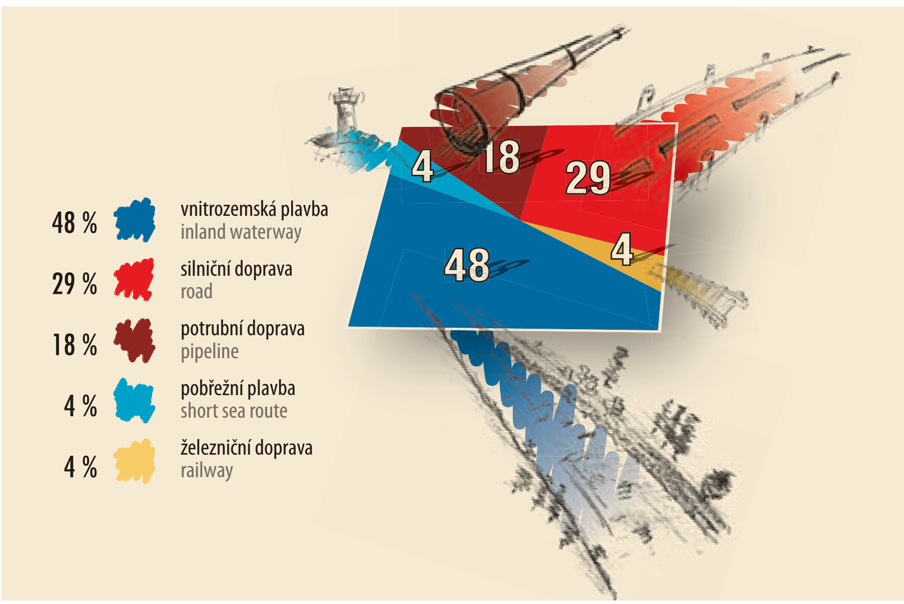
However, the statistical data could be interpreted differently too. Let us take a note of the coastal navigation share in the exchange of goods between the EU countries.



The respective sum does not include distance sea navigation, as its transport output ranks high above the levels of the inland or coastal average. Although it includes transport performed by smaller coasters, e.g. from Italy to France, from Germany to Denmark or Finland etc. The category also includes vessels reaching deep to the inland, using the inland waterways, with their construction especially adapted for such combination navigation purposes. It concerns mainly the river-sea going vessels, adjusted for limited coastal navigation or on shorter lines, crisscrossing the inner seas. As the river navigation purposes must take into account low bridges, such vessels are fitted with low superstructure, a lowerable wheelhouse etc. The differences between the purely inland or coastal navigation thus often merge; there are even tendencies toward their gradual integration. Summarizing the shares of both the transport types, it is safe to say that navigation as such (on either sea or fresh waters) is the main carrier of cargo transport in EU. **The total share of navigation in the EU transport output exceeds 40 % and measures up to (or often outmeasures) the fast-growing share of lorries. Compared to railways, it is approximately 5 x larger!**

A slightly different view of the inland navigation itself will show in the data of its share on goods exchange between the EU countries, which consider longer transportation distances. Then its share is 2 x larger. Even more significant arguments of its cargo transport importance will result from comparison within the countries of developed waterway network only, not in the frame of the whole EU. Results that are still more convincing are obtained in the regions with truly a modern system of waterways, which compares to high-capacity railway or motorway network. E.g. the rear of the largest world seaport, Rotterdam, provides such conditions. The cargo transportation from and to this port is widely dominated by inland navigation, its share reaching to 48 %, notably suppresses the share of road transport.

At this very point, a careful reader starts to criticize the text, arguing that slow river vessel can hardly match up to fast and prompt trucks, allowing shipping from door to door, always true to the spirit of "just on time". He or she can also point out that the inland navigation is usually restricted to transportation of bulk cargo like coal, ores, gravel sands, when the speed really does not matter much, and which are transported in high volumes. Even though the reality is quite different, such misinterpretation of water transport still remains.



Podíl jednotlivých doprav při obsluze přístavu Rotterdam.

Modal split of inland transport servicing Rotterdam seaport.

Na trase Rotterdam–Duisburg se při přepravě hromadných nákladů uplatňují především velké tlačné soupravy.

Bulk cargo transport between Rotterdam and Duisburg uses mainly large pushed convoys.

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Where is the truth?

The precipitate development of road transport and expansion of the motorway network, namely after WWII, truly led to higher cargo volumes, namely of piece goods, which were highly speed and accuracy demanding. Its stream left waterways and moved to the road. The same phenomenon hit also the railways, which have paid even a higher price for the automobile boom than the water transport. The reasons are similar in both cases: a railway train or a river vessel are both large units, which are not convenient for shipping of smaller articles. To gather such small parcels e.g. in boxes, barrels, sacks or other packaging in the amount large enough to fill a barge or tens of wagons to create a whole train that would be very slow and costly. It makes the transport more expensive and disproportionally extends the delivery period. **The delivery period does not really depend on the technically available speed of the means of transport but rather on the operations required before the cargo can be actually shipped out. Containers have introduced a revolutionary change of the practice; their capacity and loading limit roughly equals the box of a wagon or a trailer, they are easy to manipulate when loaded or unloaded, while they fully substitute a warehouse in the place of transhipping. The container has "bulked" the piece goods and rid off the above-described inefficient operations.**

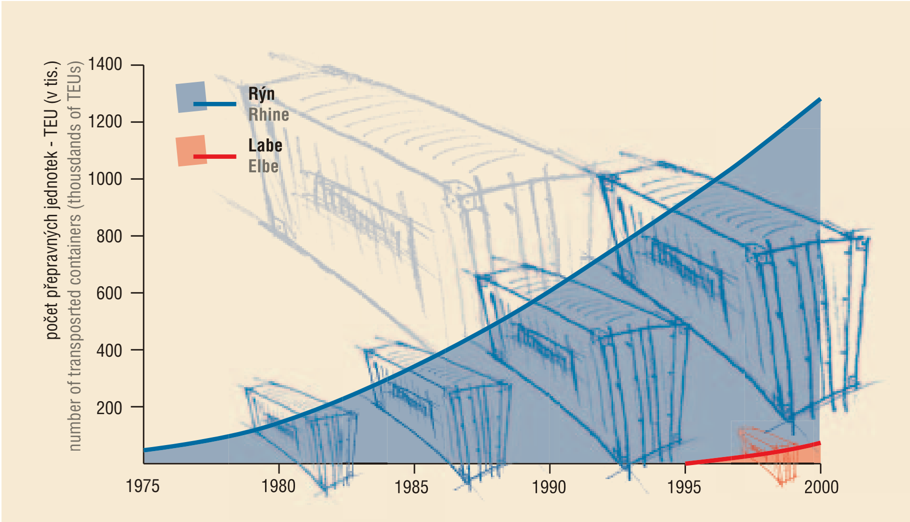
Containerization was pioneered by sea navigation, as it uses the largest vehicles. Some 50 years ago, piece goods were only transported by smaller sea vessels. Their loading and unloading took whole days. Today it is quite common, that a container ship carries up to several thousands TEU in many tiers. Nevertheless, their port stops count only by hours. The situation is quite similar in inland navigation. The standard width of the freight hold in the vessels of the modern European waterways can carry 4 rows of containers in two, three (most often), four, and sometimes even five (Rhine) tiers. Large cargo vessels can thus hold 200–500 TEU, and even more in pushed convoys. The container transport set the bridge clearance height in waterway classification. Container shipping is also more demanding in terms of transport speed as well as continuous around-the-clock operations. That again requires modern equipment of the waterways, e.g. radar detectable navigation signs. The state-of-the-art equip-

Speciální kontejnerové lodi na Rýně přepravují obvykle více než 100 jednotek (TEU) ve čtyřech řadách a čtyřech vrstvách.

Special container vessels on the Rhine usually transport more than 100 TEUs in four rows and four layers.

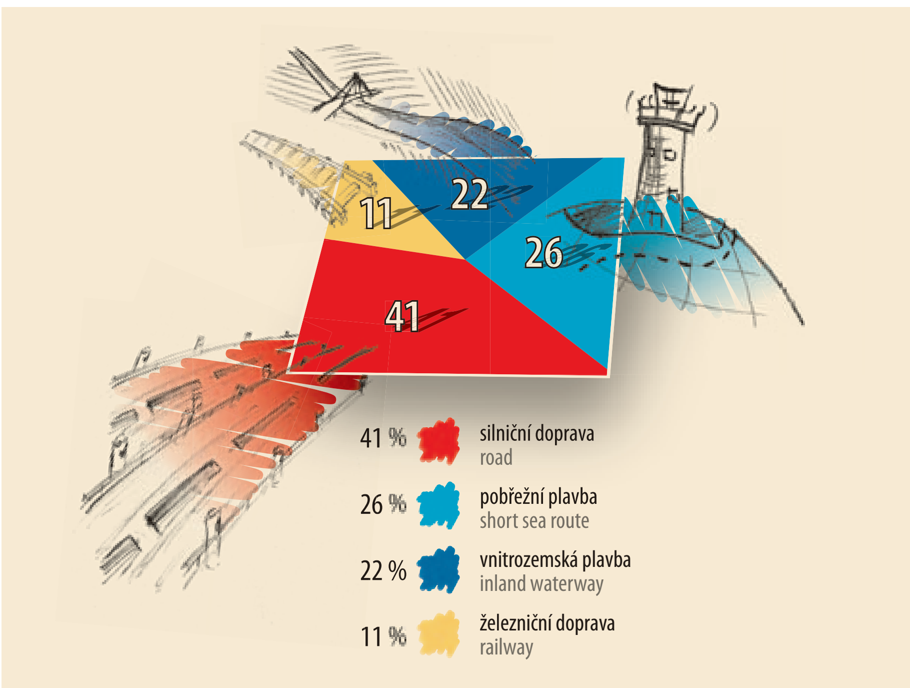
Vykládka kontejnerů ve vídeňském říčním přístavu.

Unloading of containers in the river port of Vienna.



Vývoj přepravy kontejnerů na Rýnu a na Labi.

Progress of container transport on the Rhine and Elbe.



Podíl jednotlivých doprav na rozvozu a svozu kontejnerů při obsluze přístavu Rotterdam.

Modal split of container transport servicing the seaport of Rotterdam.

ment of the container vessel, which allows partially or fully automatic conduct, is absolutely common today. Container transport bloom on the waterways depends on development of port logistic centres, fitted with the necessary transhipping machinery and with a sufficient area for storing containers. Such centres offer even other services (filling the containers, packaging, goods checks, customs services etc.). Long-distance transport between such centres, and especially between the centres and seaports, is mainly about collection and delivery. Such combination guarantees efficient transfer of goods from the roads to the railway and waterways, or it at least prevents any further increase of the share of the automobile transport.

The statistics of the container transport on the Rhine and other EU waterways prove such progress. The first containers sailed the Rhine as early as in 1970s. In 1975, there were 50,000 of them shipped. In 25 years, the number increased 25 times; in 2003 the number of containers broke the amount of 1.3 mill. TEU[1] and the boom has not stopped yet.

As the container transport has been growing very fast, the growth dynamic of containerized goods have proved much higher than of the "classic" goods. It is interesting to compare container transport servicing the seaport of Rotterdam according to individual transport types: the waterways move twice as many containers than the railway.

Speciální rýnská kontejnerová loď Jowi může převážet téměř 500 TEU.

The special Rhine container vessel Jowi can transport nearly 500 TEUs.

[1] *Number of containers is usualy expressed in TEU (Twenty Feet Equivalent Unit). This unit equals to a container with a lenght of 20 feet (6,06 ms). The largest containers have a lenghts of a 40 feet and equal thus 2 TEU. The truck can transport 2 TEU, in the case of heavy cargo only 1 TEU.*

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COSCO


TERRA


SERVE

Menší a rychlá kontejnerová loď třídy Neokemp může zajistit rychlou obsluhu při kratších přepravních vzdálenostech, a to i na menších vodních cestách II. třídy. Uveze 48 TEU ve třech vrstvách.

Smaller and fast container vessel of Neokemp class provides quick service on shorter transport distances, even on smaller waterways of class II; it can carry 48 TEU in three layers.

Speciální lodi na přepravu automobilů na Rýnu převážejí až 600 osobních vozů.

Special Rhine vessels for transport of automobiles can carry up to 600 cars.

Automobilka Renault na břehu Seiny v Paříži může nakládat vyrobené vozy přímo na speciální říční čluny.

The Renault factory on the Seine bank in Paris loads their products directly to special barges.

Přeprava automobilů na Seině pod Paříží (plavební komora Andrésy).

Transport of automobiles on the Seine below Paris (the lock Andrésy).

Speciální tanker pro přepravu chemikálií. Vodní dopravě se vzhledem k její bezpečnosti dává přednost při přepravě nebezpečných nákladů včetně zkapalněných plynů.

A special tanker for transport of chemicals. Due to its safety, navigation is a preferred way of transporting dangerous cargo, including liquefied gases.

The promising development of container transport by inland navigation can be tracked on other EU waterways: e.g. in France on the Seine and Rhône Rivers, on the main Belgian and Dutch waterways, as well as on the German canal network. The trend can be spotted even on the Elbe, although it interferes with the lack of reliability in dry periods. The Danube waterway offers extremely convenient conditions, as it matches the Rhine from the operations point of view, and a boom of container transport – similar to the Rhine – is a matter of the nearest future. According to estimations, the EU waterways should transport up to 7 mill. TEU in 2010. A similar progress has been recorded in the transport of personal and commercial vehicles, which are loaded to special vessels with the ro-ro system (roll on – roll off). A growth is to be expected even in transport of dangerous substrates (flammable liquids, liquefied gases etc.). **Already today, the inland navigation transports relatively a larger share of dangerous substrates than the road or railway transport. Paradoxically, it is a result of environment protection standards. The high safety of water transport lowers the risk of ecological damage by escape of harmful substrates into water, or air and soil. As this is a largely unknown fact, there is a space for some curious ideas in**

In case of accident, only a mere transport of salts, fertilizers and grains could cause an enormous pollution of the environment. Transport of dangerous cargo (waste, mineral oils etc.) is then especially problematic.

The proposed Danube–Oder–Elbe waterway from the point of conservation and environment. Veronica, Brno 2002

It is a capital mistake to theorize
in advance of the facts, my dear Watson.

Sherlock Holmes (A. C. Doyle)

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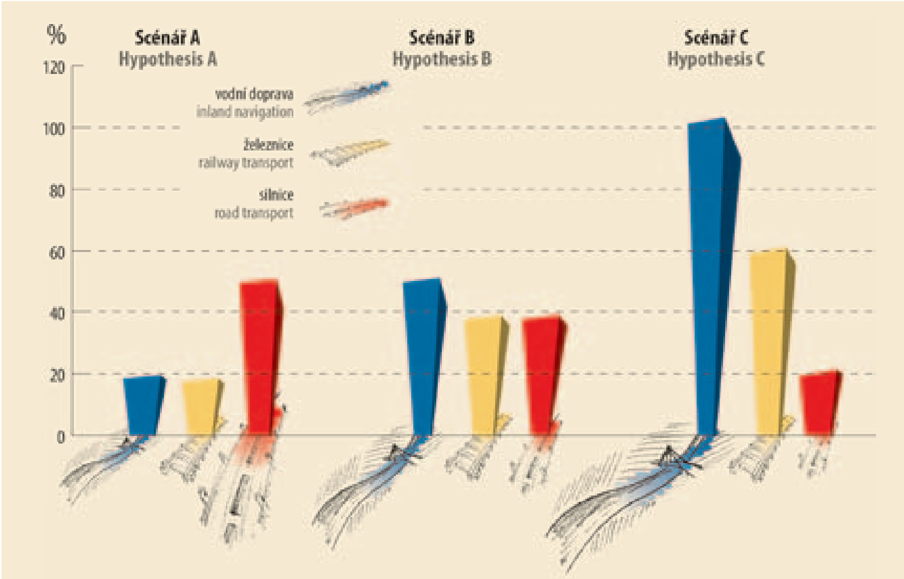


Scénáře možného růstu nákladní přepravy v jednotlivých druzích doprav do roku 2010.

Prognosis of the cargo transport growth in individual means of transport till 2010.

Statistic data of the EU countries document that the volume of goods transported by inland navigation in the past decades has grown, as well as the respective transportation output – and usually faster than with the railway transport. The inland navigation seems to be more truck-resistant than the railways; its percentage share of the total output basically has not dropped, which can hardly be said about the railway transport. Considering the expected growth of general transportation demands and the required suppress of the road transport, we can safely presume that employment of water transport in the European conditions will keep growing. The EU prognoses present three different scenarios of the transportation output shares in the course of future development:

Pessimistic hypothesis A. It does not count with radical transport policy interference with the transport market. The road transport will keep expanding the fastest with all the negative environmental impacts.

Realistic hypothesis B. Legislative and other noninvestment interference will keep the vessels, trains and trucks in balance. This option counts with the water transport output to grow quite significantly until 2010, approximately by 50 % from 1998.

Optimistic hypothesis C. If the investments are realized, which are bound to improve the railway and especially, yet not quite coherent, waterway infrastructures, these environment-friendly transport types will outrun the expansion of the road transport quite significantly. The EU navigation outputs can than grow by more than 100 %.

The far-sighted, environment-friendly scenarios (B, C) count on faster growth of water transport than the railway. Such development is supported by three facts: firstly, the span between the rates of water and road transports is larger than between the rates of automobiles versus railways; secondly, the waterway network offers much more reserves than the railway network; **and lastly, the objective views of environment conservation must win. There has to be a significant suppression of automobile transport in order to relieve the environmental burden of transportation activities, which in case of road transport is the worst, while the smallest in the water transport case.** The burden, concerning emissions, noise, accidents etc., could be generally expressed as so-called external costs of transport. They cover compensation of negative impacts of transport, and although they are not included in the tariff rates, every citizen bears these expenses. The EU data on external costs of transport speak in favour of water transport very clearly.

Similarly to the official EU sources, the future development has been estimated by the INE agency (Inland Navigation Europe), sited in Brussels. Materials of the agency evaluate separately the expected development in individual areas of the European navigation network, and at the same time, they describe two alternatives of development in 2000–2015.

- The first – minimal – alternative considers the current operational and economic features of the network in the respective area i.e. zero investments into its improvement or further development.
- The second – optimal – alternative, on the other hand, presumes realization of the proposed investment projects in order to improve quality of the infrastructure.

The INE prognosis indicates even the probable course of transport development in case the interconnection Oder–Danube would open for operation by 2015. The estimation might seem very modest at first sight, until you compare it to the current water transportations in CR. It would represent ten times the amount! Note also the multiple growth of the traffic on the Seine–North waterway in case the route, which currently is classified as class I, gets modernized. The premise came closer to reality at the end of 2003, when the French government decided to built a new Seine – Scheldt Canal in the given route, corresponding to the class Vb, i.e. allowing pushed convoys carrying up to 4,400 tons. This new waterway connection should be open by the end of this decade. Meanwhile, the decision has proved that water transport can effectively interfere with the excessive expansion of automobile freight transport, as it was primarily motivated by urgent need to relieve motorway A 1 between Paris and Brussels of the frequent heavy truck traffic. Apart from the EU funds, the project should be finance also from the motorway toll income, which argument truly speaks for itself.

The inland water transport in Europe seems to be in for some prosperous future due to its economic convenience, and above all for the new trends, which include containerization and different transport combinations, progressing integration of the river and sea navigation, as well as the emphasis on lower environmental impact of the transport operation. The graphic presentation illustrates it rather clearly. Further development of waterways, namely a more thorough integration of their network, must be considered one of the effective instruments of safeguarding the sustainable growth of the transport system as such. Despite all the objective information, some D-O-E project opponents argue that water transport is a matter of history that it has been barely surviving as its outputs keep dropping and the world has been once for all turning away from it. To support their statements they point out the British minicanals, where commercial navigation practically ceased, as the barges carrying 25 tons, towed by slowly pacing mules, could not compete with the developing steam driven railways. In this historical case, it might be true. Although to remain consistent, the public should realize that at the same time the railway swept even the horse pulled carts from the roads. Which, analogically, would make any road transport in the time of railway a pure nonsense.

History, although it sometimes gets "naughty", is chiefly edifying. In 16th century, the raft navigation was an adventure for bold travellers eager to see the world. At the turn of the third millennium, water transport of goods, often manufactured with the cost of extensive environment damages, and often largely redundant, is only an anachronism. The costly canals and cumbersome vessels remain a stiff and inflexible practice. Besides, the navigation on the British Isles was long conquered by the railway in 19th century... To the question: "Barges or ducks?", there is a brief response: "Leave, your time has passed!"

Krzysztof Smolnicki: Spływaj! Kropla – magazyn ekologiczny

As O. Štěrba rightly mentions, many a country experienced an apparent crash of the river transport. In the 19th century England, despite the hard natural conditions, one of the best waterway networks in the world was built. Today it is mostly abolished. It has left behind a number of damaged (canalized) rivers. In France, it is quite the same.

Jan Zeman: On efficiency of the proposed construction of the Danube–Oder–Elbe Canal. The seminar of "The Danube–Oder–Elbe waterway – ecology – economic - landscape", Olomouc 2003

History is a mass grave
of hasty judgements.

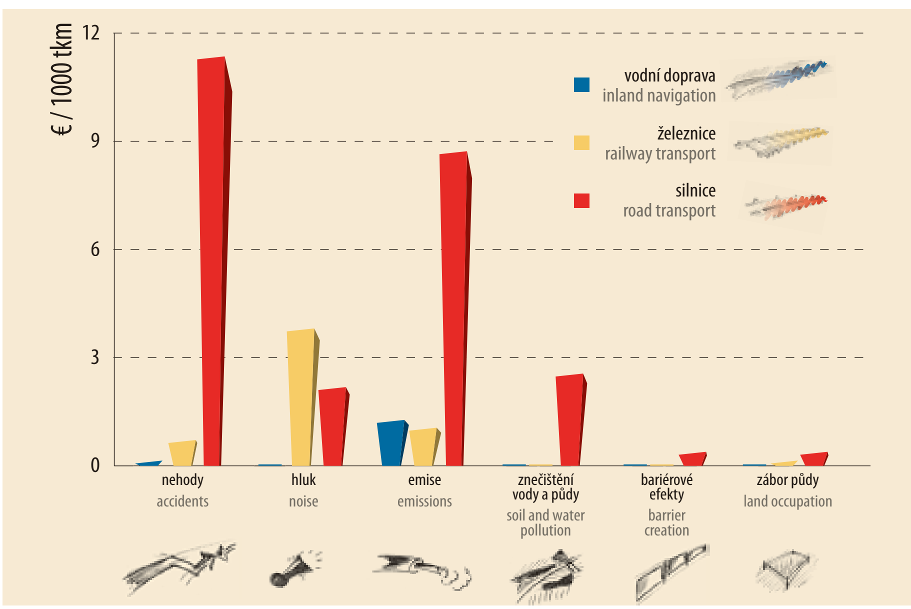
Daniela Fischerová

When you do not understand,
do not jump to shallow conclusions.

Josef Čapek

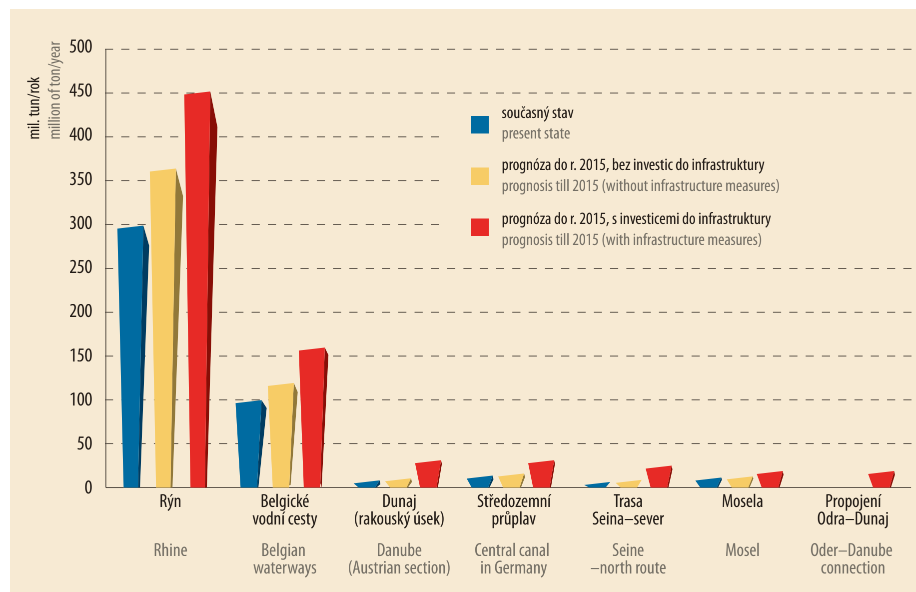
Error grows ever more dangerous,
when mixed with truth.

Ivan Sergeyevich Turgenev



Externí náklady jednotlivých doprav (tj. náklady na kompenzaci negativních vlivů dopravy na životní protředí v €/1000 tkm).

External costs of individual means of transport (i.e. compensation of negative environmental impacts of transport in €/1000 tkm).



Možný růst výkonů vnitrozemské plavby na různých úsecích sítě.

Potential increase of inland navigation traffic in different sections of the network (millions of tons/year).

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New dimensions of waterway development

The common opinion that inland water transport is somehow not up-to-date any more, has been hopefully sufficiently clarified in the previous chapter. Still, there are voices, which permit its development – or at least existence – within the current navigation network, but are at odds with the idea of any further expansion of waterways. Such voices often come from poorly informed circles or from the camp of the “fundamental opponents”, nevertheless – and so much the more – it is advisable to present few examples to prove, that neither in Europe, nor in the other continents the progressing or planned construction of waterways has been reduced to mere maintenance of the already finished sections or to some petty alternations. On the contrary, it concerns large-scale activities, which often involve record objects. Let us present at least the major ones.

V posledních fázích realizace průplavu Mohan–Dunaj se objevily snahy o zastavení jeho výstavby, v jejichž čele byli zejména ekologičtí aktivisté. Proti nim vystoupili obyvatelé z měst a obcí při trase vodní cesty s iniciativou nazvanou „Ano k průplavu Mohan–Dunaj“. Občané nakonec vyhráli a své uspokojení dali najevo při slavnostním uvedení průplavu do provozu dne 25. září 1992, kdy si pro uvítání první lodě pořídili historické kostýmy.

The last stages of the Main–Danube Canal construction were complicated when certain efforts – mostly of ecological activists – tried to stop the project. Inhabitants of towns and villages along the waterway opposed them with their protest “Yes to the Main–Danube Canal”. As the local citizens eventually won, they demonstrated their content at the opening of the canal on September 25, 1992: they welcomed its first vessel in historical costumes.

Celkový pohled na vodocestný uzel u Magdeburku. Uprostřed 918 m dlouhý průplavní most přes Labe, v popředí vpravo sestupná spojka k Labi se starým lodním zdvihadlem Rothensee a v roce 2001 nově zřízenou plavební komorou s úspornými nádržemi.

A general view of the waterway junction near Magdeburg. In the middle a 918-m canal bridge crossing the Elbe; on the right a descending canal branch to the Elbe with an old lift Rothensee and a new lock with saving basins.

Tlačná souprava dlouhá 180 m na modernizovaném úseku Středozemního průplavu.

A pushed convoy of total 180 ms passing the modernized section of the German Central Canal.

As for construction of new waterways, I assume, that the matter is absolutely clear – with certain European exceptions, new waterways will never be built any more. The advantages of water transport have been long exhausted. If today an enterprise group should try for a new waterway, they will clash with a hard reality of ever clearer economic relations, as well as a resolute opposition of the resort of environment.

Prof. RNDr. Otakar Štěrba, CSc., contribution "River transport and its ecological problems" [Říční doprava a její ekologické problémy], a seminar in Olomouc 2004

Things are fundamentally refused of accepted without a need of their closer examination.

Karel Čapek

The Main–Danube Canal, finished in 1992, is nearest to the Czech border. Its concept should be remembered again as it is inspiring even for the D-O-E water corridor. As its realization practically completed the whole basic network or German waterways, further investments in terms of BVWP (i.e. the plan of federal traffic routes) concentrate on modernization of the network, which in certain cases does not differ much from construction of brand new routes. The currently finishing stage modernization of the Central Canal (or rather the whole west-east connection from the Rhine to Berlin) illustrates it quite clearly. It will significantly raise the admissible draft limits, i.e. also the loading limits of the vessels (from 700–1,000 tons to 2,000–2,500 tons), allow long pushed convoys carrying up to 3,500 tons and above all a reasonable container transport (which involved raise or complete reconstruction of more than 300 bridges). The reconstruction then seeks to accelerate navigation and exclude any level crossing with the Elbe, which led to frequent draft restrictions. The modernization thus included erection of a unique multilevel junction of waterways at Magdeburg, with the 918 ms long largest canal bridge of the world. The project was finished in 2003.

Since 2004, the reconstruction of the canal between the Elbe and Lübeck commenced, as well as construction of the second line of locks on the Mosel in order to increase loading limits of the convoys, and especially to expand (more than double) the admissible capacity of this extensively used waterway.

Modernization of the Dutch and Belgian waterways is of a similar character. In a number of cases, completely new routes are built along the historical canals, which do not comply with the demands of today. The new route of the Canal du Centre in Belgium is one of the examples; the realization required construction of a long and progressively designed canal bridge across the Sart valley, and also the world's highest vertical lift Strépy, which surpasses a difference of more than 73 ms. The lift opened in 2002.

The regulation adjustments of the Danube between Vienna and Bratislava have not stirred so much medial attention. The project was to increase the navigation depths at low discharges from 2.20 to 2.80 ms, i.e. to a higher level than required by the Danube Committee. Although it does not seem to be too impressive, from the point of view of the navigation operational efficiency, it is a big step forward. Moreover, even though the concerned river section lies in a renowned Austrian national park, their concepts are by no means in a conflict. To the contrary, the planned intervention should contribute to revitalization of the river and its banks, and help to preserve water-level regime of the alluvial forest along the Danube. The same approach will be applied even at the proposed Danube regulations in Romania and in the Romanian-Bulgarian section of the river.

When looking for examples away from the European continent, the attention is naturally drawn to the recently finished Tennessee–Tombigbee Canal in USA. It exceeds the European dimensions as it was built to accommodate larger pushed convoy (carrying up to 12,000 tons), as well as in terms of excavation works, which the construction required.

In particular, it is hard to miss the boom of waterway construction in China, which could be easily demonstrated on the example of the dam Three Gorges on the Yangtze River (also transcribed the Chang Jiang). The case is worth mentioning namely for the one-sided information, which

Modernizace průplavu z Labe do Lübecku. Starou plavební komoru Lauenburg (v popředí), přizpůsobenou lodím o nosnosti 1000 t, má nahradit rozestavěná nová (uprostřed), která již vyhoví lodím o nosnosti až 2500 t. Foto z roku 2005.

Modernization of the Elbe–Lübeck Canal. The old lock Lauenburg (front) for 1000-ton vessels is being replaced with a new one (centre) ready for the 2500-ton ones. A photo from 2005.

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became literally a medial hit of the season. Let us put side by side both the medialized data and the concealed facts to get a complete picture of this water project. It should provide us with an interesting comparison of what information is generally distributed (statement A) and what is being hushed (statement B):

A: Creation of a large artificial lake called for relocation of more than 1million people.

B: True, but the main purpose of the project was to prevent flooding on the middle and lower sections of the river, which kept 70 mill. people in danger. In the big flood of 1931 150,000 people died and in 1935 the toll was approximately the same. In spite of vigorous anti-flood measures, the casualties could not be prevented (although recently the numbers are of a lower order).

A: It is a dangerous, environmentally threatening megalomania.

B: The basic parameters of the water project are comparable to any other Chinese projects of such type (which are not criticized as they are not so well known), after all quite proportionally corresponding with the "usual dimensions" of the country. When considering the environmental impact, you have to take into account the output of the hydropower plant, ten times the output of the nuclear power plant in Temelín. The plant is to produce a clean and renewable energy. The equivalent coal-fired power station would use 100 mill. tons of lignite, i.e. twice of the amount currently quarried in the North Bohemian pans.

Nedávno dokončenou novou trasou průplavu du Centre v Belgii (2003) mohou proplouvat lodi o nosnosti až 2000 t. Ve srovnání se starým průplavem je to sedminásobné zvýšení. V pozadí je vidět lodní zdvihadlo Strépy.

A recently finished section of the Canal du Centre in Belgium is used by vessels carrying up to 2,000 tons, which is seven times more than on the former canal. The lift in Strépy is in the background.

Průplav Tennessee–Tombigbee v USA (dokončený roku 1985) protíná rozvodí hlubokým zářezem, připomínajícím přirozené říční údolí. Objem zemních prací na tomto vnitrozemském průplavu je srovnatelný se zemními pracemi na Panamském průplavu.

The Tennessee–Tombigbee Canal (completed in 1985) crosses the watershed with a deep cut resembling a natural river valley. The volume of excavation and earthmoving works compared to those of the Panama Canal.

Tato tlačná souprava se 6 čluny nepatří na průplavu Tennessee–Tombigbee k největším. Parametry průplavu a plavebních komor připouštějí, aby byly připojeny ještě další dva čluny po obou bocích remorkéru.

This pushed convoy of 6 barges does not rank among the largest on the Tennessee–Tombigbee Canal. The canal parameters allow two additional barges to be hitched on both sides of a push boat.

A: Earthquakes will endanger the dam and the reservoir will be soon clogged with sediments.

B: The dam of the water project is located in a seismically extremely calm area and it is appropriately secured against quakes. A notably seismically active area spreads only to the reservoir. The dam is sufficiently raised in order to withstand tsunami waves, which could gather on the surface.

The problematic of sedimentation was subjected to detailed studies both in theory and on models; the results reflect in the dam construction. The pessimistic scenario estimates that sedimentation of 80–100 years will lower the water project efficiency by 20 %.

It is now time to mention the positive effect of the dam on the river navigability. Although this function does not count among the primary reasons of the project realization, it is very important for the future development of river traffic. Moreover, the realized navigation facilities are imposing. The fall of 113 ms is surpassed in a double five rise flight of locks breaking records in many its features, which admit river-sea going vessels carrying up to 10,000 tons of cargo or convoys of approximately twice as much the load. Parallely, a vertical lift is being built to service large passenger vessels and cargo vessels carrying up to 3,000 tons, which will push the Strépy lift to the second position on the "world chart". It hardly seems right to call the project megalomaniac and not to take into account the fact that due to focused efforts for improvement of its navigability the water transport on the Yangtze River has currently exceeded the outputs of navigation registered on the Rhine or Mississippi, which has remarkably contributed to the sustainable transport development of the most densely populated part of China. The margin between grand or grand-scale on one side and gigantic or giant on the other should not be trespassed so wilfully, unless you wish to slip into the range of cliché phrases.

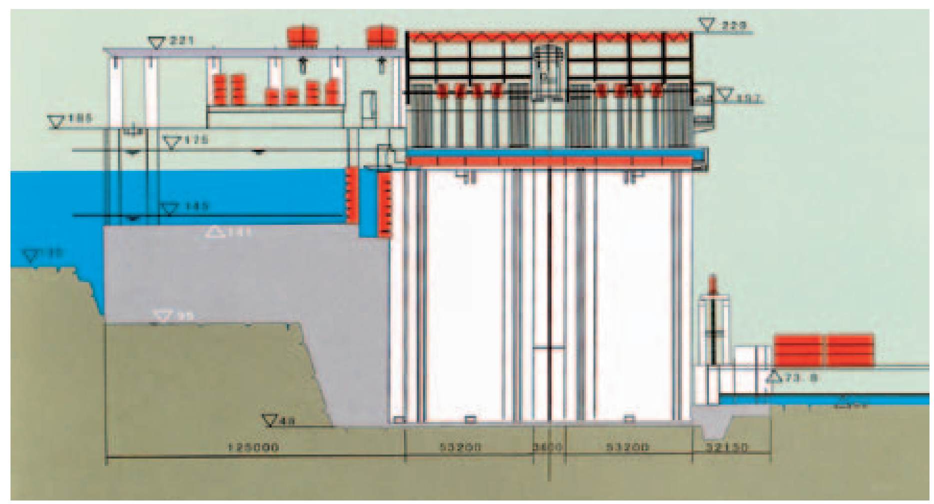
Phrases are criticised to spoil the language and style. That is true, although their destructive power reaches much deeper. A phrase merges difference between the true and untrue.
Karel Čapek

We could probably mention even the planned reconstruction of the Panama Canal for much larger vessels. However, it is a ship canal, so it is not quite appropriate to argue with its example. One note only deserves mentioning: the project was adopted upon a national referendum, which says a lot.

Let us return now to much more modest European conditions. As we speak, the construction work on the new waterway Seine–North (Seine–Scheldt) have commenced. As it represents an important progress step as well as inspiration for the D-O-E water corridor in many a respect, it deserves its own chapter.

Pětistupňová dvojitá stupnice plavebních komor na vodním díle Tři soutěsky v Číně. Rozměry každé z komor činí 280 x 34 m při hloubce záporníků 5 m. Dopravní kapacita stupnice dosahuje 50 mil. t v každém směru.

A double five rise flight of locks at the Three Gorges Dam in China. The locks have dimensions of 280 x 34 ms while the depth of sills is 5 ms. The transport capacity reaches 50 million tons per year in each direction.



V určité fázi výstavby vodního díla Tři soutěsky došlo k přerušení původní plavební dráhy a k částečnému vzdutí. Stupnice plavebních komor však ještě nebyla uvedena do provozu. Průběžná plavba byla proto zajištěna provizorní plavební komorou pozoruhodných rozměrů (240 x 24,5 m). Dnes je již zrušena a na jejím místě se buduje největší a nejvyšší lodní zdvihadlo na světě. Bude mít žlab rozměrů 120 x 15 x 3,5 m.

In certain stage of Three Gorges construction the river channel was interrupted, the water level swelled to some extent, while the flight was still not in operation. A temporary lock of notable dimensions (240 x 24.5 ms) enabled continuous service. Today the lock has been abolished and the highest ship lift in the world, with a caisson of 120 x 15 x 3.5 ms, is being built in its place.

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Project of sustainable growth in Europe

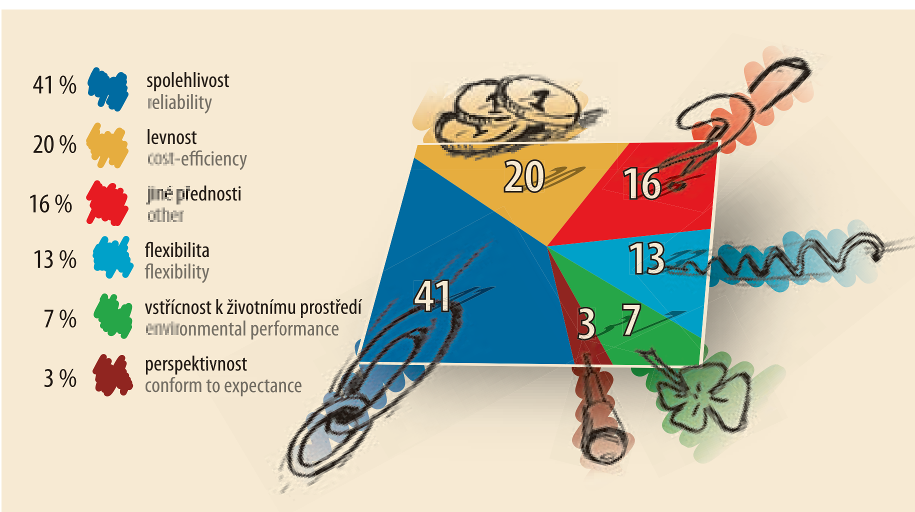
The waterway "Seine–Nord Europe" (Seine–Scheldt) will consist of the modernized section of the Oise and a new canal between this river and the Upper Scheldt. The connection should admit pushed convoys carrying 4,400 tons. The whole interconnection should be open for concurrent operation by the end of this decade. The main reason of the project realization must be seen in the favourable development trends of water transport in France, namely in terms of container transport, as well as in an urgent need to radically cut down on heavy truck traffic on the parallel motorway A 1 from Paris to the Belgian border. As for the trends, in 1997–2002, the French water transport scored the largest increase of all the inland transports – 22 %. In 1999–2002, the container transport on waterways registered a growth by 69 % in France, 21 % in the Netherlands and 138 % in Belgium. It clearly proves justification of the tendency to transfer the load from the motorway to a modern waterway. At the same time, the project complies with demands of the Kyoto Protocol. Transport is the largest CO_2 "producer" in France (in 2000, more than 140 mill ton CO_2). Unlike in other sectors, the growth of emissions resulting from the transportation activities has not been managed to stop. If the automobile transport (emitting 5–7 times more CO_2 than the river transport) is to keep increasing its share in the activities, the reduction of emissions of CO_2 in the sector will remain unrealistic.

The new Seine–Scheldt waterway too, prides in record-breaking features. E.g., the proposed lock Moislans should surpass a fall of 30 ms, which in the category of canal locks with saving basins is the highest in the world. So far, the record has been held by some locks of the Main–Danube Canal, which reach to 25 ms. The canal bridge crossing the Somme River valley in order to preserve its alluvium, will be 1,300 ms long, thus breaking the record of the above-mentioned canal bridge at Magdeburg. Along its primary transportation role, the canal should effectively contribute to the flood control in the Oise and Somme River valleys.

Naturally, it is not the only or the last of the French or West European projects of expansion and improvement of the waterway network. According to the company Price Waterhouse Coopers' research, assigned by the organization Voies Navigables de France [French Waterways] in 2003, 87 % of the polled French entrepreneurs are convinced that waterways need a new and adequate infrastructure, and 75 % of them wishes to use water transport more as they appreciate its economy, reliability and environmental friendliness.

Therefore, it sounds almost like a paradox, that a halt to any further development of Czech waterways is often a declared wish of ecological circles. Do they assume that the sustainable development of transport and nature conservation will rather benefit from extra motorway kilometres, which realization they unwittingly support?

There are a large number of other more or less significant examples of the waterway projects, which are currently being realized, prepared or planned. Nevertheless, we shall now leave this controversial topic and focus fully on the D-O-E water corridor, which not only happens to be one of them but certainly should classify as a priority from the European point of view.



Co oceňují francouzští podnikatelé na vodní dopravě (podle průzkumu firmy Price Waterhouse Coopers).

Aspects of inland navigation appreciated by French entrepreneurs (according to the Price Waterhouse Coopers survey).

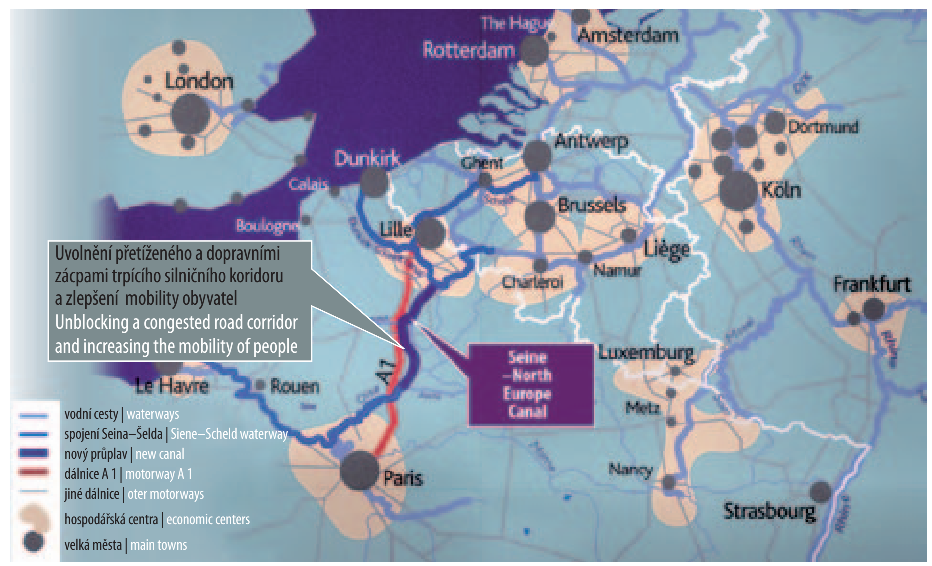
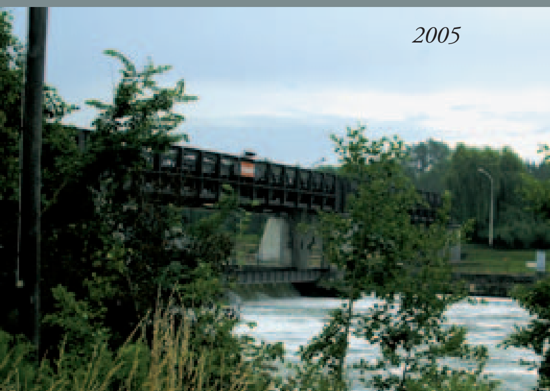


Schéma souběhu trasy vodní cesty Seina–severní Evropa s dálnicí A 1.

Parallel lines of the Seine–North Europe Canal and the motorway A 1.

Postup výstavby nové Evropské vodní cesty Seina–sever (Šelda) v letech 2005–2007

Advancing construction of the new European waterway Seine–North (the Scheldt)



Výstavba nových klapkových jezů na řece Oise byla zahájena jezem Isle Adam (1. a 2. řádka) a pokračuje jezem Pontoise (3. řádka).

Construction of the new Oise dams with falling gates started at the dam Isle Adam, followed by the dam Pontoise.

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The D-O-E waterway in the European waterway network

To consider the role of the D-O-E water corridor in the future network of internationally important waterways, it is safe to keep in with the quoted agreement AGN, which defines such waterways (i.e. waterways of category E) rather clearly. The map, which is included in the agreement, shows at first gland the central position of the D-O-E interconnection. Realization of the project, which might be one of the major missing links, will effectively contribute to increase of the transportation output in the European navigation network, as well as to provide for sustainable development of transport.

Careful readers will naturally remain sceptical and demand more convincing arguments than a glance at a map. Let us offer a more profound analysis. The above presented graphs e.g. illustrate a noticeably dominating role of the Rhine, which concentrates much more transportation activity than other waterways. It is a fact that currently this river on the German and Dutch border moves about 160 mill. tons of goods per year. No other continental traffic route, nor the most frequent railway or motorway, features such traffic density. The Rhine superiority does not lean only on the remarkably convenient operation qualities of this waterway, not even on its favourable routing through highly industrial areas with its final destination in almost the largest world seaport of Rotterdam.

If you wish to follow the different employment of water transport in Europe and explain its causes, it is necessary to adjust the AGN map of the E category waterways and mark down the traffic density of each main route. Traffic density represents the amount of goods, which passes through given sections every year. Although the Rhine rate reaches the highest, interesting results are scored even on its tributaries and connecting canals, on the Maas, and on the waterways of Holland, Belgium and France. Most often, it concerns areas where waterways came to life in the historically convenient time, often still in the "pre-railway" era, although not as early as in Britain. They became the main arteries of industrial revolution, grew into a coherent network and later, along with the development of railways, they were constantly modernized. As the industrial revolution was slower to come in Central and Eastern Europe, the railways, which network was easier and faster to build with a generous state assistance, already took the role of the main carrier. Thus, promoters and builders of modern waterways missed the most convenient historical opportunity and had to fight a certain unfair competition of the state railway companies. The fate of the D-O Canal project, designed for the Anglo-Austrian Bank, is just one of the examples. As some historical waterways never got a chance to have their navigability improved, their navigation often completely vanished, e.g. on the Vltava from České Budějovice to Prague, on the Lower Morava, and even on one of the largest European rivers – on the Vistula, which is, with the exception of few fragments, practically innavigable. The Elbe navigability from Ústí nad Labem nearly to Hamburg is barely satisfactory; navigability of the regulated Oder below Wrocław then totally unsatisfactory. The transport importance of such waterways is naturally minimal and their low employment quite understandable. The traffic density of the Elbe reaches approximately 0.5 % of the Rhine figures, and it is even lower on the Oder. The same is true about connection canals between the Oder and Vistula Rivers (Bydgoszcz Canal), neglected for decades, with almost a zero traffic. It is becoming quite clear that unless there is some radical move, the gradual decay of Central European waterways will become an irreversible process. The waterway network of the expanding EU will then stop in the Berlin or Stettin area. The Danube will become the only waterway running eastward, however without any network of feeder routes. It could very well happen, that the future waterway map will mark the entire area between the Danube and the Baltic with "hic sunt leones", which ancient geographers used to write over unexplored territories, where "only lions live".

Plavební provoz na Rýně u Weselu v blízkosti nizozemsko-německé hranice. Motorové lodě a tlačné soupravy proplouvají v těsném sledu. Stejné množství zboží by se dalo převézt po silnici za předpokladu nepřetržité řady plně naložených kamionů v obou směrech, následujících za sebou po 5 sekundách nepřetržitě 24 hodin denně.

Naval traffic on the Rhine at Wesel near the Dutch-German border. Self-propelled vessels and pushed convoys pass in close succession. On the road, the same amount of cargo would be carried by a continuous queue of trucks passing in 5-second intervals in both directions for 24 hours.

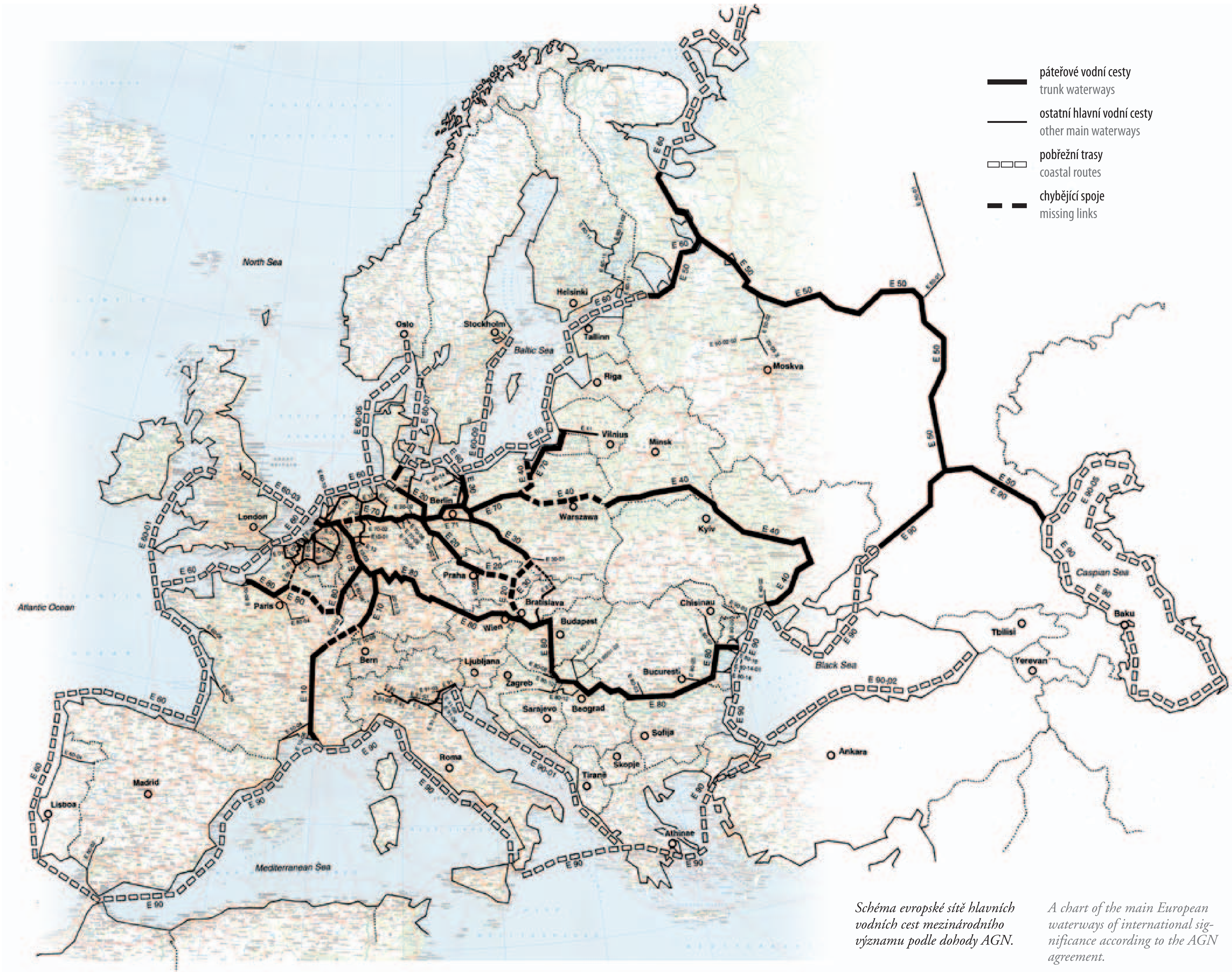

Schéma evropské sítě hlavních vodních cest mezinárodního významu podle dohody AGN.

A chart of the main European waterways of international significance according to the AGN agreement.

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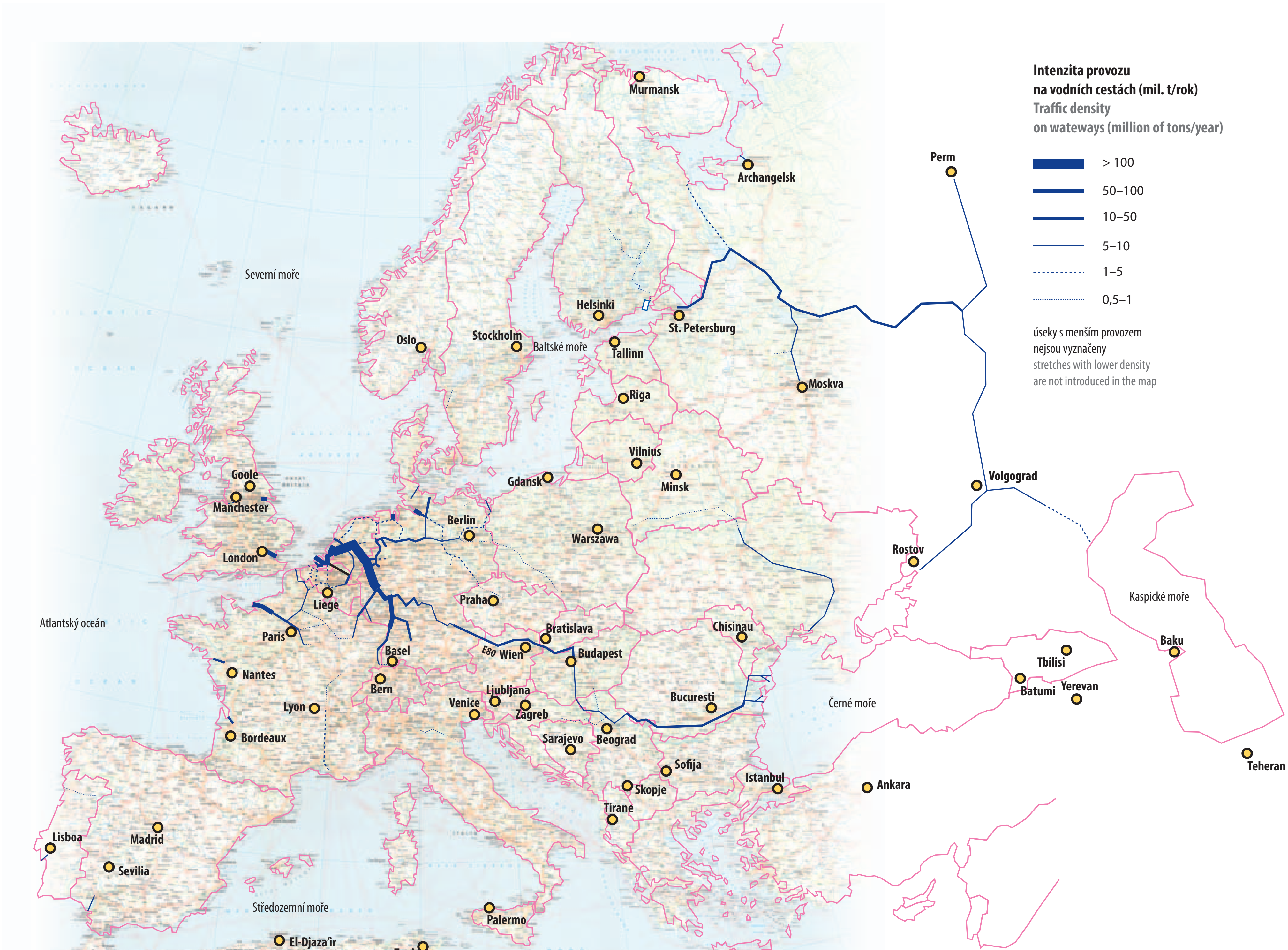

Hustota přeprav na hlavních vodních cestách zahrnutých do dohody AGN.

Traffic density on the main waterways included in the AGN agreement.

Only a radical move shall do

Due to their location, the AGN agreement considers both the Elbe and Oder Rivers the essential part of the crucial routes E 20 and E 30. A systematic modernization of free flowing sections of both the rivers is a must, as its defective navigability, or rather unreliability, seems to be the main reason of the lingering water transport on these waterways. Such modernization would require regulation of river stretches of several hundreds of kilometres, or, taking into account the objections of conservationists to such adjustments, construction of hundred kilometres of lateral canals. That would account for several billion Euros of investment. To guarantee its recovery, the traffic density would have to exceed 10 or rather 20 mill. tons per year. That is only hardly conceivable considering its current unfavourable state. It sounds like the causality dilemma of the chicken or the egg. Moreover, the Elbe and the Oder represent dead-endings of the network with only tepid attraction areas.

The only way out of the dead endings leads via transferring the trans-European traffic streams to the Elbe and Oder Rivers by means of the D-O-E water corridor. That would significantly upgrade and liven up the whole central network of the E category waterways, as well as the Danube with its giant transport capacity, employed only up to about 10 %. Utility of this river, after Volga the second longest river or waterway in Europe, clashes with its incomplete connection to the rest of the European network. Although since 1992 there is the Main–Danube Canal connection, its route runs too far to the west from the central network area, therefore while it is quite convenient for the Danube access to the ports at the Rhine estuary (Rotterdam), in Benelux and in North France, it is barely suitable for the eastern North Sea ports (Bremen, Hamburg), and absolutely inconvenient for the Baltic ports (Stettin), industrial areas of East Germany, around Berlin and in Poland. The D-O-E connection would work much better in all these cases, as easily proved on respective hauling distances and on the number of locks on the variant routes. While in terms of prompt accessibility of Rotterdam, both routes running from the area of the Middle Danube along the Rhine and the Elbe are practically comparable, in case of Bremen and Hamburg especially, the Elbe route proves markedly more convenient, as does the Oder route in case of Berlin, Stettin and other Polish locations.

The Danube–Main–Rhine (R-M-D) interconnection is of no competition to the Danube–Oder–Elbe (D-O-E) water corridor. Both the transcontinental routes would fulfil their own specific functions, and could be even complementary. After all, some 50 years ago, both routes were included in the UNECE documents at the same time and equally, not as alternatives.

It implies that the D-O-E water corridor is the only measure how to prevent the "white spot" in the middle of European waterways as much as it is the most needed integrating part of the network as such.

Comparison of the numbers of locks appears the most convenient in the route D-O. The schematic comparison of the lock numbers on the compared routes takes into account the presumable construction of other locks, which will probably be needed while canalizing the Oder, or even the Elbe. Such intervention will naturally involve shortening of the route due to lateral canals, which has been included in the calculation. Notice, that even when considering the increased number of locks, their count remains very low when compared to the Main–Danube connection, which is operationally advantageous. It is chiefly caused by the fact that the Oder branch crosses the main European watershed between the Danube river basin and the basins of the rivers emptying to the North and Baltic Seas in the far lowest part, i.e. in the Moravian Gate. This wide valley is exceptionally convenient for routing of all kinds of trans-European traffic routs. Incidentally, the first railway on the Austrian-Hungarian territory led through there, as well as the important north-south motorway, which is already being built. The surface of the summit pool on the Oder branch will reach bare 275 ms ASL. Coincidentally, the Czech territory offers also the second best spot for crossing the main European watershed: the Elbe branch of the D-O-E water corridor can cross this "magic line" at Česká Třebová at approximately 390–395 ms ASL, which could be further lowered to mere 350 ms ASL for the price of a longer tunnel. Owing to such solution – undoubtedly costly – the number of locks on the routes running through the Elbe branch remains very low, in some cases even lower than in the Oder routes. The area south from Nuremberg, crossed by the existing Main–Danube Canal, with the summit pool at 406 ms ASL, thus comes only as the third most convenient for surpassing the watershed.

The comparison of altitudes clearly shows that the Moravian Gate must be considered a natural asset of the Czech Republic, which so far has gone unemployed and unappreciated.

Construction and operational demands of any waterway is characterized by the altitude differences, which are to be surpassed on its route. The same reads for main transcontinental routes. Advantages of such routing, e.g. via the Rhine, the Oder or the Elbe for Hamburg are even more apparent than in comparison of mere numbers of locks.

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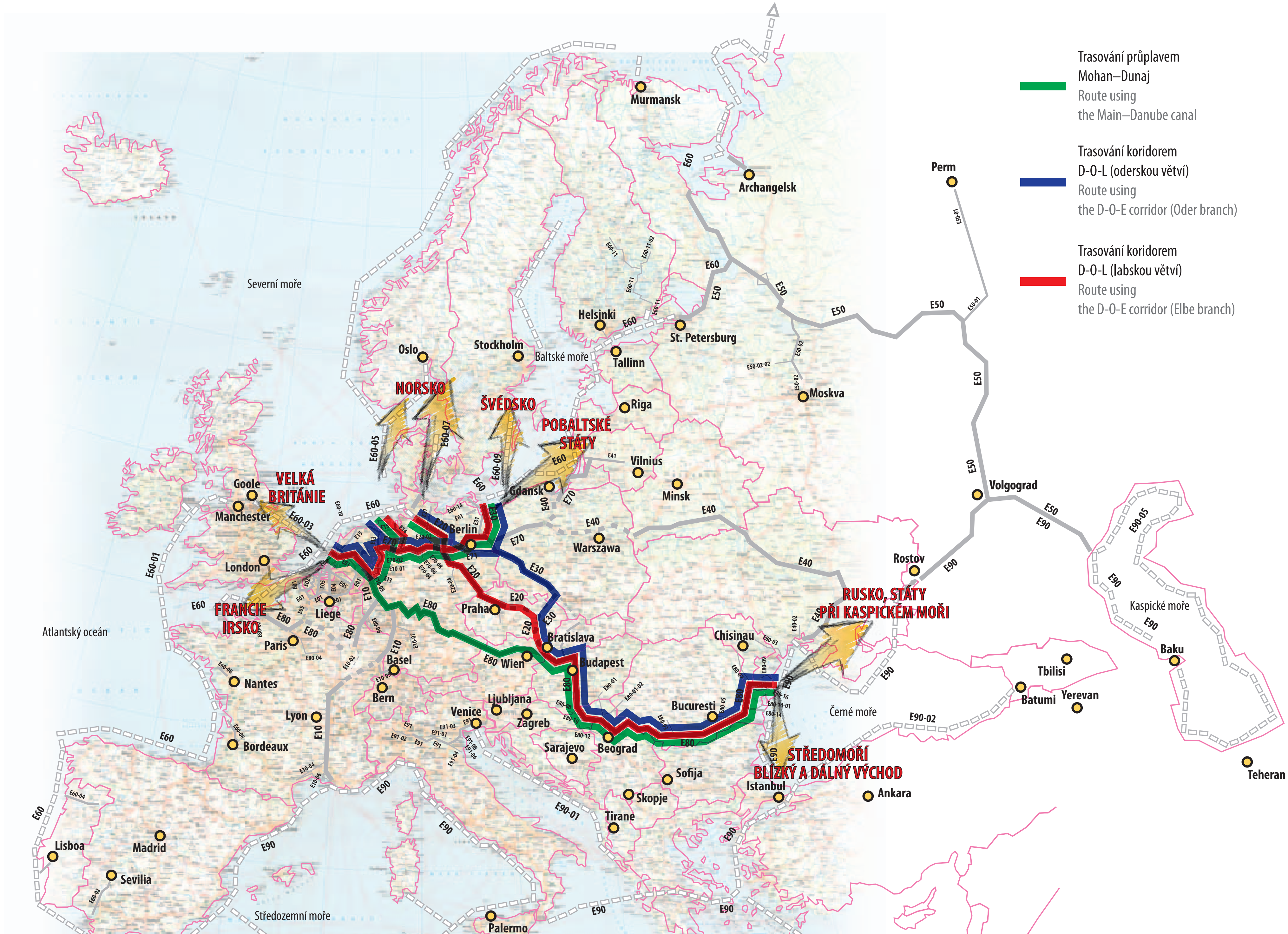
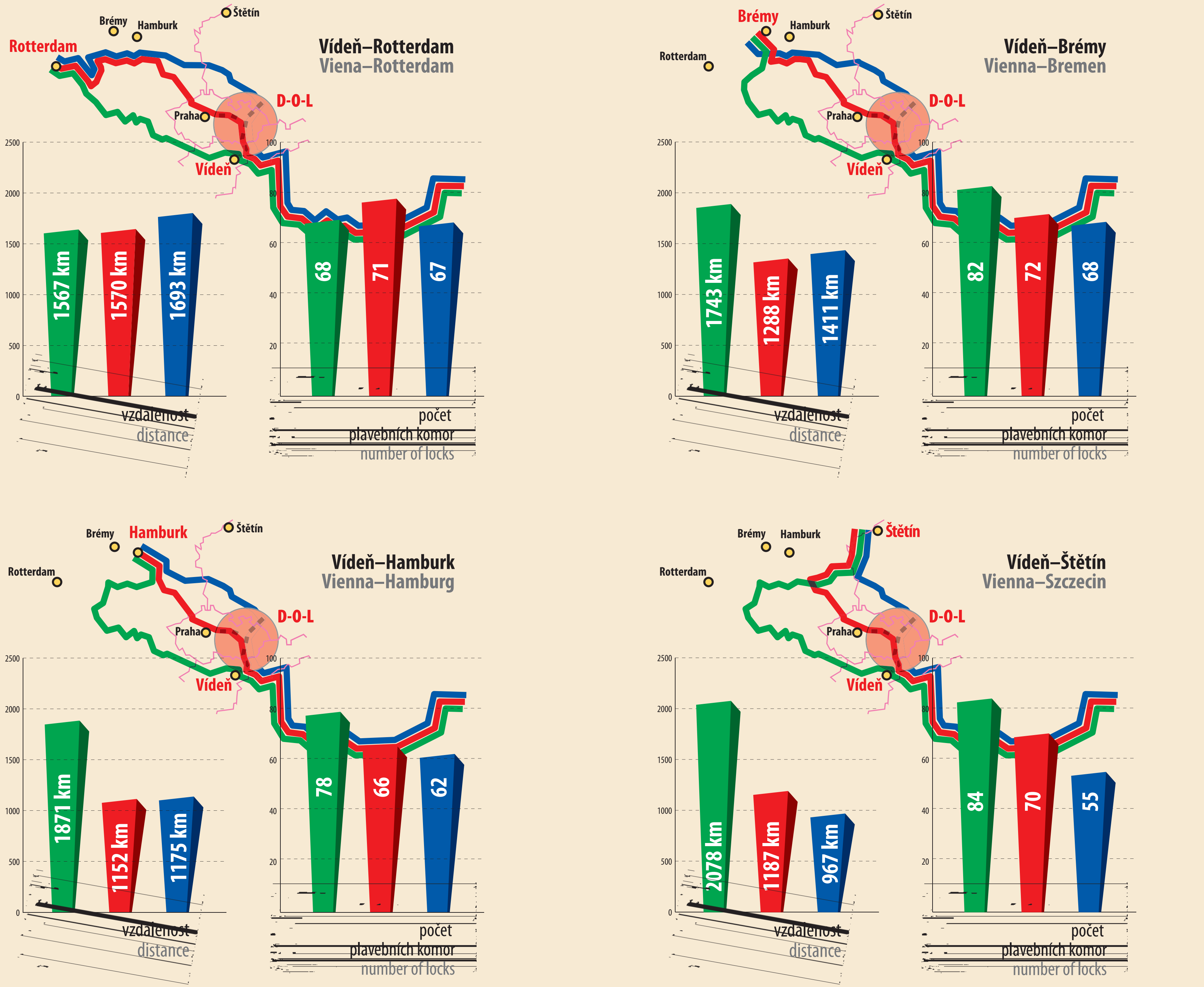


Schéma nejdůležitějších tras vodní dopravy, které by mohly procházet vodním koridorem D-O-L.

A chart of the most important navigation routes to pass through the D-O-E water corridor.



Porovnání vdáleností a počtu plavebních komor mezi Vídní a důležitými evropskými námořními přístavy při Severním a Baltském moři.

Comparison of distances and numbers of locks between Vienna and important European seaports on the North and Baltic Seas.

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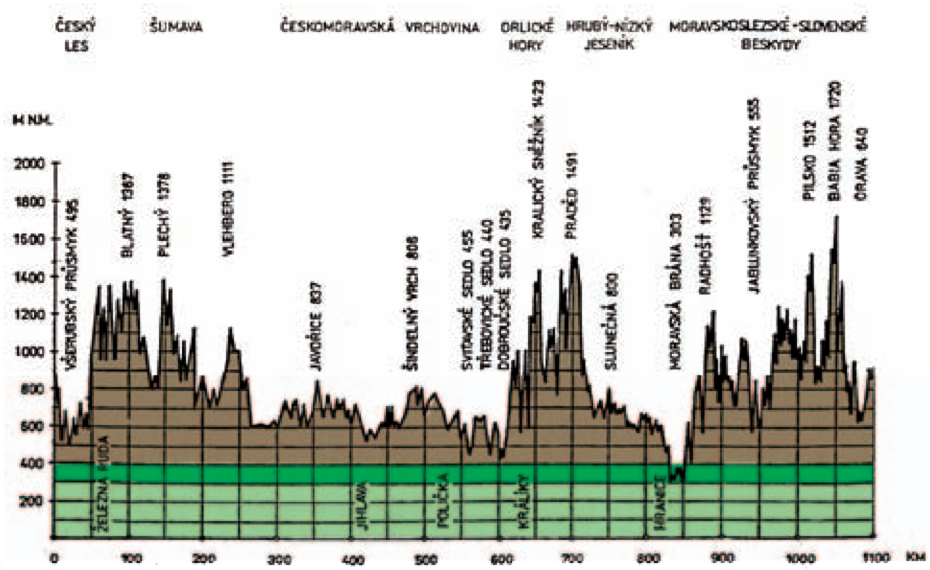
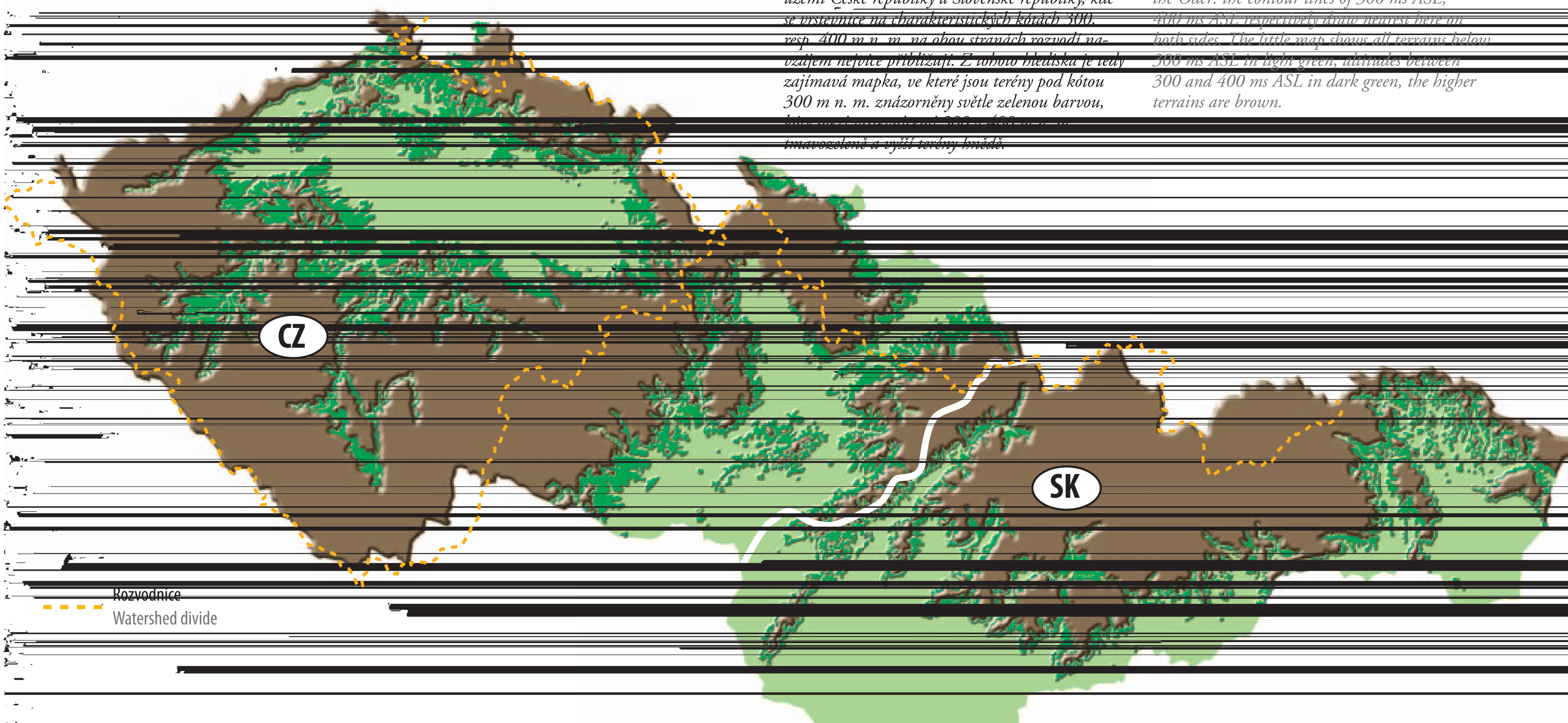


Podélný profil vedený rozvodnicí dokládá výhodnost terénních sedel na území ČR a SR ještě zřetelněji. Z hlediska nadmořské výšky je zdaleka nejvýhodnější Moravská brána (303 m), po ní následují sedla u České Třebové (435–455 m), Všerubský průsmyk (495 m) a Jablunkovský průsmyk (555 m).

A longitudal profile of the watershed shows the advantage of terrain saddles in CR and SR. According to altitude The Moravian Gate (303 ms ASL) proves the most convenient, followed by the Česká Třebová saddles (435 ms – 455 ms ASL), and the Všeruby and Jablunkov passes (495 ms and 555 ms ASL respectively).

Vodní cesty mohou při zachování ekonomických a provozních limitů vystoupit samozřejmě jen do určité omezené výšky. V evropských podmínkách je podle dosavadních zkušeností přijatelným limitem nadmořská výška terénu asi 300 m, výjimečně až 400 m (vyšší terén překonává pouze průplav Mohan–Dunaj, jehož vrcholová zdrž má kótu 406 m n. m.). Pro překročení rozvodí mezi povodím Dunaje a sítí evropských vodních cest od Rýna až po Odru nabízejí proto nejlepší podmínky území České republiky a Slovenské republiky, kde se vrstevnice na charakteristických kótách 300, resp. 400 m n. m. na obou stranách rozvodí navzájem nejvíce přibližují. Z tohoto hlediska je tedy zajímavá mapka, ve které jsou terény pod kótou 300 m n. m. znázorněny světle zelenou barvou, kdy mezi vrstevnicemi 300 a 400 m n. m. tmavozeleně a vyšší terény hnědě.

Maintaining certain economic and operational regulations limits the altitude of waterways. According to present practice in European conditions the highest economically acceptable altitude is 300 ms ASL, rarely 400 ms ASL (only water level in the dividing pool of the Main–Danube Canal reaches 406 ms ASL). Thus the Czech and Slovak territories offer the best conditions for bridging the divide between the Danube watershed and the system of European waterways from the Rhine to the Oder: the contour lines of 300 ms ASL, 400 ms ASL respectively draw nearest here on both sides. The little map shows all terrains below 300 ms ASL in light green, altitudes between 300 and 400 ms ASL in dark green, the higher terrains are brown.



Route part	Surpassed fall (ms) on the route via		
	Rhine	*Elbe*	*Oder*
Ascent from the Danube at Vienna to the dividing pool	256	200	125
Descent from the dividing pool to the Elbe at Hamburg	406	350	275
Falls lost at descent	102	44	74
Total surpassed fall	764	594	474

From this point of view, the D-O-E interconnection is far the most convenient and the most natural integrating element of the European network. Despite the boats, which can sail even uphill, they are still at their best when horizontal. When they need to overcome the proverbial "roof of Europe", they favour the places, where the "roof" becomes the lowest, as it happens to be in the Moravian Gate and in the upland of Česká Třebová.

To conclude, it is very safe to claim that the D-O-E interconnection is cardinally important for the international network of European waterways, as it will liven up its scarcely used central parts or even prevent gradual degradation of their water transport activities. To assess its benefits for the increase of the water transport share in the European transport system, i.e. decrease of the road transport share, it is necessary to reflect not only the expected volume of transport on the actual D-O-E connection, but also the boosted traffic in the central part of the network and on the Danube as a whole.

The above-stated recapitulation still does not cover all benefits of the interconnection to the European water transport. As already mentioned, coastal navigation plays a prominent role in the EU countries; it sometimes merges with the inland navigation, namely in connection with introduction of river-sea going vessels. There is no doubt about the vessels of combination river-sea navigation being employed more and more often, particularly with the increase of goods exchange between the EU countries and Eastern Europe or with the Middle East (Russia, Ukraine, other ex-Soviet countries, countries on the shores of the Black, Caspian and Mediterranean Seas). I.a. it is caused by the fact that most of the fleet of the Dnieper, Volga or other waterways connected with these rivers, are already ready for coastal or short sea navigation. The vessels were constructed to withstand a wave regime of large artificial reservoirs, which were built on these rivers for energetic reasons. River-sea going vessels with large depth and consequently bigger demands on the admissible draft and bridge clearance, can hardly be economically employed on all waterways. According to the contemporary views, their introduction is efficient on the waterways which:

- Are classified at least Va;
- Offer constant admissible draft of 2.5–3 ms, or at least 2 ms or more for 90 % of the year on free flowing rivers;
- Provide bridge clearance of at least 6–7 ms.

The map of waterways complying with the criteria implies two facts. Firstly, the navigation range of such vessels is surprisingly large and reaches, in fact, beyond the European borders; secondly, as it covers the inland especially due to the Danube, the D-O-E project, which connects to the Danube and fully complies with the criteria, could open the very heart of the continent for the river-sea navigation. Just another advantage of the D-O-E water corridor.

Říčně-námořní loď Hansa Kampen je 89 m douhá a 12,5 m široká, takže patří ve své kategorii k jednotkám střední velikosti. Při maximálním ponoru 434 cm uveze na moři 2964 t. Při omezení ponoru na 350 cm je možno naložit (ve sladké vodě) 2060 t. „Místem narození" této lodi je labská loděnice v Křešicích u Děčína.

River-sea going vessel Hansa Kampen (89 ms long and 12.5 ms wide) ranks among middle-sized units in its category. With the draft of 4.34 ms it carries 2,964 tons on sea routes. With limited draft of 3.50 ms in fresh water it can transport 2,060 tons. The ship "was born" in Křešice near Děčín on the Elbe.

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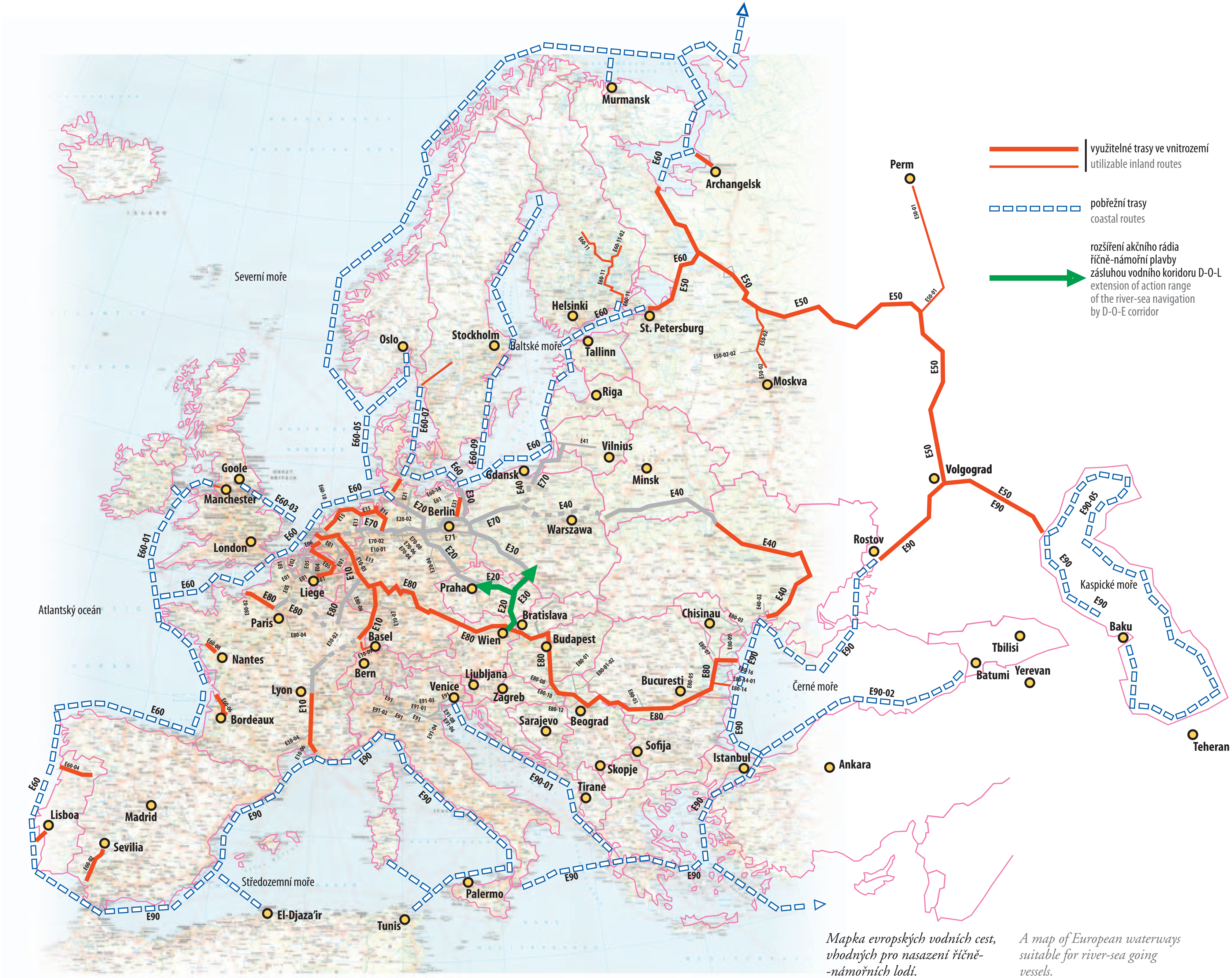


Mapka evropských vodních cest, vhodných pro nasazení říčně--námořních lodí.

A map of European waterways suitable for river-sea going vessels.

Traffic significance of the D-O-E for the Czech Republic

By far the largest part of the D-O-E water corridor route falls onto the Czech territory. The domestic opponents of the project often argue: **'Why should the problem of insufficient integrity of European waterways, an all-European problem, be resolved at the expense of the Czech Republic, at the expense of land appropriation, damages on the environment and landscape in Bohemia and especially in Moravia?'** This seemingly matter-of-fact objection is very easy to disprove.

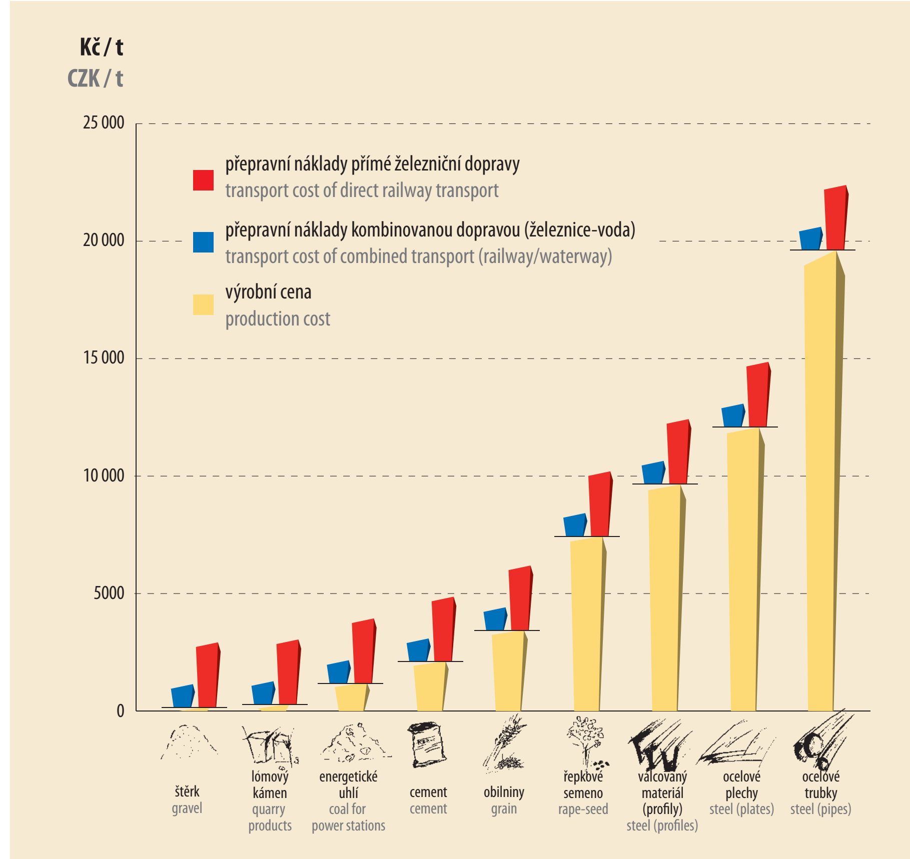
As for the impacts on the environment, wildlife and landscape, it is impossible to conceal that some of them will occur. However, the positive ones will vastly prevail; it is related to the extra-transport functions of the waterway, which are to be analysed in the following chapters, to be dealt with later but all the more profoundly.

Regarding strictly the transport problematic, it can be assessed from two different points of view: according to the transport connection of the Czech Republic to the rest of Europe as well as to overseas, and according to the influence of the traffic routes on the economic development in the adjacent areas.

Quality of transport connection of any country influences directly costs of its foreign trade, i.e. efficiency and competitive strength of its economy. Connection to a cheap transport networks is fundamental; those include also the sea, coastal and inland navigation. The important role of the coastal and inland navigation in 15 member countries of EU has already been mentioned. With the admission of another 12 countries, the proportions have slightly changed, as they are prevailingly ex-eastern-block countries with the governing share of the railway transport still surviving. Nevertheless, 26 out of 27 member countries have an opportunity to use coastal navigation, as they have seashore and seaports at their disposal, or they have a chance to entrust part of their foreign trade to the modern inland navigation. Most of them enjoy even both of the opportunities.

The only EU member country, which is deprived of either the first or the second chance, is the Czech Republic. There is no coast, neither any quality inland navigation network to speak of. Thus, within Europe, the Czech economy finds itself in a very unequal position. The handicap could be tackled only with a prompt connection of the Czech Republic to the Danube waterway, which is a logical first stage of the D-O-E water corridor.

The economic handicap of the Czech foreign trade shows for instance in the increase of the average cost price of some products when you add freight costs of export or import for longer distances (e.g. between the central part of CR and seaports



Schematické znázornění vlivu přepravních nákladů na cenu jednotlivých komodit v místě určení při přepravní vzdálenosti 1000–1200 km.

Influence of transport costs of individual commodities on their final price at destination with transport distance of 1,000–1,200 kms.

at the Rhine estuary). You can consider two alternatives: either the rates of direct railway transport or costs of the combined transport, including a short distance transport of the goods to the seaport (up to 100 kms), transhipping and other by-water transport. The comparison not only shows a great advantage of the combination with water transport, but further proves that railway transport multiplies price of some commodities at their destination so much that they are practically unmarketable. Export (or import) of such raw materials or products is thus only possible with employment of the water transport. In terms of marketability, the relative advantage of lower cost of water transport naturally decreases with the increase of the average cost price of the respective commodity. However, it is interesting, that water transport gains ground even in case of containerized goods of various and often rather high cost price, as proved in the earlier-stated data of the ever-growing role of inland navigation in this field. In case of transport of oversized, extremely heavy and bulky products, which cannot be shipped by railway and only with true difficulties

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Přeprava nadgabaritních nákladů není díky speciální překladní poloze v přístavu Mělník vzácná ani na labské vodní cestě. Znevýhodňuje ji však to, že většina výrobců nadrozměrných nebo extrémně těžkých výrobků sídlí na Moravě a je od Labe velmi vzdálena.

Special reloading facilities in the port of Mělník allow relatively frequent transport of oversized cargoes on the Elbe. However, most of the oversized or extremely heavy products are manufactured in Moravia, which is rather far away from the Elbe.

U extrémně těžkých zásilek bývá jeřábová manipulace problémem. Pak se s výhodou využívá speciálních lodí typu ro-ro (roll-on/roll-off, tj. najeď-vyjeď), do kterých je možno s výrobky o hmotnosti až 1000 t pomocí rampy a speciálního podvozku z tovární haly jednoduše najet.

Some extremely heavy articles make crane manipulation quite problematic. Such cases use special ro-ro vessels (i.e. roll-on/roll-off). Products of up to 1,000 tons are loaded and unloaded with a ramp and a special trailer.

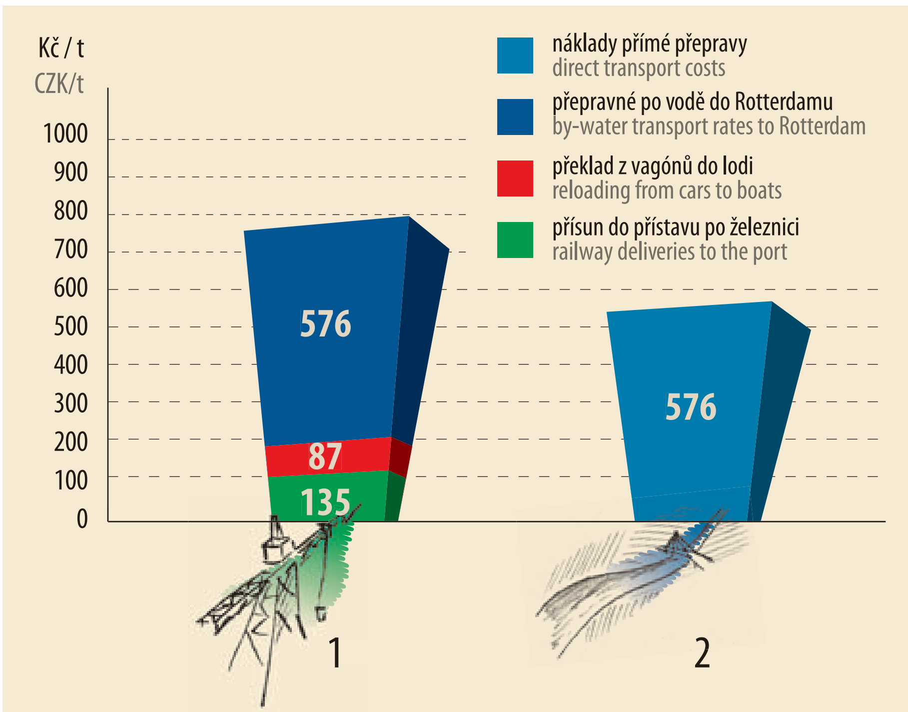
by road, the water transport offers entirely specific advantages. In such cases, the water transport benefits reach further beyond mere freight cost savings. It allows the manufacturer to despatch larger, completely assembled units, and reduce the extent of more costly assembling in the destination. Development of some industrial fields would be practically impossible without the help of water transport.

Moreover, it is little known that connecting the Czech Republic to a reliable waterway network could fundamentally affect choice of the optimal alternative of further energetic development. Quality hard coal from overseas has been on its rise in Europe; owing to the cheap sea transport, its seaport price is lower than the price of coal from the European pans. However, the consecutive transport by land marks the price considerably up, and its transfer to the Czech Republic by railways would be economically unbearable. Although the water transport would be the best solution, unreliability of the Elbe waterway can hardly guarantee a regular supply of the fuel. Thus, so far the concept of imported overseas coal has been rejected in favour of the scenario involving new nuclear power plants and expansion of coalmining in North Bohemia.

Let us get back to the critical voices, which claim that the Czech economy could by very well connected to a reliable waterway network through the existing Danube ports in Slovakia, Austria and Germany, which are only tens of kilometres away from the Czech border, easily reachable by road or railway. Such solution, tempting as it is at first glance, would in consequence cut Czech entrepreneurs from the opportunity to enter the international transport market and participate in transhipping as well as the connected logistic services. In case of river-sea navigation, it concerns business activities reaching beyond the European region. It is closely connected with job opportunities, tax yields etc. It would also represent resignation to the advantages of direct shipping by waterways; the direct transport is markedly cheaper than the so-called fractional one.

Advantages of direct shipping, with no additional costs of consecutive transport and transhipping imply the positive influence of waterways on the economic development in their immediate neighbourhood. Most often, plants and services move straight into ports, or port industrial zones. **The contemporary inland ports are not mere transhipping spots, they concentrate all kinds of economic activities, like industrial plants, trading and dispatching warehouses, silos etc.** The port of Nuremberg on the Main–Danube Canal is just one of the examples: its premises have been rented out to more than 50 businesses, which employ over 5,000 people and are engaged in various activities from dispatching and logistic services, via manufacturing of building material and fodder, down to recycling and waste material utilization. This industrial centre had been developing according to its plan long before the Main – Danube Canal was completed.

Raising new plants at an independent location on the waterway is yet another form of direct connection to the water transport. Such enterprises usually establish narrowly specialized plant ports for unloading of material or loading of their own products. The modern waterways are thus undoubtedly highly attractive for investors, as the lots on the canal or river banks rank much higher in price than those more distant from the waterways. Quite possibly the indirect economic benefits of the “gravitation” impact of waterways might be in the end more significant than the direct, easily calculable payoff.



Pohled na přístav v Norimberku a jeho průmyslovou zónu.

An aerial view of the port of Nuremberg and its industrial zone.

Jedno z překladních nábřeží norimberského přístavu. Velké silo (v pozadí) je v dosahu překladních mechanismů, takže je při přepravě obilí umožněn přímý překlad.

One of the berths in the port of Nuremberg. As the large silo in the background is within reach of reloading devices, the manipulation with grain is very simple.

Srovnání přepravních nákladů při lomené (1) a přímé (2) relaci. Schematické znázornění ilustruje situaci při přepravě zemědělských produktů z centra ČR do námořního přístavu Rotterdam, tj. na celkovou vzdálenost přes 1000 km. V prvém případě je exportér vzdálen asi 100 km od říčního přístavu a je s ním spojen železniční dopravou, v druhém sídlí přímo v přístavní zóně, nebo má vlastní překladiště na vodní cestě.

Comparison of transport costs in indirect (1) and direct (2) relation to river transport. The graph shows transport of agricultural produce from the central CR to the seaport of Rotterdam; the total transport distance exceeds 1,000 kms. The first exporter uses rail transport to cross about 100 kms to a river port; in the second case the exporter resides directly in a port zone, or there is their own loading berth on a waterway.

Thus, we inquire:

Shall the Czech Republic reject all the above-listed economic benefits and resign to the handicap, which it entered the European Union with? Will the country employ the advantages of its location in the centre of Europe, with the unique phenomenon of the Moravian Gate, and become a junction of ultimate waterways, thank to the Upper and Lower Danube, Elbe and Oder Rivers reaching to four directions from its territory? Or shall the Czech Republic choose to cut itself permanently off the perfect navigation network, give up interests for the Danube and let the Elbe and Oder navigation linger on?

The questions were best answered by Ing. Antonín Patočka as early as in 1948:

"The centennial history of the canal project has been entwined with the red thread of irresoluteness, including the original project from 1901 – often also apparent insincerity, or conversely, excessive optimism. If we start building on our own and soon – and we can do both – we should win ourselves supremacy, invoke offers of collaboration from other countries. We should accomplish, although gradually, a task, which will guarantee benefits for the whole ages to come, when other, many times more expensive so-called state must-haves will have long disappeared."

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Situation on the waterways to be connected through the D-O-E Canal

It is imperative to repeat that the operational quality of the Danube, Oder and Elbe Rivers largely differs: very good on the Danube, less satisfying on the Elbe and far the worst on the Oder.

The Danube

The river ranks among the best European waterways, simultaneously, its modernization has scored the biggest progress in the past few decades. Only 50 years ago, navigation of this large stream involved manoeuvring through some extremely demanding and dangerous stretches, above all the famed cataracts of the Iron Gate, where the stream of Danube broke through the Carpathian massif. Or the shallow ford section between Bratislava and Komárno and the rocky narrows (Grein-Struden and others) on its German and Austrian route. Owing to the energetic water projects of the Iron Gate and Gabčíkovo, as well as the whole system of locks and dams of both energetic and navigation purposes on the Austrian and German Danube, such obstacles belong to the past and the Danube navigability has been continuously improving.

The Danube waterway of the final stage should comply with the following classification:

- Vb from Kelheim (the mouth of the Main–Danube Canal) to Regensburg;
- VIb (pushed convoys with 4 standard barges) from Regensburg to the D-O-E water corridor branch-off place, i.e. the mouth of the Morava River);
- VII (pushed convoys with 9 barges) from the Morava mouth downstream, while on the Lower Danube convoys of 12 barges are common even today.

The section Straubing–Vilshofen in Germany represents the only graver exception: at low discharges, the dimensions of convoys need to be adjusted to the size of class Va (a push boat with one barge only, not exceeding 110 ms in length). In terms of waterway classification, the Danube will be superior to the D-O-E water corridor. However, the system of modules and the push technology will guarantee complete compatibility of the waterways. On the other hand, it is to be noted that the Danube is navigated even by vessels of above-standard beams, like the river-sea going vessels coming from the Dnieper and Volga areas. The locks of the ex-Soviet territory do not respect the module system established in the rest of Europe. Their width on the main drags (the Volga–Don and the Volga–Baltic canals, Dnieper) spans to 18 ms, which results in the river-sea going vessels often 17 ms wide.

Dunajské katarakty již patří historii; připomeňme si však obtížnost jejich zdolávání snímkem tlačné soupravy plující proti proudu kanálem Sip, obcházejícím mělké peřeje. Silný remorkér tlačí jen dva čluny, přece mu však musí pomáhat parní lokomotiva na speciální potahové dráze. Rychlost proudu v kanále dosahovala až 18 km/h.

The Danube cataracts are already history. The old photo recalls the difficulties of their navigation. As a push boat struggles upstream along the Sip Canal as it by-passes shallow rapids, it pushes only two barges, and still it needs to be helped by a steam locomotive on a special tow rail. The speed of water used to reach 18 kms/h.

Proplavování plavební komorou VD Gabčíkovo na Dunaji. Nejčastěji se v plavební komoře setkávají menší tlačné soupravy, jednotlivě plující motorové nákladní lodi a motorové nákladní lodi v soupravě s jedním nebo více tlačnými čluny.

Locking in Gabčíkovo on the Danube. The large lock is usually passed through by several self-propelled vessels and pushed convoys with one or more barges at once.

Protiproudní tlačná souprava se čtyřmi čluny na Dunaji nad ústím řeky Moravy. Rakouské stupně jsou vybaveny dvojitými plavebními komorami rozměrů 230 x 24 m. Plně tedy vyhovují těmto soupravám.

Upstream going pushed convoy with four barges on the Danube river near the Morava mouth. Double locks with dimensions 230 x 24 m are usual in Austria. They are thus in conformity with such convoys.

VD Greifenstein na Dunaji v Rakousku.

Lock and dam at Greifenstein on the Austrian Danube.

Vodní dílo Gabčíkovo obchází dřívější brodový úsek Dunaje. Celkový rozdíl hladin, dosahující až 23 m, překonává jediný stupeň s vodní elektrárnou a dvojitými plavebními komorami rozměrů 275 x 34 m.

The Gabčíkovo water project bypasses the former ford stretch of the Danube. Vessels overcome the fall of 23 ms by means of a double lock of the dimensions 275 x 34 m.

VD Altenwörth na Dunaji v Rakousku.

Lock and dam at Altenwörth on the Austrian Danube.

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Vodní dílo Freudenau na Dunaji s dvěma plavebními komorami o užitkových rozměrech 270 x 24 m.

Lock and dam at the Freudenau on the Danube River. Double locks have dimensions 270 x 34 ms.

Motorová nákladní loď o nosnosti 2000 tun plující proti proudu Dunaje míjí Bratislavský hrad.

A self-propelled vessel carrying 2,000 tons going upstream the Danube. Bratislava Castle in the background.

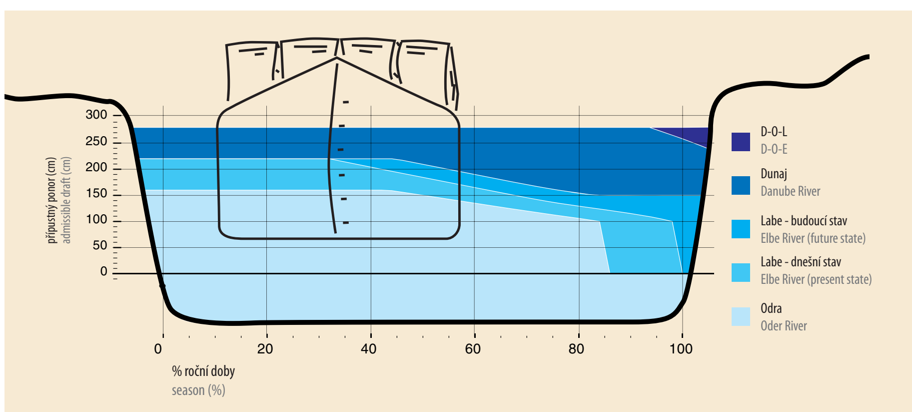
Kajutové osobní lodi kotvící v Bratislavě. Tato plavidla jsou velmi oblíbena a jejich provoz na Dunaji nezadržitelně stoupá.

River cruisers mooring in Bratislava. These vessels are very famous on the river and their traffic is unstoppably increasing.

Regarding the Danube admissible drafts, they follow recommendations of the Danube Committee, which recognizes different standards for the canalized and regulated sections of the Danube. On the canalized sections, the recommended depth below Vienna is 3.50 ms and 2.70–2.80 ms above Vienna. On the regulated sections, the minimum of 2.50 ms must be guaranteed for 94 % of a year, although the newest regulation projects are little more ambitious than the Danube Committee recommendations and aim at the depth of 2.70 ms. Considering that the Danube is to be gradually canalized before long (especially from Vienna downstream), the criteria will be set by the regulated sections, which for most of a year (when the margin of 0.20 ms deducted) should offer the admissible draft of 2.50 ms. The figure naturally does not say much about the character of depth fluctuation, i.e. the admissible drafts in the course of a year. Therefore it seems advisable to burden the reader with a bit of theory and explain that you get the most transparent statistical characterization of the draft fluctuation occurrence when following a curve of exceeded admissible drafts in an average water year. At each draft figure it states length of the period (in days or percentage of a year time) when the draft was guaranteed, i.e. reached or exceeded. It can also have a form of a graph. Such graphic chart of the D-O-E water corridor was very simple: it is a line at the level of 2.80 ms, as such admissible draft will be guaranteed for 100 % of the year. In the chart, the regulated Danube sections feature lower drafts than the D-O-E for part of the year, however, the draft of 2.80 ms is guaranteed for approximately 85 % of the year. Thus, the river navigability can be defined as very favourable, suitable for the river-sea vessel traffic.

The conclusion is naturally true on the condition that the individual regulated sections of the Danube will really achieve their defined objectives, which can be accounted for rather safely in the near future. The above-mentioned stretch Straubing–Vilshofen, stands out as the only exception, representing a bottleneck of the almost completely canalized Danube route from Kelheim to Gabčíkovo. Nevertheless, even this section could comply with the satisfactory navigability if canalized with two or three locks and dams. Their construction has already been prepared. To remain objective, it is necessary to mention that the continuous system of energetic and navigational locks and dams from Kelheim to Gabčíkovo features another two similarly narrow spots: above – proposed and so far postponed – the lock and dam Rührsdorf in Austria, and then between Vienna and Bratislava. Due to satisfactory water discharges (below the mouth of the Inn, high and relatively stable Danube discharges are guaranteed) it is feasible to achieve the introduced goal only by means of regulations.

The Danube bridge clearance standards are again submitted to the Danube Committee recommendations, which are stricter than the AGN agreement, as they require clearance of 7.5–8 ms above Vienna (only 6.4 ms above Regensburg), and even 9.5–10 ms below Vienna. Although such standards have not been thoroughly met yet in all cases, it is expected that in the near future it will become possible to account for three container layers above Vienna and four layers below the city even at the highest navigable water level. It suggests that the bridge clearance of 7 ms, allowing three tiers of containers, should be mandatory even for the D-O-E water corridor. The reliability of the Danube navigation is reinforced by the fact that breaks for flood discharge or ice drift reasons are very rare and their occurrence have decreased in the recent years.



Křivky překročení ponoru.

The graph describing exceeding of admissible draft.

The Elbe

The river has two operationally different canalized sections and a regulated one, which had to be evaluated completely independently. The canalized section above the mouth of the Vltava is called the Middle Elbe, below the mouth – the Lower Elbe. The regulated Elbe section starts below Ústí nad Labem and ends just above Hamburg. Regarding the operating conditions, the section up to Magdeburg is important.

The current navigation conditions of the Middle Elbe could be described as follows:

- Admissible vessel and convoy size is limited by the effective dimensions of the locks, which were mostly built before WWII; most often they are 85 ms long and 12 ms wide. For the first half of the last century, the dimensions were chosen quite far-sightedly, as they comply with the class IV of the valid classification, i.e. standards of the AGN agreements for the European waterways of international importance. All locks of moderate fall feature fast filling and emptying, so locking time is reduced to the minimum, which allows a high traffic capacity. The locks would admit even a standard push boat of the class V 11.4 ms wide and about 80 ms long (without a push boat – in emergency). An ideal compatibility with the D-O-E water corridor would thus call for gradual transition to the class Va. It would represent construction of other locks or extension of the current ones by 30 ms. Prepared lock Přelouč II has already dimensions of 115 x 12.5 ms, which meets the class Va standards.
- The current admissible drafts on this section are 2.20 ms at any discharge. In places, where the calibre is not fully guaranteed yet, it could be achieved by continuous maintenance of the navigation channel, i.e. without any large investments.

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Střední Labe – setkání dvou lodí v horní rejdě plavební komory Kostelec nad Labem.

The Middle Elbe – meeting of two vessels in an upper lock approach of Kostelec nad Labem.

Further deepening could easily reach the level of 2.50 or even 2.80 ms. However, admissible drafts over 2.50 ms would clash with insufficient depths above sills of most locks – only 3 ms.

- Underpass heights of bridges correspond with the lowest alternative according to classification, i.e. 5.25 m (but not with the requirement to ensure the height of 7 m). Non-complying bridges are gradually substituted within the framework of renewing old constructions. A good example is the recently implemented substitutions of road bridges at Lysá nad Labem–Litovel and Poděbrady and modernisation of railway bridges at Nymburk and Kolín. It can be expected that as a part of routine modernisation the current state when no bridge is lower than 5.25 m will improve and finally the height of 7 m will be ensured.

From the navigation reliability point of view, the considered section scores much worse than the Danube or the proposed D-O-E water corridor; in other aspects, it offers much better conditions. There are also certain reserves (shorter navigation breaks for maintenance purposes, more consistent frost abatement, appropriate increase the highest navigable water level etc.).

Owing to the foresight of previous generations, the Middle Elbe has been treated at such level that it can become a perfect part of the transcontinental connection as of today. It is also worth praise that the modest water projects of this section were carefully incorporated in their surroundings.

Zdymadlo Poděbrady na středním Labi. *The lock and dam Poděbrady on the Middle Elbe.*

Zdymadlo Nymburk na středním Labi. *The lock and dam Nymburk on the Middle Elbe.*

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Historický most v Nymburku na středním Labi nabízí jen stísněné podmínky pro průjezd moderních plavidel. Výhledovým potřebám však vyhoví, byť za cenu jednosměrné plavby.

A historical bridge in Nymburk on the Middle Elbe offers a very limited opening for modern units; however, the one-way traffic will comply even with the future demands.

Tlačná souprava, vyplouvající z plavební komory v Kolíně na středním Labi. Tento snímek dokumentuje, že důsledné využívání unifikovaných rozměrů plavebních komor přispívá k ekonomice provozu i na vodních cestách skromných parametrů.

A pushed convoy leaves the lock in Kolín on the Middle Elbe. The photo documents how consistent utilization of unified lock dimensions contributes to the economy of navigation on waterways of rather modest parameters.

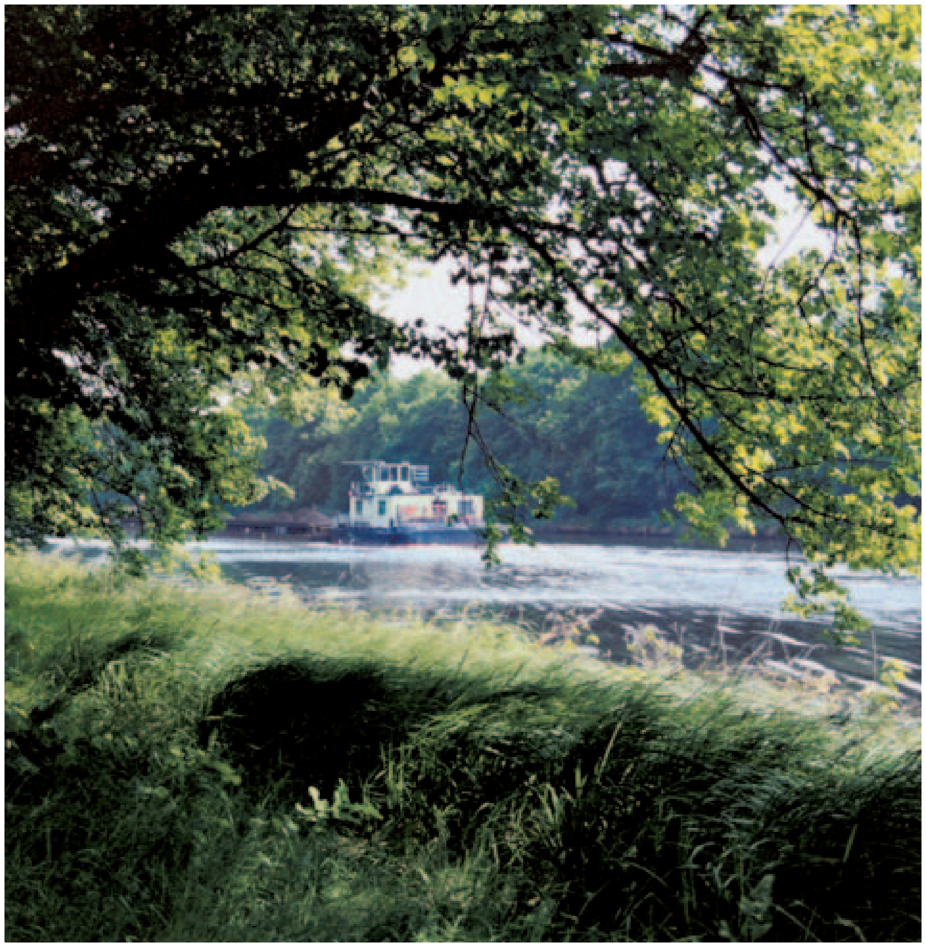
As **the Elbe below the mouth of the Vltava** was canalized even before the Waterways Act, it is marked by some older views on technical solutions of the dams; dams with frames and needles (or shutters), which followed old French models, typical for 19th century, did not satisfy modern navigation as they had to be collapsed for winter.

Locks of the section represented another disadvantage; although doubled and grand-scaled in dimensions (the length of the "large" ones exceeded 140 ms, the width even 22 ms), so that once they ranked among the largest European locks, their gates were mostly only 11 ms wide. However, till the mid 20th century the width did not seem to be a problem, as in Germany and Belgium, the gates span only to 10 ms in many cases. The canalized Lower Elbe was thus actually advanced.

Replacement of the old-fashioned dam constructions with the modern compact ones, suitable for all-year-round navigation and fully automated operation, as well as modernization of the secondary locks, has been already mentioned in connection with the transport of energetic coal for Chvaletice. Recently, thank to purposeful efforts of the Elbe Administration [Povodí Labe s.p.] and the Directorship of Waterways, also the main locks were modernized: the gates were widened to 22 ms, while the effective length was extended to the minimum of 155 ms. Currently the canalized Lower Elbe complies with the class Va standards, the actual navigation channel and some of the objects even with Vb. A gradual transition to the class Vb seems very feasible. It would level the Lower Elbe with the Austrian Danube or the Rhine above the Mosel mouth. The lock parameters of the last lock and dam in Ústí nad Labem–Střekov have come very close to these standards. The canalized Elbe below the Vltava mouth represents a traffic route, which could easily transport tens of millions tons per year. Practically, its capacity is employed only by about 10 %. In terms of admissible drafts, it equals the

Middle Elbe; regarding the bridge clearance, it offers considerably better conditions. Only with few exceptions, the bridges of this route span in more than 7 ms above the water level. Double locks guarantee its higher operational reliability. Nevertheless, the situation on the canalized Lower Elbe resembles a modern motorway with the traffic density of a side road or rather a field path.

The main reason of the paradox has to be seen in the discontinued network of European waterways in the very geographic centre. The missing link of the D-O-E water corridor is something, which the Elbe engineers did not account for. The situation on **the regulated Elbe downstream below Ústí nad Labem to Hamburg** seems to be another reason. More precisely, it concerns the section up to Magdeburg, where the vessels are allowed to reach the reliably navigable canal network. At critically low water level stages, they can use a parallel route of the Central Canal or the Elbe Lateral Canal for Hamburg. Let us consider the potential of the regulated Elbe little more in detail.



Kanalizování středního Labe spočívalo převážně v náhradě prastarých pevných jezů, které komplikovaly průchod povodňových průtoků, moderními pohyblivými jezy, a samozřejmě i v dostavbě plavebních komor. Jednotlivé zdrže dobře zapadají do přirozené krajiny a někde – např. v okolí Poděbrad – mají charakter přívětivého přírodního parku.

Canalization of the Middle Elbe replaced ancient fixed dams, which complicated passing of flood flows, with modern movable weirs and, of course, some additional locks were built. The individual pools have become a natural part of the landscape; some places, e.g. near Poděbrady, create pleasant natural parks.

Dvě tlačné soupravy, proplavující se současně plavební komorou v Lovosicích. K takové situaci dochází ovšem jen zřídka. Kapacita tohoto úseku řeky není ani zdaleka využita.

Two pushed convoys passing the Lovosice lock at the same time. Such view is rather rare as the capacity of the river here is far from fully exploited.

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Masarykovo zdymadlo u Střekova je hranicí mezi kanalizovaným a regulovaným úsekem Labe. Jeho součástí jsou dvojité plavební komory poměrně velkorysých rozměrů, tj. 170 x 24 m a 2 x 85 x 13 m.

Masaryk lock and dam at Střekov divides the canalized and the regulated sections of the Elbe. There are two parallel locks of grand dimensions: 170 x 24 ms and 2 x 85 x 13 ms.

Výkonný zadokolesový nízkoponorový remorkér se závěsem několika motorových nákladních lodí na Labi pod Ústím nad Labem. Jeho výpomoc je nutná, aby plně naložené lodi překonaly prudký proud Labe a nebyly v mělkých místech ohrožovány dynamickým zvýšením ponoru.

A powerful shallow-going stern wheel tug with several self propelled vessels in tow on the Elbe below Ústí nad Labem. It aids fully loaded vessels to overcome the strong Elbe stream, and eliminates the resulting danger of dynamic rise of draft in shallow stretches.

Problems caused by fluctuating and in dry seasons, limited navigation depths or admissible drafts occur on all rivers, which are naturally navigable or only regulated for navigation. They happen on the Rhine as much as on the Danube. They result from the character of natural rivers and there is nothing to do about it. In most of the times ship owners can deal with them in a tolerable way. Neither a motorway is passable in all weather conditions, nor is the reliability of air transport when it comes to meteorological conditions. However, if the unreliability is too high, it is not possible to speak of a modern and reliable waterway. That is exactly the case on the regulated Elbe. The already-presented graphic chart of admissible drafts of the Elbe vessels, with the usual construction draft of 2.20 ms, implies their handicap when compared to the Danube. For its unreliability, today the regulated Elbe is not a waterway, which could guarantee a modern development of water transport despite the fact that according to the classification standards (Va and lower downstream even Vb) it ranks very high.

Quite understandably, the reliability of the navigation operations on the regulated Elbe has been already tried by generations of engineers, proposing solutions of varying efficiency and costs. Economically speaking, the most practicable solutions do not substantially change the character of the river and confine only to other regulating adjustments. The most detailed project of additional regulating adjustments of the German Elbe was included in the Plan of Federal Traffic Routes from 1992. Even though its realization had promptly commenced, but it was interrupted later on as a result of not-so-correct political pressure. However, the interruption was just temporary so that we can hope that the project will be finished sooner or later – as well as the implementation of effective interventions on the Czech section from Ústí nad Labem to the state border.. The admissible drafts would then reach 0.25 ms higher at comparable discharges, never dropping below 1 m, and the threat of discontinued navigation would finally pass. In dry years, though, there would still occur long periods with admissible drafts below 1.40 ms and the navigation operations would not be profitable. However, the solution of such problems is beyond any further regulation adjustments or construction of solitary locks and dams.

Yet, there is one more possibility: to level the low discharges by effective water management in the retention spaces of the existing river pools, to save the several-day increase of discharge in order to compensate the discharge depressions. Although neither this system of discharge stabilization, will provide miracles. Nevertheless, it could guarantee that the admissible draft would not drop below 1.40 ms even in the crisis of extremely dry years. The graphic chart on page 115 illustrates that the occurring admissible draft could get at least a bit closer to the Danube standards, in spite of occasional need for lightening of the vessels coming to the regulated Elbe section from the Danube via the D-O-E water corridor. The regulated Elbe could be thus considered a suitable link – however the weakest – for realization of the transcontinental route. The admissible draft should not be viewed as a kind of fetish, which determines the ultimate quality of a waterway. Unlike in railway transport, the

Posledním českým přístavem na Labi je přístav Děčín-Loubí, ve kterém se soustřeďuje překlad většiny exportního a importního zboží

The last Czech port on the Elbe – Děčín-Loubí. Most of the exported and imported goods are reloaded here.

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Silniční most v centru Děčína nabízí podjezdnou výšku 9,10 m nad nejvyšším plavebním stavem a blízký železniční most v Loubí dokonce 10,1 m. Podobné výšky jsou k dispozici také u dalších mostů na regulovaném úseku Labe, který tedy poskytuje vhodné podmínky pro přepravu kontejnerů ve třech vrstvách.

A road bridge in the centre of Děčín offers a minimum height of 9.1 ms above the highest navigable level; a nearby railway bridge in Loubí provides even 10.1 ms. Other bridges of the regulated Elbe offer similar dimensions, thus providing convenient conditions for three-layer container transport.

Určité problémy působí ovšem historické mosty v centru Drážďan, které jsou chráněny jako technické památky. Nejhorší je z tohoto hlediska starý Mariánský most (Marienbrücke). A však i pod tímto mostem by bylo možno prakticky vždy proplouvat se dvěma vrstvami a za určitých podmínek i se třemi vrstvami kontejnerů.

Historical bridges in central Dresden, protected as technical monuments, could cause certain problems, the bridge Marienbrücke in particular. However, even this bridge would admit two container levels practically any time, and under certain circumstances even three levels.

Motorová nákladní loď s nákladem štěpků, tlačící před sebou člun, zdolává silný proud v úseku Labe mezi Děčínem a Ústím nad Labem. Za povšimnutí stojí, že ponor lodi není zdaleka využit, ač jsou nákladní prostory lodě lehkým nákladem naplněny na maximum.

A self-propelled vessel loaded with wood chips pushes a barge upstream on the regulated section of the Elbe between Děčín and Ústí nad Labem. Note how the vessel draft is not fully exploited, although the holds are fully loaded with a light cargo.

maximum load of cars is not always possible, as individual tracks differ in their admissible axled pressure. In both the railway cars and boats, the maximum load is often prevented by the content itself. If it is large and light, it will never employ the loading limits of the carrying vehicle. It is even truer about containerized goods. The optimal employment of container vessels is more often restricted by the bridge clearance than by admissible drafts. In that respect, the situation on the regulated Elbe is quite favourable. A research has proved that the Elbe bridges practically never limit layering in two container tiers, and three-tier layering only exceptionally, i.e. when carrying very light or empty containers. There are other types of “extremely light” goods, like components of giant aircrafts for instance. The already mentioned cars are a case for themselves. **Recently, one of the largest European car manufacturing plants has been established near Kolín in the Czech Republic. Producing 300,000 small vehicles a year, it is located only 3 kms from the navigable Elbe. Dispatch of the product would be easily manageable, as the draft of special vessels carrying automobiles in three storeys reaches mere 1.10 ms, and depth fluctuation on the regulated section of the river would not collide with the operational reliability of the transport. Paradox, or rather distrust in water transport, has it that the cars are shipped mostly by heavy trucks. The Czech government even granted the company an exception for road transport of automobiles even at weekends.**

Until now, we have avoided the possibility of systematic canalization of the whole Elbe route from Ústí nad Labem to Magdeburg, which would constantly guarantee the draft of up to 2.80 ms. In terms of water transport, such solution would appear to be ideal. However, it is currently impracticable for two reasons: first, there is the opposition of conservationists, which view the regulated Elbe as the last natural, or rather quasi-natural stretch. The hard-core patrons of the natural character of the Elbe have been getting heavily armed to fight the D-O-E water corridor, as they are convinced that it must involve canalization of the Elbe. Such fears are groundless and only imply their being unfamiliar with the circumstances. The second reason is of an economic character: considering the low transport use of the Elbe, such costly intervention would be far from economically reasonable.

You may object that new transit transportation streams on the Elbe may bring increase in the traffic, and the economic reasons would not occur any more. Then, however, the clash of ecology and economy could become a reality.

The classic way of canalization of lowland rivers, as known from the German Elbe, is rather out-of-date even from the engineering point of view. Such measures would call for a cascade of many low dams, which would delay the navigation traffic and prevent rational hydropower utilization. Therefore, all research studies concerning full navigability of the regulated Elbe above Magdeburg have lately concentrated on the optimal design, which transfers the water traffic to parallel (lateral) canals. Such waterway would either continuously circle around the existing Elbe stream including its alluvial plain from Magdeburg to Meissen, or it would be combined with a small number of river pools with lower dams. Years ago, the first alternative was successfully implemented on the section from Magdeburg to Hamburg, where the vessels can transfer to the Central Canal and from there further on to the recently built Elbe Lateral Canal. However, most experts incline towards the second, combination alternative, which promises many an advantage, despite some touch-ups concerning the natural looks of the Elbe. The alternative would involve altogether three changes on the lowland section of the river between Meissen and Magdeburg (235 kms):

- A river stretches of 123 kms, which is more than half of the section length, would be spared any engineering intervention and, due to the lateral canals, even any water traffic; therefore their thorough re-naturalization could proceed. The earlier regulating constructions could be removed in order to allow a completely natural development of the stream. It is an opportunity rather rare on Central European rivers. The concerned sections would particularly include the stretches running through the ecologically valued areas of the alluvial plain (biosphere reserves at the mouth of the Mulde etc.).

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- Other stretches, the total of 45 kms, would be influenced only by a slight reduction of water level fluctuation – namely increase of levels at the lowest discharges.
- Only on the remaining sections of 67 kms, which is not even 29 % of the total length, the water elevation would be more radical. Nevertheless, it would by no means exceed the natural riverbanks. Such sections would be almost exclusively limited to the urban areas, where stabilization of the water level appears as rather a desirable than ecologically negative phenomenon. Only due to water elevation caused by historical dams, the Vltava River with its stable wide water surface can create the much-valued Prague panorama.

The outline clearly proves that the solution involves absolutely no threat to either natural or other environment, but rather its improvement. It would also intensify flood control in the area partially due to the discharge capacity of the lateral canals, partially because they would function as protective dykes in some places and allow expansion of inundation.

Along with the radical upgrade of the Elbe navigability, the river energetic potential would get more rationally utilized too. Although only to half of its extent as a thorough utilization of the full theoretical potential would call for high dams, which are both ecologically and economically unacceptable.

It seems that one day – probably in far future – the issue of the guaranteed larger depths on the Elbe, achieved by the described non-classical solution, is to appear on the agenda. To remain strictly objective, it is necessary to say that between Ústí nad Labem and Meissen, the river valley is too narrow to allow easy construction of longer lateral canals, which would require some further compromises.

Několik úspěšnýh přeprav částí Airbusu A 380 po Labi je možno pokládat za důkaz, že tato řeka – byť trpí nedostatečnými plavebními hloubkami – poskytuje některým průmyslovým odvětvím možnosti, jaké nemůže nabídnout žádná jiná dopravní cesta.

Successful transportation of Airbus A 380 trunk parts along the Elbe proves that despite the limited depths of the waterway, to some industrial branches the river offers transport opportunities unlike any other traffic route.

Pro přepravu částí letadla z Drážďan na pobřeží Atlantiku byla dokonce úspěšně nasazena říčně--námořní loď Alissa.

The river-sea vessel Allissa was employed to transport the airplane parts from Dresden to the Atlantic.

Regulační úpravy mají za cíl především soustředění nízkých průtoků do užší a hlubší plavební dráhy. K tomu slouží např. tzv. podélné stavby, obvyklé na českém a saském úseku Labe.

River regulations concentrate low discharges into a narrower and deeper channel. The solution of longitudinal concentration dykes is common on the Czech and Saxon Elbe sections.

Jiný způsob koncentrace průtoku spočívá ve výstavbě příčných výhonů. Ty byly aplikovány na tzv. pruském úseku Labe od obce Kaitzsch až po Hamburk a jejich počet jde do tisíců.

Construction of transverse dykes – groins – is another solution of flow concentration. Thousands of them were built on the Prussian Elbe section: from the village Kaitzsch (below Riesa) to Hamburg.

Labské nákladní lodi v plavební komoře Sülfeld na Středozemním průplavu. Dvojité plavební komory Sülfeld se v současné době rekonstruují, aby vyhověly zvýšení ponorů z 200 cm na 280 cm.

Elbe cargo vessels in the Sülfeld lock on the Central Canal. Currently the double lock is under reconstruction in order to increase the admissible draft from 2 to 2.8 ms.

V Magdeburku mohou labská plavidla opustit vrtošivou řeku a plout dále po Středozemním průplavu a Labském laterálním průplavu, kde mohou využít za každých okolností plný ponor, jako plavidlo na snímku dolní rejdy plavební komory Sülfeld na Středozemním průplavu. Není vyloučeno, že podobné laterální průplavy v budoucnu vyřeší i problém Labe od české hranice po Magdeburk.

In Magdeburg Elbe vessels can leave the wayward river and continue on the Central and the Elbe Lateral Canals, where they can employ their full draft at all times. In the photo a vessel in a lower approach basin of the Sülfeld lock on the Central Canal. In future, similar lateral canals could solve the problem of the Elbe from the Czech border to Magdeburg.

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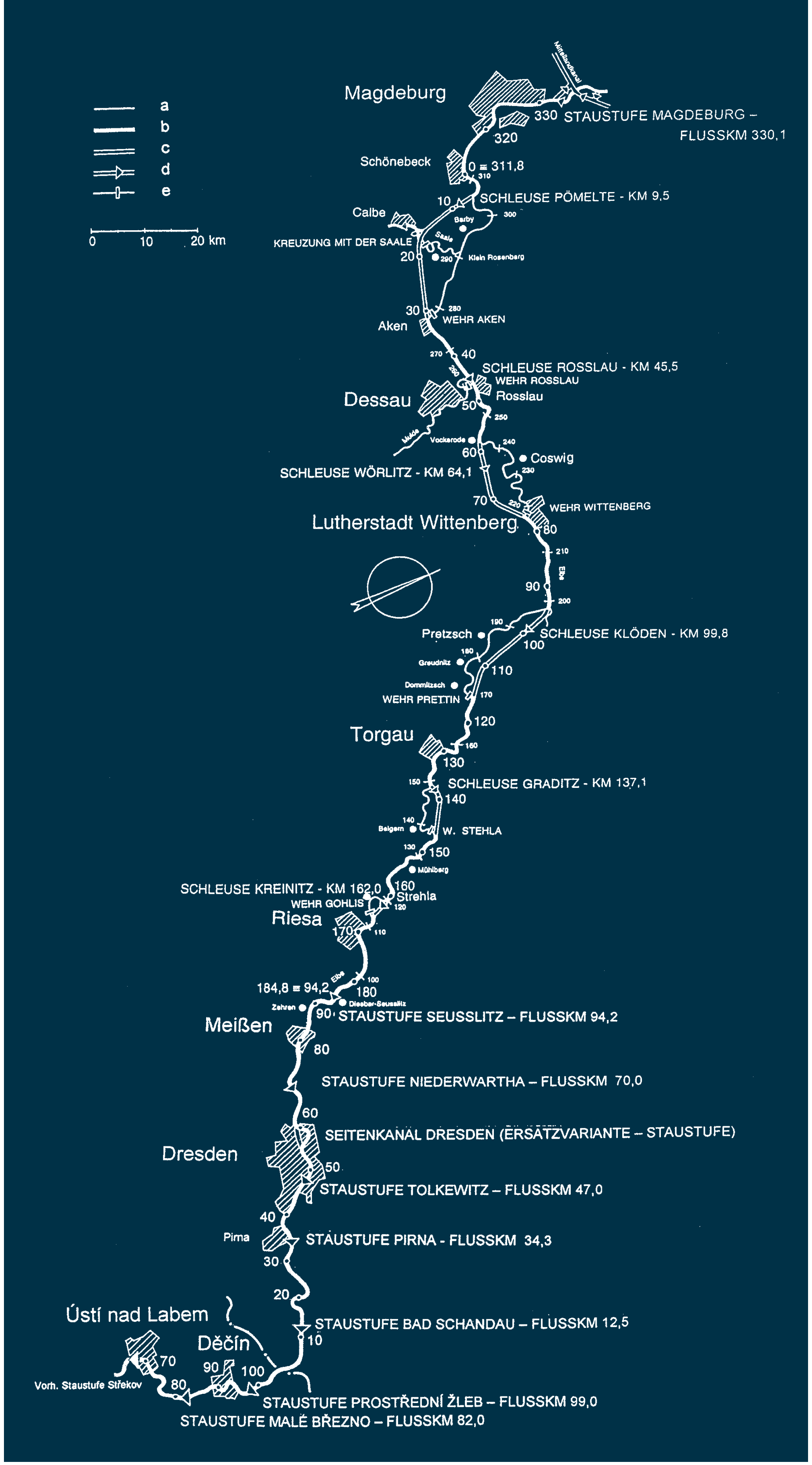

Schéma koncepce radikálního zlepšení splavnosti Labe mezi Ústím nad Labem a Magdeburkem, spočívající v kombinaci laterálních průplavů a nízkých říčních stupňů.
a – říční úseky, kde dojde k vyloučení plavebního provozu a bude umožněna jejich renaturalizace
b – zdrže nízkých jezů
c – laterální průplavy
d – plavební komora
e – jez

A concept of radical improvement of the Elbe navibability between Ústí nad Labem and Magdeburg combines lateral canals with low dams.
a – River sections where navigation will be completely excluded, thus enabling full renaturalization.
b – Pools of low dams.
c – Lateral canals.
d – A lock.
e – A dam.

The Oder

The canalized Oder from Koźle to the lock and dam Malczyce (under construction) meets only standards of the international class III, i.e. it does not comply with the criteria of 'the waterway of international importance' according to the AGN agreement. To admit convoys of at least 110 x 11.4 ms, as provided in the class Va standards, represents a more serious problem on the Oder than on the Elbe. While the so-called locks may be long enough (180 ms), their width, most often only 9.6 ms, is absolutely insufficient. Although the efforts for construction of wider, 12-m locks began as early as before WWII, unfortunately, there has been not much success. In most cases, there are also parallel "small" locks of the same width, which are only 55 ms long – a "total emergency backup" of the larger locks.

Out of 24 locks, including the unfinished Maczyce, only 5 of them offer the width of 12 ms (Zwanowice, Janowice, Rędzin, Brzeg Dolny and Malczyce). To equip similarly the remaining 19 locks will be a matter of many years.

The admissible drafts of the canalized Oder are also unsatisfactory. The river pools guarantee the depth of only 1.80 ms, i.e. the draft of 1.60 ms. To improve the situation by simple dredging might not be easy. As early as before WWII there were discussions of the possibility to rebuild the canalized section in order to substitute the large number of small locks with a lower count of higher locks with deeper pools. The proposal of Hydroprojekt Wrocław from 1973 counted on lowering the number of pools by 8 and elevating the admissible draft of the canalized section by 2.50 ms. In addition, the project should replace the old dams with frames and needles, which had to be collapsed for winter, with modern constructions. In the following years, though, the plan was abandoned, only the modernization of the dams was carried out, which the original layout of locks and dams was preserved. Similarly to the Elbe, on the Oder too, only modernization of the dams guarantees reliability of navigation traffic. Fortunately, the task has been almost completed and only the last two dams with frames and needles in Chróscice and Ujście Nisy still need modernization.

The bridge clearance on the Oder is even worse than on the Elbe. The lowest of them span only 4 ms above the highest water-level stage, the bridge in Ratowice only 3.37 ms.

Such limitation, along with the unsatisfactory lock widths, spoil any expectations of soon development of economical container transport on the Oder.

When compared, the canalized sections of the Oder scores much worse than the Elbe; the same goes for the respective regulated parts of the rivers.

The admissible size of pushed convoys on **the regulated Oder** is the same as on its canalized part, i.e. 118 x 9 ms (wider convoys are allowed in the lower section), which proves that the units of the class Va (110 x 11.4 ms) will be easily passable. The regulated Oder would not represent a seriously narrow profile for transit vessels.

However, the admissible drafts are rather pathetic. The graphic chart on page 115 illustrates their exceeding in an average water year quite clearly. The admissible draft of 1 m is exceeded only for about 300 days a year (i.e. 80 % of the year time), a full admissible draft, only 1.60 ms with the Oder vessels, is guaranteed only for about 150 days (approximately 40 % of the year time). The average navigation break for insufficient depth reasons is about 2 months. In dry years, the conditions get even worse. In addition, the length of the actual navigation period is adversely affected by a difficult ice regime on the lower reach: according to the statistic, the average navigation period stretches to mere 275–290 days.

For over 70 years, the improvement projects of the Oder navigability focused on construction of retention reservoirs, which could increase discharges and thus admissible drafts of dry periods. However, the results of the efforts are rather scarce. Unlike in case of the discharge stabilization on the Elbe, which should eliminate short-term (at most several-day) discharge depressions, the Oder solution should provide considerably higher admissible drafts for the total period of hydrological disorders. Consequently, it called for accumulations of several hundreds millions of m^3 and much higher investment costs. The latter were never fully available. Nowadays, it is quite clear that this method is unable to provide convenient navigation conditions on the regulated Oder.

The bridges of the regulated Oder limit the navigation operations as much as they do on its canalized section – the lowest one reaches only 3.75 ms above the highest water-level stage. Unlike the Elbe, and even after the project of the Oder 2006 will have been implemented, the Oder can hardly be considered a suitable part of the transcontinental waterway from the Danube to the Baltic and North Seas, or to the canals between the Rhine and Oder.

Quite understandably, the situation has provoked numerous projects for complete canalization of the regulated Oder. The newest official design came from the Wrocław Navicentrum in 1993. Starting from the last lock Brzeg Dolny after Hohensaaten (the mouth of the Havel–Oder Canal), it proposed construction of 23 relatively low dams with locks of the dimensions 190 x 12 ms, i.e. fully of Vb class standards. It included also some route corrections and reconstruction of the off-size bridges. The pools would guarantee admissible draft of 2.50 ms practically at all times. The construction period was estimated for 35 years.

However, a thorough evaluation proved once again, that in European conditions the conventional canalization of lowland rivers has become outclassed and hardly practicable. The proposal was gradually turned down, and only two locks downstream from the lock and dam Brzeg Dolny were decided to be realized: Malczyce (currently under construction) and Lubiąż. Navigability of the further route should have been treated again only through regulation and improved discharges from further reservoirs.

Up to now, the description of the Oder waterway confined to critic and sceptical views of the future development. It could evoke impression that connection of this neglected river to the Danube might have no point. It is high time to present some other facts showing the future of the river in a more optimistic light.

There are practicable ways to improve the Oder navigability, they were, however, only documented in outline studies. The Oder situation could be treated similar to the Elbe with the combination of small number of low dams and lateral canals running beyond the alluvial ecosystems or other ecologically sensitive locations. Moreover, on the Oder it is much easier to carry out. First of all, there are no narrow valleys on the regulated Oder, which would obstruct construction of lateral canals. The positive impact on the quality of the environment could thus become even more distinct than in the Elbe case. Secondly, the length of the river stretch, where full-navigability would rely on the combination of dams and lateral canals, is much shorter on the Oder, as well as the total surpassed fall and the required number of locks. The combination solution could be arranged into three stages. In the first stage, the vessels would be able to reach the Oder–Spree Canal at Fürstenberk in its summit pool, i.e. the connection to the fully navigable network of European waterways. The following stages are not as urgent, similarly to treating the Elbe stretch below Magdeburg. To assess truthfully the difficulties of the Elbe and the Oder solution, it is necessary to compare the section Ústí nad Labem–Magdeburg with the section Lubiąż (as proposed in the Oder 2006 programme) – Fürstenberg. The comparison is unambiguously favouring the Oder.

	Compared section	
Compared feature	The Elbe: Ústí nad Labem –Magdeburg	The Oder: : Lubiąż –Fürstenberg
Section length (kms)	365	238
Total surpassed fall (ms)	93	55
Number of required dams	14	6
Number of required locks	13	6
Length of lateral canals (kms)	87	114

The advantages of the combination solution on the Oder grow more obvious when compared to the Navicentrum Wrocław design, which proposed 15 dams and 16 locks.

As for the nature conservation, the benefits of the combination solution are similar to the Elbe ones, or rather even more significant. The length of sections, which would be revitalized or renaturalized, would stretch to approximately 135 kms, thus

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Plavební komora Różanka na Odře. Proplavování tlačné soupravy o nosnosti 1000 t.

The lock Różanka on the Oder. Locking of a 1,000-ton pushed convoy.

Velká plavební komora Rogów na Odře. Proplavování tlačné soupravy o nosnosti 1000 t.

The main lock of Rogów on the Oder. Locking of a 1,000-ton pushed convoy. A smaller secondary lock on the left.

Segmentová horní vrata v horním ohlaví plavební komory Różanka představují v síti evropských vodních cest spíše výjimku.

On the European waterways a radial gate in the upper gate of the Różanka lock is rather unusual.

Stupeň Dobrzeň na Odře je typickým stupněm na kanalizovaném úseku. Velká komora má rozměry 187 x 9,6 m, malá 55 x 9,6 m. Šířka velké plavební komory se zdá na snímku být větší, to je však způsobeno tím, že na jedné její straně je namísto svislé stěny šikmý svah. Pro lodě jsou samozřejmě rozhodující šířky ohlaví.

A typical lock and dam of the canalised section in Dobrzeń on the Oder The large main lock has dimensions of 187 x 9.6 m, the secondary one 55 x 9.6 m. In the photo the width of the main lock seems larger due to a slope, which replaced lock walls of one side. For vessels the width of gates is however crucial.

Tlačná souprava s nákladem 1000 t uhlí vplouvá z horní vody do plavební komory Chróścice. Při malé šířkové vůli usnadňují vplutí vhodně vytvarovaná svodidla.

A downstream going pushed convoy with 1,000 tons of coal enters the lock Chróścice. At the limited clearance fitted guide walls make the manoeuvre much easier.

Malá plavební komora a centralní velín u stupně Rogów.

A secondary lock with a central control room in Rogów.

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Plavební komora „nové generace" Janowice na Odře má rozměry 225 x 12 m.

A lock of "next generation" in Janowice on the Oder (225 x 12 ms).

Nedávno dokončená nová plavební komora Zwanowice odpovídá svými rozměry (190 x 12 m) přesně třídě Vb. Je předobrazem cílového stavu oderské vodní cesty.

Dimensions of the recently completed Zwanowice lock (190 x 12 ms) correspond with the class Vb. It models the future conditions on the Oder waterway.

Míjení dvou tlačných souprav v dolním kanále plavební komory Różanka. Snímek byl pořízen téměř ze stejného místa jako historická fotografie na str. 38. Může být tedy dokumentem převratných změn v technologii vodní dopravy na Odře.

Meeting of two pushed convoys in the lower approach of the Różanka lock. The photo was taken from the same place as the historical one (p. 38). It illustrates the revolutionary changes of navigation technology on the Oder.

Na Odře byla poměrně brzy a důsledně zavedena tlačná technologie plavby. Po získání prvních zkušeností byly vyvinuty tlačné soupravy typu Bizon se dvěma čluny nosnosti po 500 t při ponoru 160 cm, které optimálně využívají současných parametrů řeky. Jejich délka (108 m) je limitována směrovými poměry plavební dráhy, které jsou v některých místech dosti nepříznivé – např. při výjezdu z plavební komory Rogów.

On the Oder the progressive pushing technology was introduced relatively early and consistently. The initial experience helped to develop the pushed convoys Bizon. With two barges carrying 500 tons each at the draft of 1.6 ms they optimally employ the river parameters. Their length (108 ms) is limited by the channel radii, which are rather inconvenient in some places, like in the upper approach of the Rogów lock.

Původní hradlový jez Rogów je příkladem historické konstrukce, která byla donedávna obvyklá prakticky u všech jezů na kanalizované Odře. Sloužil vodní dopravě celé století. Dnes jeho funkci převzal moderní klapkový jez.

The former dam with frames and needles Rogów shows a typical historical solution, until recently similar to most dams on the canalised Oder. Having served the whole century, it was replaced with a modern dam with falling gates.

Modernizovaný sektorový jez Różanka.

The modernized dam Różanka with sector gates.

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Regulovaný úsek řeky Odry nad Ścinawou. Řeka má v těchto místech ještě malé průtoky a její koryto je extrémně zúženo četnými výhony.

The regulated Oder above Ścinawa. The river features still small discharges here and its bed is extremely constricted with numerous groins.

Charakter skutečně velkého toku má Odra teprve pod ústím Lužické Nisy u Frankfurtu nad Odrou (na obr.) a zejména pod ústím Warty.

The Oder becomes a truly large stream only below the mouth of the Nysa Łużycka near Frankfurt (photo), and especially below the mouth of the Warta.

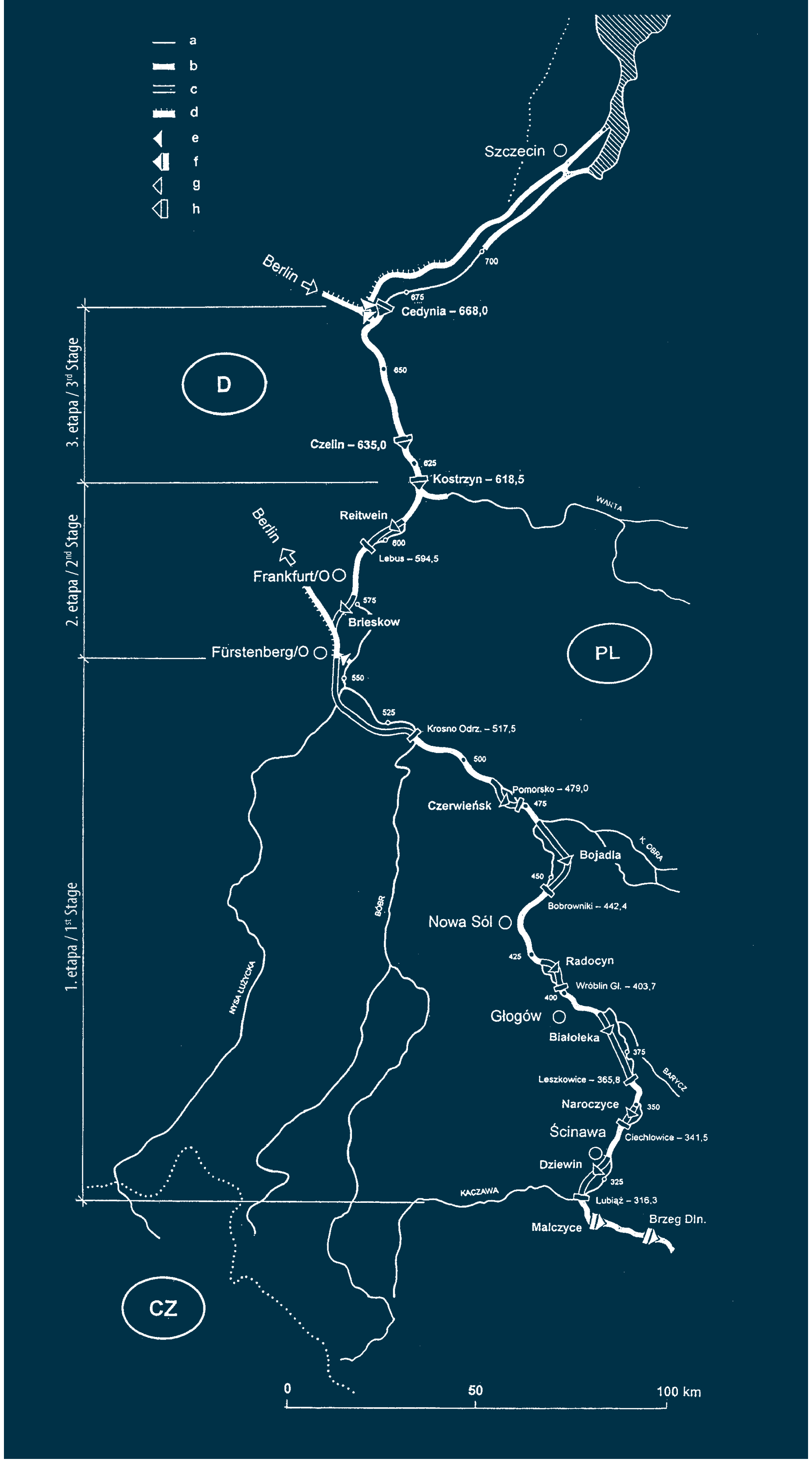
Prvým krokem k zavádění tlačné plavby na Odře bylo využívání tzv. kombi-sestav, složených z motorové nákladní lodi, která tlačila částečně upravený vlečný člun zádí napřed.

So-called "combi system" was the first step to the navigation by pushing on the Oder: a self-propelled cargo vessel pushed one traditional barge its stern front.

occupying almost 57 % of the total river length. The positive impact in terms of flood control, expansion of natural inundation area and energetic utilization of the river would not fall behind the Elbe results.

The replacement of the problematic section of the regulated Oder with a full-navigable waterway would cost undoubtedly less than a similar treatment of the Elbe. Their economic efficiency depends again on realization of the D-O-E water corridor.

In conclusion of this chapter, it is necessary to state that the situation of the Elbe and especially the Oder waterways is not consistent with the favourable navigability of the Danube and the proposed parameters of the D-O-E water corridor. While with the Elbe the radical measures do not seem to be inevitable, it is by no means the case of the Oder. In both cases, though, the respective impacts caused by the D-O-E water corridor will not be technically extreme and they will not clash with the quality of environment, but rather otherwise.



Námět na radikální zlepšení splavnosti regulovaného úseku Odry (ve třech etapách), spočívající v kombinaci nízkých jezů a laterálních průplavů.
a – říční úseky, kde dojde k vyloučení plavebního provozu a bude umožněna jejich renaturalizace
b – zdrže nízkých jezů
c – navrhované laterální průplavy
d – existující průplavy
e – existující plavební komora
f – existující stupeň
g – navrhovaná plavební komora
h – navrhovaný stupeň

A design of radical improvement of navigability on the regulated Oder (in three stages) combines low dams with lateral canals.
a – River sections where navigation will be completely excluded, thus enabling full renaturalization.
b – Pools of low dams.
c – Suggested lateral canals
d – Existing canals.
e – An existing lock.
f – Existing lock and dam.
g – A suggested lock.
h – Suggested lock and dam.

Schematická mapka, zařazená do propagačního prospektu vydaného organizacemi WWF a Daphne. Autoři této mapky se pokoušejí přesvědčit širokou veřejnost o tom, že realizace vodního koridoru D-O-L vyvolá kompletní destrukci chráněných oblastí podél Labe a Odry (zelené plochy), a to až po Hamburk, případně po Štětín.

A schematic map enclosed to the leaflet by the WWF and Daphne organizations. Its authors seek to make the public believe that realization of the D-O-E corridor will cause a complete destruction of the natural character of the Elbe up to Hamburg, and the Oder up to Szczecin.

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Kamil Lhoták

Nature granted us enough virtue
to be able to use it properly.

Johann Wolfgang Goethe

Jak se buduje vodní cesta

How to build a waterway

IV

Už v úvodu jsme se „odvolali“ na názor Járy Cimrmana, podle něhož je stavba průplavu, který je vlastně jen pouhým větším rigolem, krajně jednoduchou záležitostí. Ani na tomto místě nemíníme s prohlášením českého génia a polyhistora zásadně polemizovat, dovolíme si však tuto jednoduchost trochu přiblížit.

In the introduction we quoted Jára da Cimrman. According to the Czech polyhistorian, construction of a canal, which is in fact just a larger ditch, is an extremely easy task. Although we have no intention to principially argue with the genius, we would like to specify the easiness a little further.

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Selection of parameters

Following on from what was written in the chapter on history, it is clear the scale of parameters of waterways is extremely broad. This means that the difference between the old English canal and a European waterway as set out in the AGN Agreement is probably much bigger than the one between a mere forest path and a six-lane highway. This is why an international classification of waterways based on a modular principle was created and adopted into the AGN Agreement, which further limits the selection of parameters in the case of new European waterways of the E category as it requires them to comply at least with parameters of the Vb class and recommends to ensure admissible draft of 280 centimeters. As the D-O-E water corridor should be an E category waterway according to the AGN Agreement, the choice of the Vb class is given unambiguously. In connection with the conditions on the Danube it is purposeful to choose the value of 7 meters out of the recommended values of air clearance. While respecting these parameters, it will be possible to ensure sailing of motor cargo vessels of maximum load up to 2,500 tons, and smaller river-sea ships, as well as pushed convoys able to carry up to 4,000 tons of goods.

It may seem that planning engineers have very little to think about when suggesting parameters of a waterway as the limits of internationally valid norms are clear and unambiguous. It is not exactly like that, though. The classification sets out only the horizontal dimensions of vessels and convoys (i.e. 110 x 114 ms, resp. 185 x 11.4 ms in the case of the Vb class) and recommends to consider their enhancement by 7-10 percent (which would correspond with the beam of 12 m). However, it says nothing about the channels or locks width or admissible minimum radii of bends, widening channels in curves, etc. Its requirement reads: Planning engineer, ensure a safe and fluent operation of vessels and convoys of a given size in a cost-effective way. And it is up to you what kind of margins and reserves will be used.

A similar situation is in the case of a recommended admissible draft. The classification does not set out even an appropriate safety margin between the bottom of a vessel and the bottom of a waterway. Therefore the security aspects and admissible vessel speed (which significantly influences the margin) have to be considered by a planning engineer on a case to case basis. The only value related not to a vessel but directly to a waterway is the air clearance of bridges.

The proposal of waterway parameters, appropriate size of its cross-section and locks sizes is up the a planning engineer who has to look for an optimum solution while considering non-traffic functions of a project, particularly in the areas of flood protection, water power utilization, etc. In the case of the D-O-E water corridor, respecting non-traffic functions certainly represents a fundamental requirement. Economic aspects as well as ecological (or rather environmental) requirements are crucial criteria during the optimation procedures. Considering probable directions of the future development may be added to the above core criteria as well, although this broader approach is connected with some sort of insight and some intuition too.

Optimum routing solution

A route of a channel can be planned in various ways according to characteristics of a waterway. Big, naturally navigable rivers where the navigability is achieved via “soft” regulatory measures have the channel given by a natural thalweg, resp. by places of the biggest depths. The channel is “defined” by clear markings (buoyage). The requirement of clear markings is understood as standard visibility or as a clear view on a radar screen. So it is not created artificially. Fully artificial canals built outside water streams are the other extreme. There are certainly a lot of intermediate options between both extremes and so the planning engineer often faces a dilemma. Should he lead a route of a waterway via a natural non-navigable streamline and propose to make it navigable, usually asking for more radical regulation or even construction of lock and dams? Or should he prefer a combination of canals and natural river sections? A hundred years of development of the D-O-E water corridor should serve as a textbook showing various approaches and motifs for choosing them.

In the “pre-railway” times rivers on the route of the D-O-E water corridor – namely the Morava River – offered an acceptable sailing route for small wooden barges. The construction of a parallel canal would have been excessively costly. A rising demand on the size of vessels led to prevailing of the “orthodox” canal concept, which almost absolutely avoided using natural streams, including big rivers like the Morava and Oder. Canal bridges were projected even in places where canals were supposed to cross the rivers. This concept was influenced by experience from Great Britain and France. As such, the concept was far from an easily accepted project, but was not buried by attempts of Tomáš Baťa and survived till the end of the 1950s. At that time it was not sustainable anymore to project an artificial canal alongside practically navigable parts of the Morava River. And so the “river” concept prevailed in the end. The pendulum of development deflected too much, though, and is understandably beginning to return.

In the previous paragraph we only summed up what was written in the historical introduction. The readers most probably expect a clear answer to the current preferences of a technical solution. **Should the D-O-E water corridor be routed in preference through beds or natural streams or independently on them?**

The answer results from the following facts:

- Over a hundred years ago the demands on size of vessels suddenly dramatically rose. In times of the Waterways Act of 1901 a barge with a load capacity of 600 tons represented a high set aim as did a vessel type with a load capacity of 1,000 tons in the middle of the last century. Such parameters are obsolete now. Type motor cargo vessels for the Vb class have a load capacity up to 2,500 tons and pushed convoys even up to 4,000 tons. The Morava and Oder Rivers got effectively “smaller” and using their beds as a part of a waterway is not that beneficial any more. Tracing a route through a river would sometimes need excessive enhancing of its existing cross-section (its width and depth). Enhancing the cross-section ad post is easier in the case of artificial canals.

- Implementation of economically and particularly energetically beneficial pushing traffic requires enabling sailing of long units, i.e. pushed convoys, which are stiff and can hardly "fit" into bends of small radius. Numerous attempts to improve their maneuverability when using hinge (flexible) connections of individual barges or groups of barges did not lead to a solution that would be technically and economically satisfactory. River bends of a small radius usually restrict fluent and safe operation of such convoys. Canals, on the other hand, do not present such a problem.
- Tracing a waterway through a river in flat terrain does not permit using higher locks and dams and leads to creating operationally unadvantageous short pools.
- A route of a canal can be led aside from ecologically sensitive river flood-plains and so minimize conflicts with interests of protection of the environment, while in the case of changing the characteristics of a stream such conflicts are quite numerous and salvaging them is difficult.

The current concept of the technical solution of the D-O-E water corridor prefers the "canal" solution on routes leading almost without exception aside from the reach of river flood-plains. Only in places where the route through the river is obvious, i.e. on bigger rivers with existing pools due to dams built earlier for different purposes, routing the waterway via river beds can be considered. In such cases any change of the elevation of hydrostatic water level or dynamics of its fluctuation are not taken into consideration. This means the status quo remains the same.

The solution based on these principles usually enables an easy creation of a fluent route. It should not consist of long lines intersecting the countryside in the length of many kilometers and therefore looking monotonously and strangely. A waterway is not a highway or a high-speed railway used for very fast train transportation and so it can copy the morphology of terrain sensitively and conform itself with the characteristics of the countryside. Bends of its route can have optimum radii of approximately 2,000 ms (while the value of 1,000 ms does not cause problems either). To compare: high-speed railways require minimum radii of the route of 4,000–7,000 ms.

When proposing a route, it is necessary to avoid radii than 1,000 ms, resp. 800 ms as a shorter radius requires widening a channel due to ensuring a safe navigation. This is based on behavior of a vessel when passing through a bend. The required widening of a channel is significantly higher with shortening the radius of a bend – the shorter the radius, the broader the channel – as can be seen in the following chart of values for pushed convoys of 185 meters in length.

Radius of bend R (ms)	Widening of channel e (ms)
1000	17,0
800	21,3
600	28,3
400	42,5

Unlike the case of highways or railways it is not necessary to insert interlines between two counter bends, resp. substitute simple circular bends by bends of changeable curvature. Intermittent widening of a channel on one or the other side can lead to the fact that the actual route of vessels (unlike the theoretical axis) will be absolutely fluent.

Sometimes it is not possible, though, to maintain the radius of a channel curvature or the required widening of a channel as it would lead to unfavorable impacts on the character of the countryside (e.g. in curved river valleys) or to conflicts with existing build-up areas. In these cases it is necessary to search compromising solutions, e.g. restriction of passage of long pushed convoys in opposite directions in the same place and at the same time in unfavorable meanders by police-navigation regulations. Just like in the case of other transportation ways, tunnel solutions have to be implemented in extreme situations, i.e. intersecting a meander by a short canal tunnel. Such tunnels are to be found namely in the network of old French canals. Straightening the route via using a canal tunnel is considered also in the case of newer projects of waterways of bigger parameters.

A fluent route of a canal enables leading other high-capacity transport ways paralelly with it on its banks. This brings about savings of space as well as cutting costs when building bridges for intersecting communications as a bigger bridge crossing a canal and a parallel railway line or highway is much more cost-effective than two smaller bridges built separately. This principle was used for leading the Mohan–Danube canal through the outskirts of Nuremberg where a four-lane speedway was on its banks. Such a solution is not suitable outside intensively urbanized areas, though. A waterway led independently, even though in the form of a fully artificial canal, is more a part of a landscape than an industrial piece. It is mainly a quiet space or a man-made biocorridor and so a noisy highway or railway on its banks would depreciate it. An appropriate example is leading the Mohan–Danube canal through the valley of the Altmühl River where an environmental project recommended independent "arhythmic" routes of highways bypasses as well as coastal paths along the canal.

The route of the D-O-E water corridor is currently quite accurately planned and included into the landscape planning documentation. There are still some parts, though, where an alternative solution is possible. In these cases the choice of the alternative is still to be decided upon.


KATHARINA
HAREN EMS D
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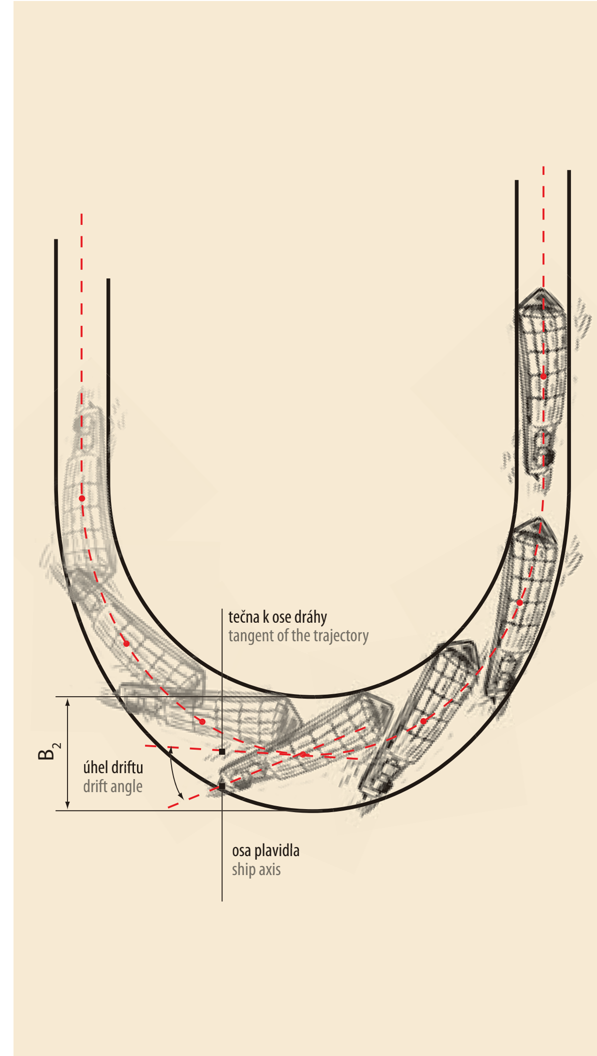

Pobřežní průplav (Küstenkanal) v severním Německu je veden zpravidla mnohakilometrovými přímými úseky, což nepůsobí v krajině nejlépe. V daném případě mělo ovšem takové řešení zcela specifické důvody, neboť průplav měl sloužit ke snadnému odvádění vod ze zamokřených území a rašelinišť, takže jeho trasa musela být co nejkratší.

The straight many-kilometre stretches of the Coastal Canal (Küstenkanal) in Northern Germany hardly match the landscape. The solution had very specific reasons: the canal was designed to drain moorland and wet agricultural areas, and its route needed to be the shortest possible.

V zaklesnutém meandru ve zdrži Mettlach na kanalizované řece Saar má plavební dráha poloměr pouze 315 m. Přesto jím proplouvají tlačné soupravy o délce 185 m. Jejich vzájemné míjení v tomto oblouku je však vyloučeno. Díky extrémnímu rozšíření plavební dráhy je ale povoleno vzájemné míjení s kratšími plavidly.

In a deep-cut meander of the canalised Saar near Mettlach the axis of the channel has a radius of only 315 ms. Still it allows passing of 185-m long pushed convoys. While their meeting in the bend is impossible, the extreme widening of the channel allows meeting with shorter units.

Schéma pohybu tlačné soupravy v oblouku. Osa plavidla není tečnou trajektorie, po které se pohybuje jeho těžiště. Je od teoretické tečny T odkloněna o úhel driftu, takže plavidlo zabírá pruh o podstatně větší šířce (B_2). Mohli bychom to přirovnat automobilu na kluzké vozovce, který projíždí zatáčku smykem.

A pattern of a pushed convoy motion in a curve. The axis of the convoy is not identical with the tangent of the trajectory, which follows the convoy's gravity centre, as shown left. It declines from the tangent T by a drift angle, so the convoy takes a substantially wider stripe (B2). The motion is similar to a car sliding through a road curve.

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Typická ukázka paralelního vedení trasy rychlostní komunikace dálničního typu s průplavem Mohan–Dunaj v intenzivně urbanizovaném území u Norimberku.

A typical example of parallel routes of the Main–Danube Canal and a speedway in the heavily urbanized centre of Nuremberg.

Také v případě vodního koridoru D-O-L by mělo dojít k těsnému souběhu s jinými komunikacemi, a to v napajedelské „soutěsce", kde se vzájemně přibližují vodní koridor (tj. zdrž jezu ve Spytihněvi na řece Moravě, která je vlastně hotovým úsekem vodního koridoru), dvoukolejná elektrifikovaná trať a silnice I/55 (budoucí rychlostní silnice R 55), procházející mezi řekou a železnicí. Již letmý pohled na tento úzký souběh dává jasnou odpověď na otázku, která z těchto dopravních linií je krajině nejbližší.

The D-O-E water corridor as well should feature a tight parallel leading of several transport routes, namely in the Napajedla "narrow": a water corridor (i.e. a pool of the Spytihněv dam on the Morava – in fact a completed section of the corridor), an electrified double track railway, and the road I/55 (the future speedway R 55) in between. Just a fleet look at the tight side-run proves quite clearly which of the traffic routes is the most landscape-friendly.

V podmínkách přírodní krajiny by ovšem strohé paralelní linie působily cize. Proto byl krajinářský projekt průplavu Mohan–Dunaj v údolí řeky Altmühl založen na zásadě, že strohé paralelní linie je třeba vyloučit. To se týkalo jak vedení nové silniční trasy, tak i vedení pobřežních stezek podél průplavu.

In a natural landscape the strict parallel lines would appear rather alien. That is why the landscaping project of the Main–Danube Canal in the Altmühl valley tried to exclude any parallel lines. The same applied to the route of a new road and paths, which were to lead along the canal.

Optimum longitudinal section

The width and depth of a channel are given by hydrodynamic regularities laws and also by economic requirements. A standard vessel can pass even through a quite narrow channel, albeit at big resistance and high fuel consumption, restricted speed and lowered safety when passing a vessel going in the opposite direction. The size and shape of the cross-section can be different even in the case of the same vessel type depending on the economic optimum.

The first criterion of a proposal is the area of the cross-section F, the sufficient size of which must be based on the relation to the so-called area of the midship section of a vessel f, which is given by a product of its beam and admissible draft. The ratio of these quantities (n = F/f) is called a hydraulic coefficient. The dependence of resistance on the value n can be proven easily. A mathematical proof also leads to the fact that the value of n should not be smaller than 7, in extreme cases (and on less frequented waterways) smaller than 5.

Emerging from the fact that in the case of the D-O-E water corridor, the following stands: f = 11.4 x 2.8 = 31.92 m^2, the **area of a transverse cross-section** should be minimum 5 x 31.92 = 159.60 m^2, or even better 7 x 31.92 = 223.44 m^2.

Another criterion is the safety of passing vessels which is decisive for the channel width. If this value is measured at the level of bottoms of fully loaded vessels, it has to correspond with double their width with reasonable reserves added, particularly the impact of declination from the line of straight trajectory. Based on theoretical research, accurate model measurements and practical experience, the width reserve needed for a safe gap between vessels and vessels and the banks should reach approximately 40–75 %. The total channel width would then reach 22.8 x 1.4 to 22.8 x 1.75 = 32 to 40 meters. This value must definitely be higher in bends as has been stated above.

It is also necessary to assess the **depth of a channel**, in which a significant role is played by hydrodynamics again: the admissible draft of a moving vessel is bigger than of a vessel standing still. What happens is called "squat", which rises with the speed of sailing. Therefore the depth should be bigger than the admissible draft, at least by 20–50 cm. The lower value of this so-called margin complies only at low speeds and in places with a "soft" bed as in these cases the incidental contact with the bed would not present any danger. Although we would like to avoid all unnecessary details regarding hydrodynamics, we still have to mention at least one more – dependence of the critical vessel speed on the depth. The critical vessel speed plays a similar role as the speed of sound in the case of an airplane. Breaking it would be connected with extreme increase of resistance by unfavorable wave phenomena that are similar to sound strains of supersonics when breaking the sound barrier. If vessels are to move at minimum 10–15 kms/h at reasonable energy consumption and without excessive waves troubling the banks, the channel depth should range between 400 and 500 cm, independently on the admissible draft of a vessel.

We can guess from the above that the choice of the transverse cross-section is basically "over assessed" as fulfilling one of the conditions accurately leads to "overrating" from the point of view of the other conditions. Hydraulic coefficient is usually decisive as its satisfactory value can be ensured by choosing a wide channel with a minimum required margin or by using a relatively narrow channel with "excessive" depth. The first option is chosen in the case of bigger and sufficiently wide rivers, the other one is much more suitable in canal solutions because of necessary appropriation of land and investment costs as well as due to hydrodynamics. In the case of the D-O-E water corridor the "canal" cross-section is preferred on most river parts as natural beds of the Morava and Odra rivers are not exactly too wide and so a favorable coefficient can be achieved thanks to deepening rather than widening them. This way also prevents erosion of their natural banks.

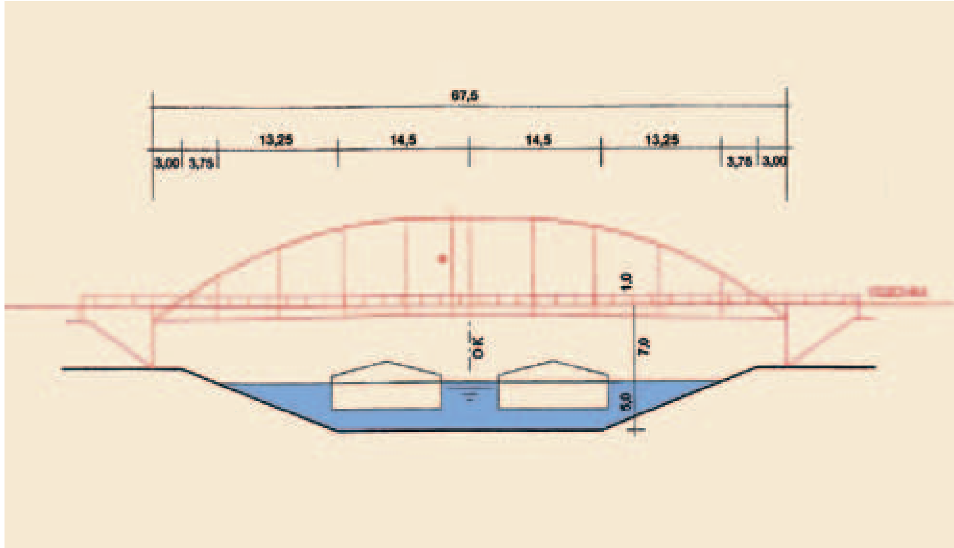
A different approach can be used in the case of geometrical shape of a river bed. In urban areas and in constrained parts a rectangular cross-section can be used. It is very demanding from the point of view of construction as it needs building vertical or almost vertical embankment walls or anchored sheet pile walls. In most cases a simpler shape of a trapezoid is chosen as it corresponds with the shape of natural river beds. Project engineers can also propose compromising shapes of the cross-section, in accord with local conditions.

The cross-section considered for the D-O-E water corridor should be safely passable for vessels with admissible draft of 350 cm, supposing their restricted speed and reasonable traffic regulation. In the part adjacent to the Danube even river-sea ships wide up to 17 m could pass – they are a usual sight in Ukraine and Russia and not that rare on the Danube.

A canal is not a mere "ditch" and so its cross-section has to be constructed and fortified. This leads us to notes of a "concrete bed" often stated by the D-O-E project opponents. Unfortunately it has become a favorite saying in the official media as well. Fortifying slopes of a canal cross-section by a layer of concrete would be certainly possible, but it would be hard to find an engineer willing to propose such nonsense. Concrete revetment is not used in navigable canals, but in derivation canals of water power stations where the speed of water is considerable. Roughness of banks or beds is not desirable as it basically lowers a possible energy output of the plant. Therefore smooth concrete is preferred. In the case of canals for navigation the "roughness" of banks, e.g. some vegetation, is desirable as it effectively subdues waves originating due to water traffic.

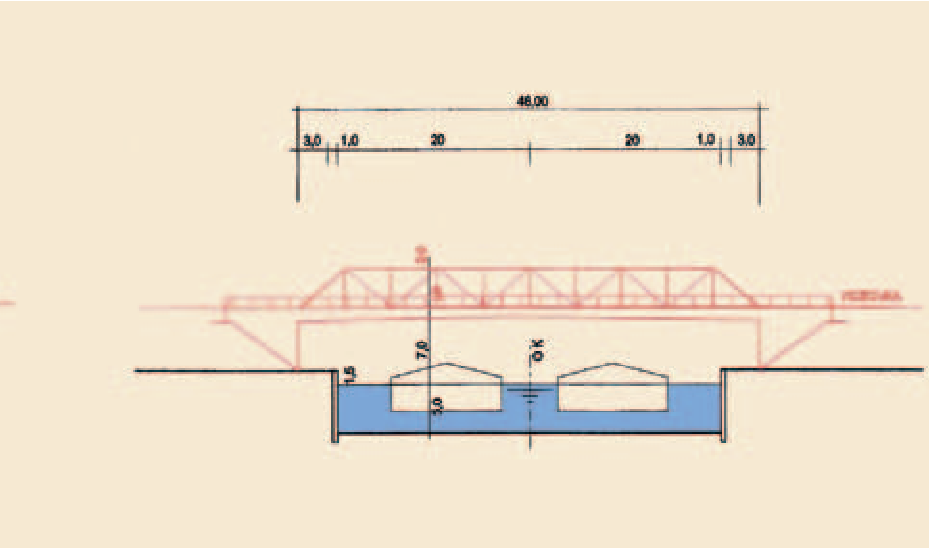
As the time went by, an opinion formed that there are three basic principles to be considered:

- Simple and cost-effective construction;
- Durability against influences of the traffic ensuring low maintenance costs;
- Acceptable solution from the point of view of the environment.



Rozměrové schéma příčného profilu vodního koridoru D-O-L – základní varianta (lichoběžníkový profil).

Cross-section dimensions of the water corridor D-O-E – a basic version (a trapezoid profile).



Rozměrové schéma příčného profilu vodního koridoru D-O-L – varianta vhodná pro stísněná místa, např. v zástavbě (obdélník).

Cross-section dimensions of the water corridor D-O-E – a version suitable for narrow places, e.g. build-up areas (a rectangle).

Reed is the most effective wave break, for instance, while roots of willows or alders provide the best fortification of banks. A certain disadvantage of vegetation fortification rests in the fact they become effective only after a longer period of time. Therefore riprap layers consisting of stones of various sizes are preferred to safeguard the bank at the beginning. As time goes by the gravel "gets lost" in growing vegetation. The cover is spread on multiple-rise sand filters or geotextiles and sometimes the cohesion is helped by pouring suitable agglutinant in or using wire nets. This way canal banks correspond to banks of a natural stream and are sometimes even "more natural". A welcome complement of the coastal line is certainly **high vegetation, which not only hardens the surface, but creates effective windbreakers lowering impact of crosswind on vessels – particularly on the ones without a load.** In connection with the growing lack of lakes, moors and green islands in the countryside due to intensive agricultural procedures in the past, the construction of new canals and modernization of the existing ones must be connected with compensation measures. These rest mainly in constructing shallow coastal zones along the actual deep canal cross-section in suitable places. They are divided from it by little dams, often not seen above the water surface, having some "passes" constructed in them from time to time to allow for free migration of fish and other animals. The depth and layout of shallow coastal zones usually comply with the ideal conditions for fry upbringing and for good living conditions of some birds and amphibians needing water for life. Shallow coastal zones are systematically built not only at the time of construction of new canals, but also during modernization of old ones. It is obvious that a canal with a lot of shallow zones is substantially wider than its theoretical size parameters require.

Similar principles of solving a transverse cross-section can be used also in canalized sections of rivers.

Favorable experience with shallow coastal zones was gained namely during the construction on the Main – Danube canal where this "natural" way of complementing the canal was first applied in accord with the landscape plan created for a sensitive part of this waterway in the valley of the Altmühl River.

The landscape plan included not only maximum preservation of existing values, but also creation of new "artificial" environment for rare and endangered species. As a part of it, even vertical clay walls for nesting of kingfishers and sand martins were constructed. The plan was preceded by detailed assessment of biodiversity in the actual part of the valley. Now, control surveys are following, covering comparison the numbers of various species before the construction and after it. Curiously enough, the situation has changed for the better.

A different situation is certainly in densely urbanized areas and namely in larger cities where emphasizing a quasinatural function of banks would be useless and nonfunctional. If the space for leading the waterway is not exceptionally limited and does not need using strictly rectangular cross-section with vertical embankment walls, the embankments and nearby spaces gain a character of city parks. **What is created is symbiosis of water surface and green spaces in the middle of busy towns and as a result "quiet" zones exist. We should emphasize how differently a city is influenced by noisy thoroughfares of automobile traffic, polluting the air by emissions. Could they become "quiet oases"?**

Ukázka „konstrukce“ břehového opevnění nizozemského průplavu rákosem a soustavné údržby svahů souběžné hráze pastvou ovcí.

An example of bank slope reed revetment on a Dutch canal; the dyke slopes are constantly maintained by grazing sheep.

Čerstvě dokončený kamenný pohoz na štěrkovém filtru nevypadá právě přírodně (snímek dokumentuje práce při rozšiřování Středozemního průplavu v Německu).

A newly finished riprap on gravel filter looks far from natural (the photo illustrates works on widening of the Central Canal in Germany).

Kamenný pohoz s přiměřenou mezerovitostí však ihned po dokončení dostatečně chrání břeh před vlnami (průplav Mohan –Dunaj).

A slope layer riprap with the appropriate spaces between stones protects the canal banks against waves quite sufficiently (the Main–Danube Canal).

Pohoz postupně proroste vegetací, která jeho odolnost zvýší a zároveň přispěje k přirozenému vzhledu břehů (průplav Mohan–Dunaj).

The vegetation, overgrowing the riprap revetment, increases its robustness and contributes to natural looks of the banks (the Main–Danube Canal).

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RENATE
RENATE

Větrolamy podél průplavu Labe–Lübeck se nacházejí za manipulačními stezkami.

Windbreaks along the Elbe–Lübeck Canal behind the operating paths.

V současné době již nepřichází v úvahu vlečení člunů ze břehu, proto mohou vysoké stromy a keře lemovat vodní hladinu, jak je možné dokumentovat třeba na Středozemním průplavu v Německu...

As towpaths are currently no longer in use, trees and bushes can line the water, as viewed on the Central Canal in Germany…

...nebo na průplavu Mohan–Dunaj.

… or on the Main–Danube Canal.

Průplav Mohan–Dunaj umožnil značné rozšíření bobrů, což má i své stinné stránky, neboť je nutno před jejich pílí chránit pobřežní stromy.

The Main–Danube Canal allowed a significant spread of beavers. Now the bank trees have to be protected against their busy activities.

Staré francouzské průplavy (jako Burgundský průplav na obrázku) jsou lemovány vysokými a hustými alejemi stromů za potahovými stezkami. Při hladině nejsou ani keře, které by byly na překážku tradiční trakci ze břehu.

Old French canals (like the Canal de Bourgogne) are lined with tall and thick alleys of trees behind a towpath. Close to water there are no bushes to block the traditional bank towing.

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Průplav Mohan–Dunaj v údolí řeky Altmühl je provázen mělkými pobřežními zónami, ostrůvky a odstavenými rameny.

The Main–Danube Canal in the Altmühl valley is hemmed with adjacent shallow zones, islands and dead-end branches.

Příklady mělkých pobřežních zón, zřízených v údolí řeky Altmühl v rámci výstavby průplavu Mohan–Dunaj. Snímky zachycují tvar dělicích hrázek z hrubých kamenů (balvanů) s mezerami, které usnadňují migraci živočichů i výměnu vody mezi mělkou zónou a korytem průplavu. Tato výměna je podporována malým kolísáním hladiny, vyvolaným jednak plavebním provozem, jednak plněním a prázdněním plavebních komor. Dokumentují také, jak hrázky tlumí vlny, způsobené plavebním provozem. Poslední dva snímky ukazují stav mělkých zón po několika letech, během nichž se spontánně (sukcesí) vyvíjela vegetace.

Examples of shallow zones established on the Main–Danube Canal in the Altmühl valley. The pictures capture dividing stone (boulder) dykes with gaps, which allow natural migration of animals as well as water exchange between the shallow zone and the canal bed. The exchange is intensified by the water level micro-fluctuation, caused by vessel traffic, and by filling and emptying of locks. The little dams also absorb waves caused by the navigation traffic. In the last two pictures, several years after, the shallow zones have been spontaneously succeeded by vegetation.

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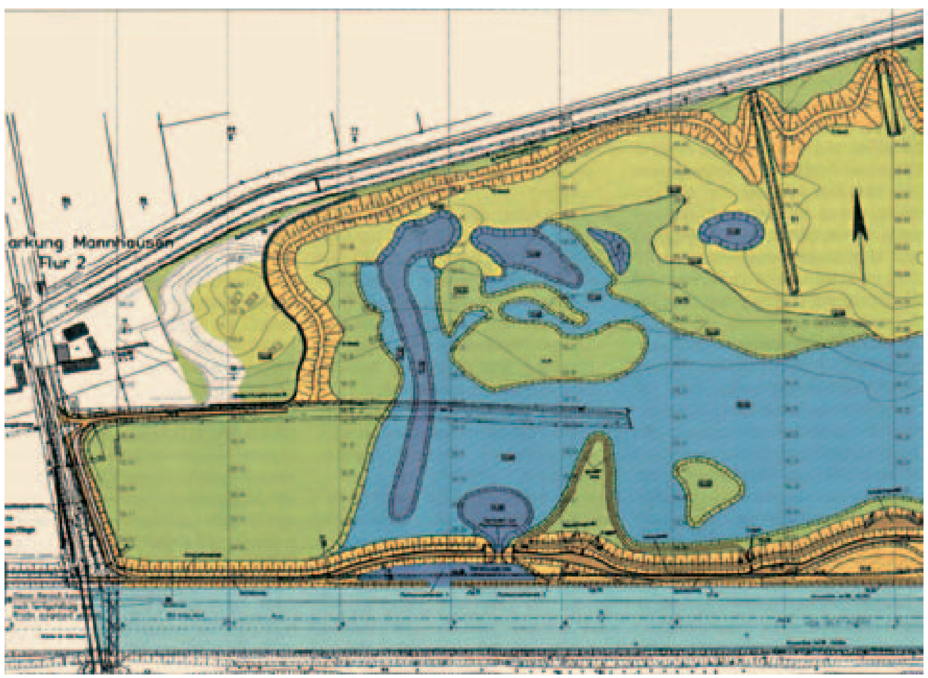
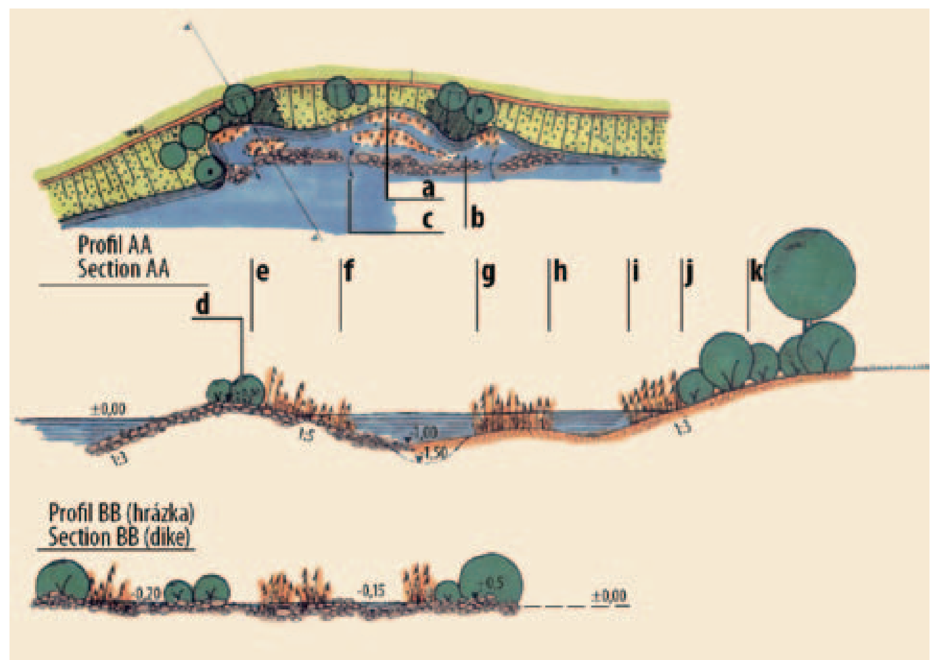


arkung Mannhausen
Flur 2



a
c
b
Profil AA
Section AA
d
e
f
g
h
i
j
k
±0,00
Profil BB (hrázka)
Section BB (dike)
-0,15
±0,00

Pohled na dokončenou mělkou zónu u Mannhausenu.

An aerial view of the completed shallow zone at Mannhausen.

Při modernizaci Středozemního průplavu byly navrženy rozsáhlé mělké pobřežní zóny v oblasti Drömling u Mannhausenu. Jejich šířka je několikanásobně větší než šířka vlastního průplavu.

At modernization of the Central Canal, extensive shallow zones were designed in the Drömling area near Mannhausen. Their width exceeds the actual width of the canal several times.

Výňatek z krajinářského plánu průplavu Mohan–Dunaj v údolí řeky Altmühl. Vzorový návrh mělké pobřežní zóny.
a pobřežní stezka, vedená v nestejné vzdálenosti od břehu
b hrázka, vedená v nepravidelné trase
c otvory v hrázce, umožňující výměnu vody
d ostrůvkovité porosty keřovitých vrb
e zóna rákosu (-0,5 až +0,2 m)
f zóna vodních rostlin (-0,5 až -1,0, místy až 1,5 m)
g zóna rákosu a ostřice (-0,5 m)
h zóna vodních rostlin
i zóna rákosu a ostřice (-0,1 až +0,2 m)
j zóna keřovitých vrb (-0,2 až +1,0 m)
k zóna vlhkomilných stromů

An abstract from the landscaping project of the Main–Danube Canal in the Altmühl valley. A model design of an adjacent shallow zone.
a a bank path led in varied distance from the bank
b a small dam of irregular routing
c dam gaps allowing water exchange
d islands of shrubby willows
e a reed zone (-0.5 to +0.2 m)
f an aquatic plant zone (-0.5 to -1.0, at places up to 1.5 m)
g a reed and sedge zone (-0.5 m)
h an aquatic plant zone
i a reed and sedge zone (-0.1 to +0.2 m)
j a zone of shrubby willows (-0.2 to +1.0 m)
k a zone of aquatic trees

V rámci výstavby průplavu Mohan–Dunaj byl vybudován v městečku Riedenburg nový park. Při jeho návrhu bylo využito zahloubeného koryta průplavu k vytvoření umělých kaskád na potoce, který je do průplavu zaústěn. Centrem parku je jezírko s malým ostrovem. Nedaleko od parku se nachází nové městské nábřeží s přístavištěm osobních lodí.

Within construction of the Main–Danube Canal a new park was built in the town of Riedenburg. Its design used a recessed canal bank to create artificial cascades on a brook, which empties to the canal. In the centre of the park there is a little lake with an island; not far from the park there is a new town promenade with a berth for passengers vessels.

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Parkové úpravy břehů průplavu Mohan–Dunaj v Bambergu.

Park landscaping of the Main–Danube Canal banks in Bamberg.

Při kanalizování Mohanu v centru Würzburgu byl v maximální míře respektován historický kamenný most i starý jez s mlýnem. Říční břehy v dosahu těchto historických objektů jsou upraveny jako promenády.

Canalization of the Main in the centre of Würzburg maximally respected a historical stone bridge as well as an old fixed dam with a mill. The adjacent river banks were adapted as a promenade.

Průplav Brusel–Charleroi probíhá hustě zastavěnou částí belgické metropole. V tomto úseku průplavu, vybudovaném v extrémně zúženém obdélníkovém profilu, nebylo možno využít rekreační funkce průplavních břehů. Jsou zde parkoviště osobních aut.

The Brussels–Charleroi Canal crosses a densely built-up part of the Belgian capital. As this stretch of the canal has an extremely narrow rectangular cross section, it was impossible to use the canal banks for recreational purposes and they have become a car park.

A more complicated approach to constructing a transverse cross-section is needed in places where the projected water level in the canal should be above the usual level of underground water or even above the level of terrain. To prevent needless outflow of water from the canal, rising level of underground water alongside the canal or even endangering of stableness of canal dams by leakage, the cross-section must be sealed. An exception can be for example an interest in siltation of the nearby area. Sealing is usually done by layers of clay material or processed earth (hydraton). The sealing layer is covered with a security layer on the canal bed under fortification of its slopes. Various sealing foils and other technologies are used these days as well. There is no visible difference between sealed and unsealed parts even in vegetation on the banks. Asphalt layer covering the whole canal bed and the slopes is often used, too. If this is the case, the layer within the water level fluctuation is covered by stones slightly immersed in asphalt, which damps the impact of waves on the slopes. Moreover, this rough cover becomes step by step silted and suitable for spontaneous growth of vegetation. The upper stripof asphalt sealing, exceeding the water level, is thus gradually covered with vegetation and is therefore almost invisible in the end. The airy part of dams is usually covered with grass, sometimes with lower or higher vegetation, too. The canal cross-section can be of some very specific forms in extreme conditions. **A canal can be led via a canal bridge or a canal tunnel.** It can seem bizarre enough to imagine a vessel going on a bridge, especially to readers who have not had a chance to get acquainted with the "world of canals". As a matter of fact, though, such constructions are far from rare sights and there are dozens or even hundreds of them only in Europe. A canal bridge must – unlike highway or railway bridges – be resistant to a load of water. On the other hand, the resistance to smaller dynamic influences does not have to be that high. A bridge solution is often chosen in cases a canal should cross a deep valley or a stream. There are also canal bridges crossing a navigable river or another waterway there. They can be compared to elevated highway crossings as they do not lack connecting ramps between top and bottom levels. The canal bridge of the Central Canal over the Weser in Germany and the already mentioned bridge over the Elbe at Magdeburg, finished in 2003, can serve as good examples. The latter mentioned bridge is one of the biggest in the whole world. Unlike in the case of historical canal bridges, which were built mostly from stone, dominant constructions now are usually steel ones. Recently, a canal bridge made of prestressed concrete has had a premiere, too. According to the available proposals, there should be some smaller canal bridges on the D-O-E water corridor as well. One of the alternatives considers even a longer canal bridge over the Morava River at Angern.

Úsek průplavu Mohan–Dunaj, který je vedený v mírném násypu s hladinou nad terénem. Na vzdušných svazích tělesa je pečlivě udržovaný travní kryt, což usnadňuje kontrolu případných průsaků.

A section of the Main–Danube Canal is led in a moderate embankment with the water level above the terrain. The grass cover of the dam slopes is carefully maintained in order to control eventual drenching.

Vysoké hráze labského laterálního průplavu v úseku, kde se jeho hladina nachází asi 10 m nad úrovní terénu. Udržovaný travní porost je pouze v nižší části svahů. Ve vyšší se naopak připouštějí – či dokonce doporučují – i vyšší stromy a keře. Na snímku je současně zachycen kratší průplavní most přes řeku Ilmenau.

High embankments of the Elbe Lateral Canal in a section where the water level reaches 10 ms above the surface. The maintained grass cover is only in the lower part of slopes. In the upper part, on the other hand, trees and shrubs are allowed if not actually recommended. The photo has captured even a shorter canal bridge over the Ilmenau.

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Horní rejda šikmého lodního zdvihadla Ronquières v Belgii se nachází na železobetonovém průplavním mostě, jehož architektonické řešení je nejspíše inspirováno antikou. Hladina na mostě je 25 m nad terénem.

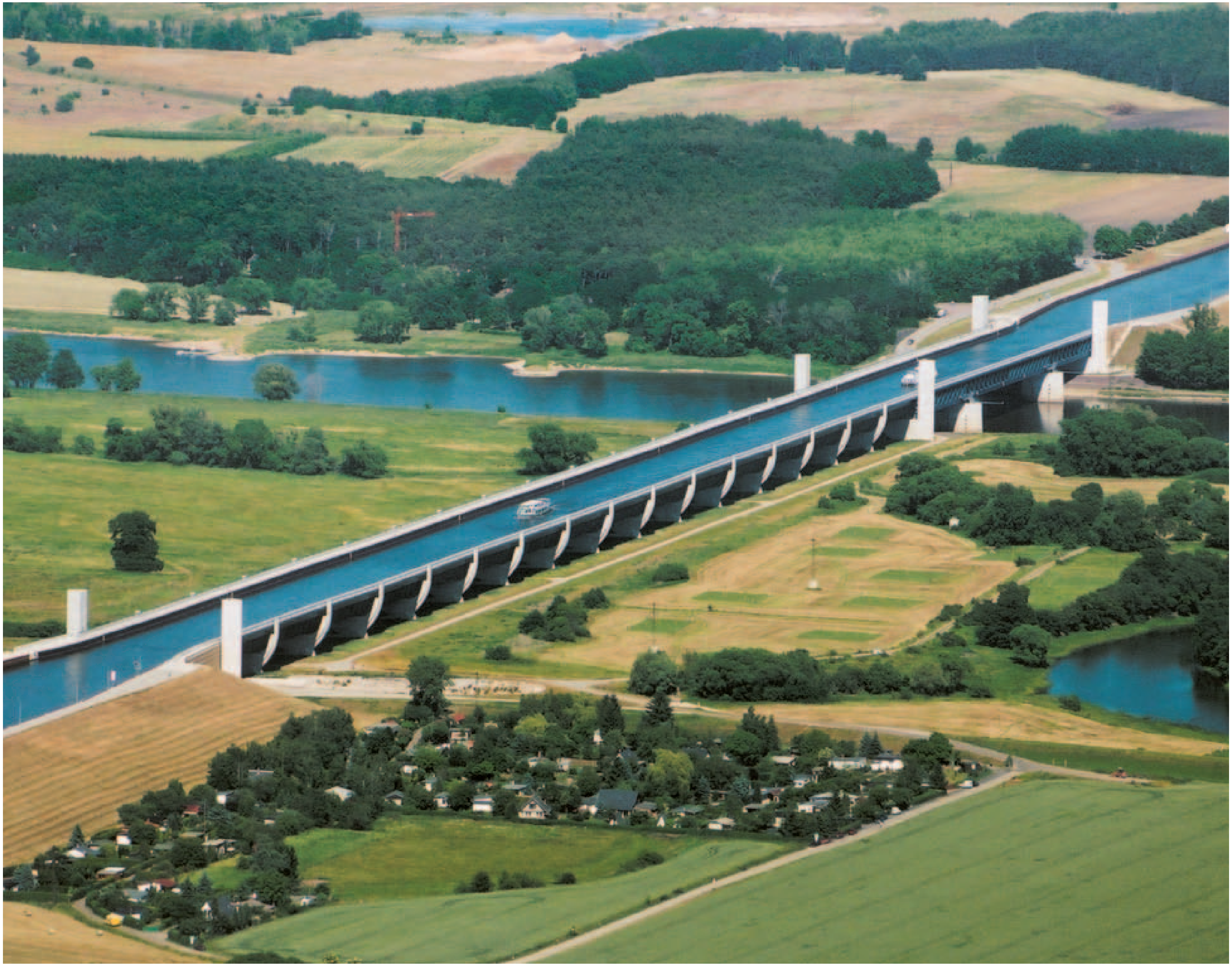
The upper approach of Ronquières incline in Belgium positioned on a ferroconcrete canal bridge, which design was probably inspired by antiquity. The water level on the bridge reaches 25 ms above the terrain.

Železobetonový průplavní most na Středozemním průplavu, křižujícím řeku Veseru, vytváří vlastně mimoúrovňové křížení dvou vodních cest. Má bohatou historii. Byl vybudován v roce 1914, v průběhu druhé světové války byl zničen a posléze roku 1949 obnoven. V rámci modernizace průplavu byl však paralelně vybudován velkorysejší ocelový most, takže tento most již představuje pouhou rezervní trasu.

The ferroconcrete canal bridge on the Central Canal, which crosses the Weser, creates, in fact, a multilevel crossing of two waterways. Its history is quite rich: built in 1914, it was destroyed in WWII, to be reconstructed in 1949. Since the canal modernization, when a larger-scale steel bridge was built, the bridge has served as a mere reserve route.

V roce 2001 byl otevřen půl kilometru dlouhý průplavní most z předpjatého betonu na průplavu du Centre v Belgii. Křižuje údolí Sartu a nachází se pod ním křižovatka rychlostních silnic. Připomíná konstrukcí – ale i vzhledem – trochu pražský Nuselský most.

In 2001 a half a kilometre long canal bridge of prestressed concrete opened on the Canal du Centre in Belgium. As it crosses the Sart vallely, a speedway junction runs below it. The construction and design slightly resembles the Nuselský Bridge in Prague.



Průplavní most Středozemního průplavu přes Labe u Magdeburku. Byl uveden do provozu v roce 2003. *The canal bridge on the Central Canal crossing the Elbe at Magdeburg was completed in 2003.*

Západní portál průplavního tunelu Arzviller na průplavu Marna–Rýn je situován těsně vedle portálu souběžné dvoukolejné železnice. To umožňuje názorné srovnání velikosti obou tunelů.

The west portal of the Marne–Rhine Canal tunnel Arzviller is positioned closely next to a parallel double-tracked railway. Thus the size of both tunnels can be easily compared.

Severní portál průplavního tunelu Ruyaulcourt (Canal du Nord, Francie). Tunel je 4,35 km dlouhý a poskytuje šířku 6,38 m mezi bočními svodidly. Ve střední části je však 1,15 km dlouhá výhybna, široká 12,3 m.

The north portal of Ruyaulcourt tunnel (Canal du Nord, France). This tunell of 4.35 kms offers a width of 6.38 ms between its guiding walls. However, in the middle there is a 1.15 km stretch of a passing section 12.3 ms wide.

Plavidlo v jednolodním úseku tunelu Ruyaulcourt.

A vessel in a one-way section of Ruyaulcourt tunnel.

Plavidla se míjejí ve střední výhybně průplavního tunelu Ruyaulcourt.

Meeting of vessels in the passing section of the Ruyaulcourt tunnel.

Canal tunnels are not rare at all. There have been dozens to hundreds of them built in Europe, although mostly on lower-class waterways. As contemporary construction methods cope tunnels of bigger cross-sections – namely the highway ones – wider usage of canal tunnels looks an obvious alternative in cases where it would mean straightening the route and in cases when they could mean significant lowering of dividing pools and lower number of locks and dams. They could be also a good solution in cases when deep cuts would mean hardly recoverable changes in the landscape. The connection between the Danube and the Oder will almost definitely be built without tunnels due to favorable height conditions, but using tunnels should certainly be considered on the Elbe branch between Přerov and Pardubice. It is obvious that the cross-section of canal tunnels must be economic to the maximum, i.e. for a single vessel. Admissible speed is usually lowered in the canal as well. Longer canal tunnels present capacity and operational bottlenecks. With suitable traffic control and clustering vessels before tunnel portals, though, they can manage even very intensive traffic. The du Nord Canal in the north of France with two tunnels serves as a perfect example.

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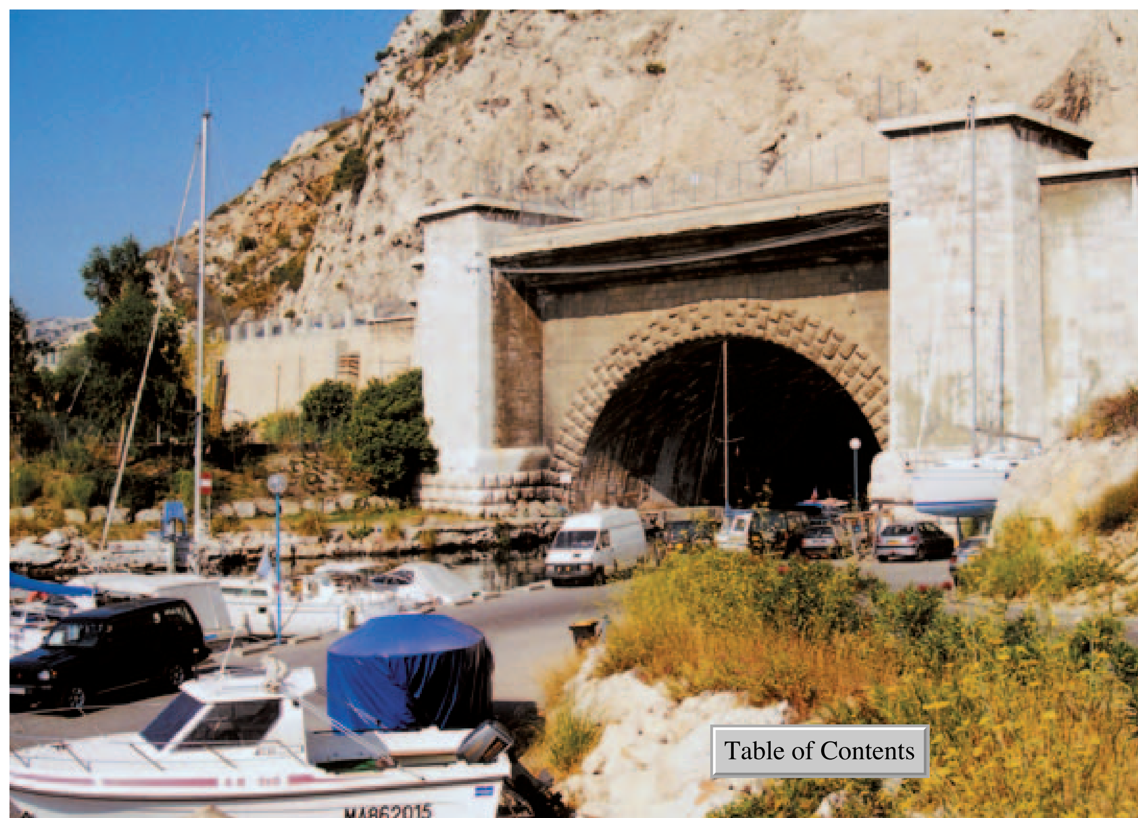
Dispečerské stanoviště tunelu Ruyaulcourt a jeho vybavení, které umožňuje průběžnou informaci o stavu provozu a jeho řízení.

Ruyaulcourt tunnel supervising centre and its equipment provide continuous information and control of the operations.

Tunel de Rove ve Francii je dlouhý 7,12 km. Jeho profil má světlou šířku 22 m a světlou výšku 15,4 m, takže by vyhověl i požadavkům na dnes obvyklou V. třídu vodních cest. Je však – bohužel – mimo provoz, neboť došlo ke zřícení části jeho klenby. Měl sloužit k napojení řeky Rhôny na historický přístav Marseille. Rozvoj tohoto přístavu je však v současné době soustředěn do oblasti bezprostředně při ústí Rhôny, takže proplouvání tunelem není nutné.

The Tunnel de Rove in France is 7.12 kms long. With the clearance width 22 ms and height 15.4 ms, it could accommodate standards of the nowadays waterway class V. Unfortunately part of its vault has crashed, and it is out of order. It was built to connect the Rhône with the historical port of Marseille. As the current development of the harbour concentrates to the immediate mouth of the Rhône, the tunnel has already lost its purpose. Its reconstruction is thus not likely to happen any soon.



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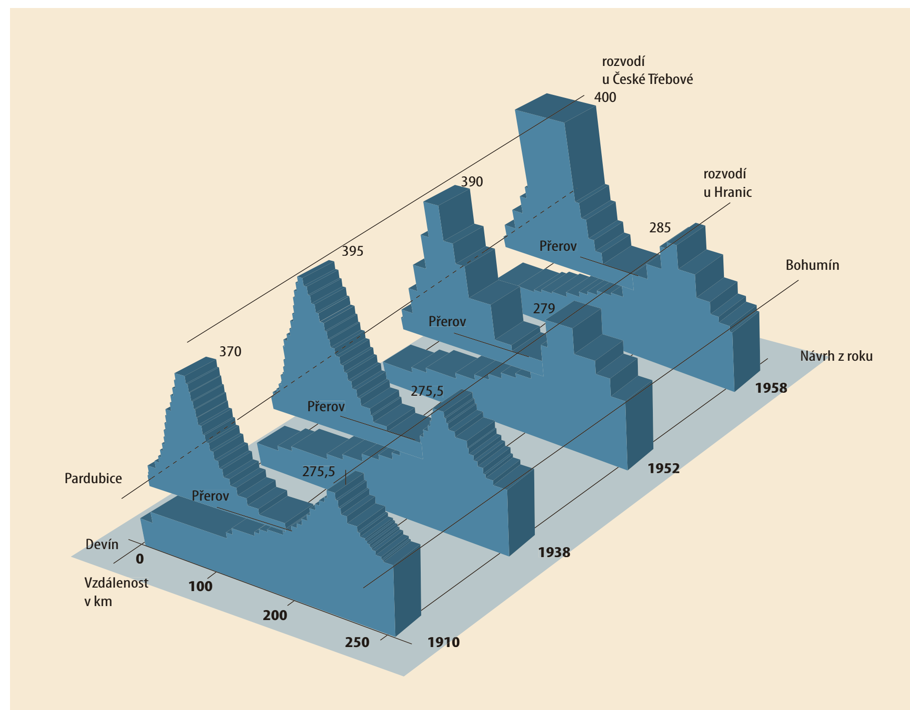
And what about the boat?

It is nothing surprising that most of the general public without any knowledge of water transport are uneasy when they hear or read about “uphill” waterways. We have already characterized the invention of a lock as the basic presumption of building canals in hilly terrains where the locks enable creating “stairs” in the longitudal section. We have also given attention to the “Přerov competition” looking for an optimum way of creating as high as possible “stairs”. Still we cannot be sure whether we have persuaded readers it is possible to surmount the roof of Europe, although the mountain range in the Czech Republic is exceptionally low.

It is clear the staircase on a waterway can only have a reasonable number of locks if the construction should not be too costly, the operation to lumpish and the speed of sailing too low. Projects ready at the time of passing the Waterway Act counted on using locks with rise up to 10 ms and so required almost 30 locks between the Danube and the Oder, while the Elbe branch between Přerov and Pardubice would need almost 40 locks of low and medium rise. If the waterway was created according to these projects, it would be quite slow. If we assess the stay of a vessel in a lock of low and medium rise at 15–20 minutes, the time loss during a sail between the Danube and the Oder would be 8–10 hours and “idle time” due to passing locks on the short passage between Přerov and Pardubice would be longer than 10 hours. At present, when the benchmark of speed is the driving time on a highway (during which delays due to traffic jams are ever more numerous as well), this toll for overcoming height differences seems too high. A hundred years ago the above mentioned numbers of locks would look reasonable. After all, there were hundreds of them on French canals – on 500 kms between Paris and Strasbourg, barges had to pass through locks more than 200 times as the medium distance between locks was no longer than some 2.5 kms. There was need to construct 191 locks on the Burgundian Canal (which, by the way, also crosses the main European watershed). The medium distance between them is shorter than 1.3 kms – and even this thanks to the fact the elevation of the dividing pool was lowered by inserting over 3 kms long canal tunnel.

Planners of the D-O-E water corridor were looking for possibilities to lower the number of locks rationally and speed up passing through the waterway. A promising solution seemed to be a substitution of some locks by boat lifts, which tendency was first seriously considered during the already described “Přerov competition”. Despite its indisputable success, the boat lifts did not prove to be so advantageous to justify quitting the “lock” concept. Thoughts of longitudal section of a waterway remained unchanged till the 1940s – they were still based on locks with rise up to 10 ms.

An overhaul change in opinions came after the break up of the First Republic when the “rudder” was taken over by the German side for a short time as we mentioned in the part on history. At that time boat lifts seemed to be the best solution of overcoming rise in canals in broken terrain. It became clear that the current technology was able to achieve – using relatively simple means and at favorable investment costs – even construction of lifts for barges with capacity 1,000 tons and rises of up to 50 ms. Namely a successful use of vertical boat lifts in Germany, at Niederfinow on the Havel – Oder canal and at Rothensee on the Central Canal, was inspiring. The boat lift at Niederfinow with counterweights and with rise of 36 ms was launched in 1934. At Rothensee the flotation lift with a maximum rise of 18.7 ms was finished in 1938. Both lifts have caissons of the 85 x 12 ms size, which is the same as the one of locks on the middle Elbe in Bohemia.



Podélný profil všech tří větví vodního koridoru D-O-L si můžeme představit jako schodiště, jehož stupni jsou plavební komory nebo zdvihadla. Vývoj vedl postupně ke snižování počtu stupňů a zvětšování jejich výšky, zejména v souvislosti s tím, jak projektanti favorizovali lodní zdvihadla namísto plavebních komor.

A longitudinal section of the three branches of the D-O-E corridor could be viewed as a staircase, each step representing a lock or a lift. The development led to gradual reduction of steps in number and their increase in height, especially since their designers favoured lifts to the lock solution.

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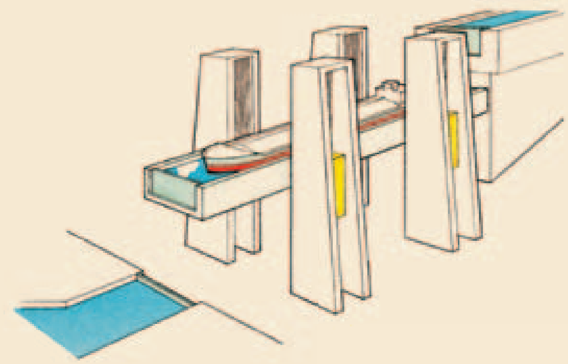
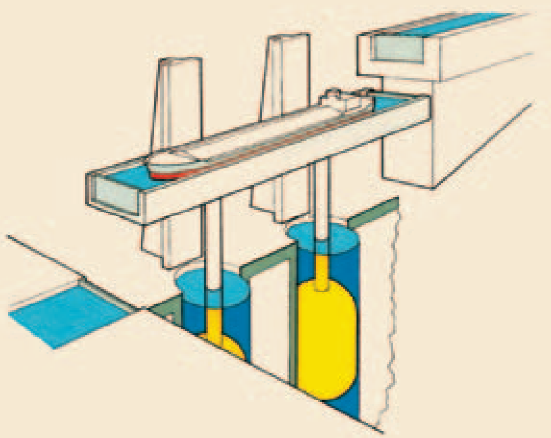


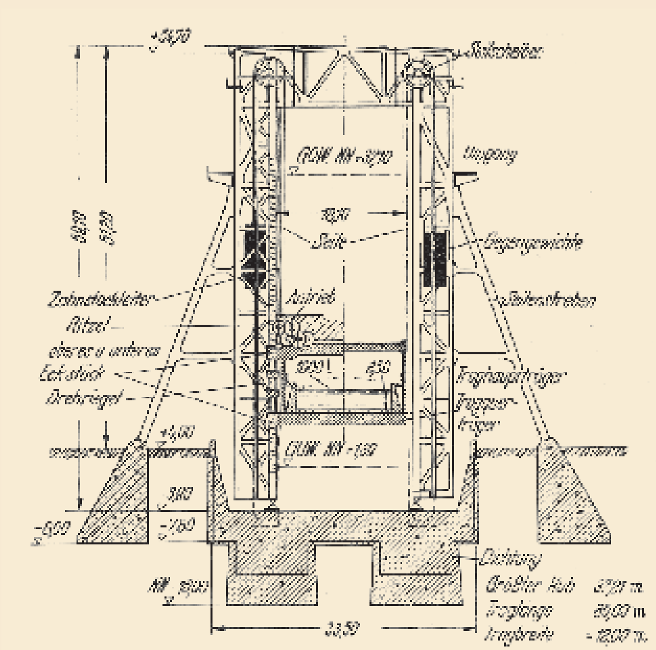


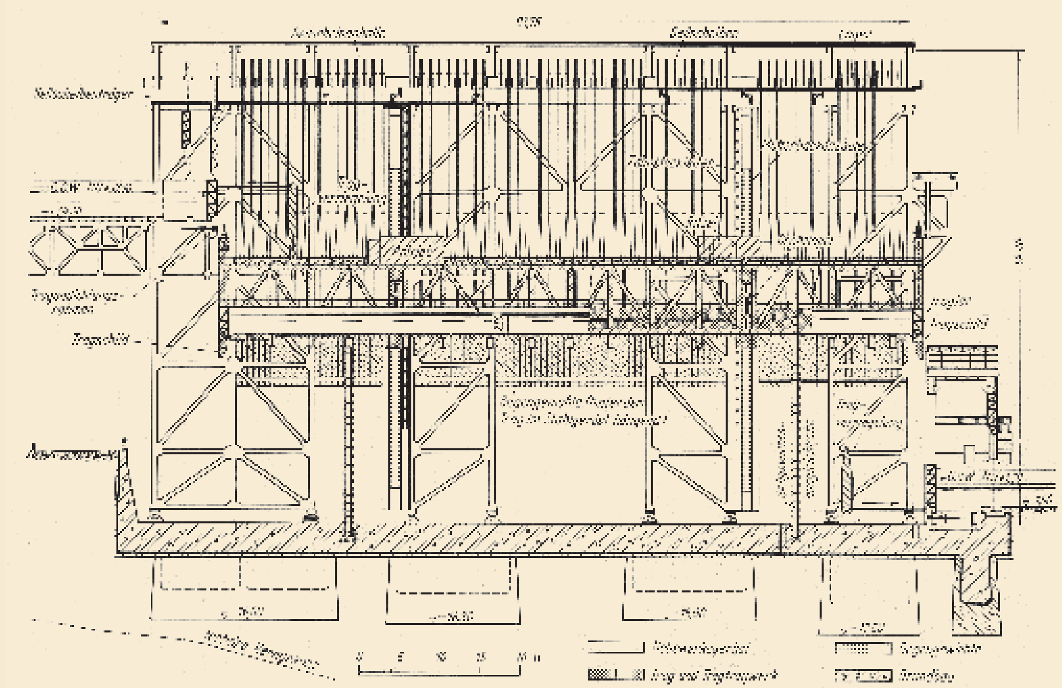
Schémata dvou typů lodních zdvihadel s protizávažím a s plováky, se kterými se dnes můžeme setkat na moderních vodních cestách pro velká plavidla. Z hlediska konstrukce jejich žlabů včetně vrat (a uzávěrů horní a dolní zdrže) se oba typy neliší. Obdobně bývá řešeno i zajištění bezpečnosti žlabů při narušení rovnováhy či stability systému. Zásadní rozdíl spočívá ovšem ve vyvážení.
U lodních zdvihadel s protizávažími (nahoře) je žlab nesen desítkami lan, vedených přes kladky k protizávažím. Tento typ je vhodný i pro mimořádné rozdíly hladin. U plovákových lodních zdvihadel (dole) je tíha žlabu vyvážena vztlakem mohutných plováků v hlubokých šachtách, naplněných vodou. Výhodou je menší namáhání základové půdy. Nákladnost šachet však omezuje použitelnost tohoto typu na spády nepřevyšující 25 m. Ty jsou dnes ovšem dobře řešitelné i plavebními komorami. Proto se s plovákovými zdvihadly v perspektivě příliš nepočítá.

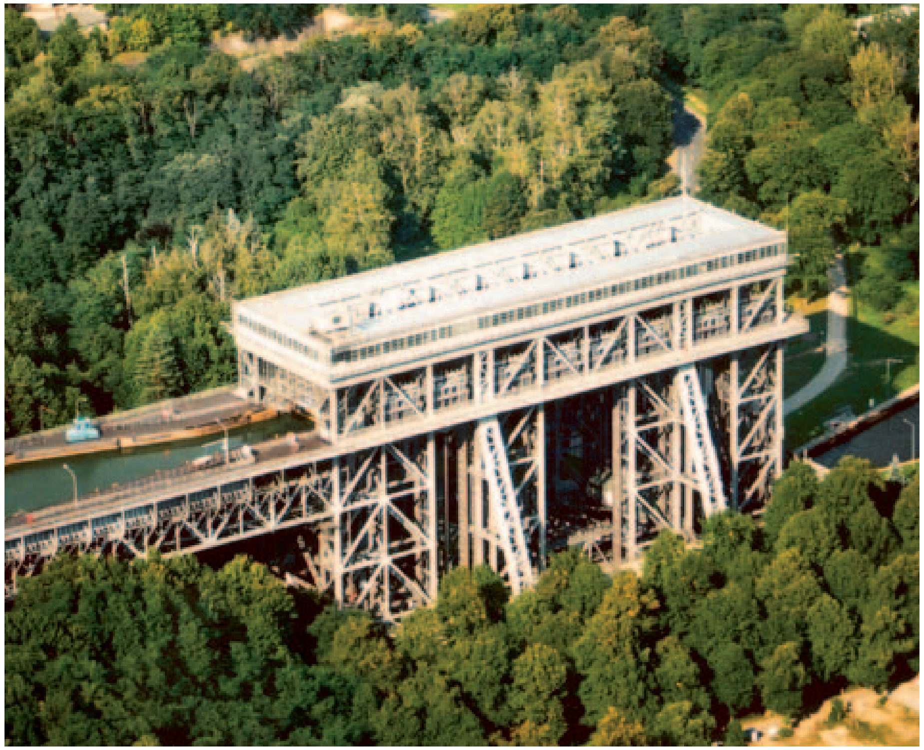
A schema of two types of vertical lifts used for large vessels on the modern waterways: a counterbalanced lift and a flotation lift. Considering construction of caissons including the gates (and the gate closing of the upper and lower approaches) both types are alike. A similar solution is used for the system controlling stability of caissons and their safety in case of balance failure. A fundamental difference lies in the weight balancing. In the first case (above), the caisson hangs on tens of wire ropes led over sheaves to counterweights. This type suits even very large rises. In the second case (below), the mass of the caisson is carried by flotation tanks in deep shafts, their buoyancy is, consequently, equal to the weight of the caisson including the supporting framework. The advantage of flotation lifts is lower straining of the foundation soil. The expenses of deep shafts excavation however limit this type only for rises up to 25 ms; even though they can be comfortably solved even by locks at resent. Thus the flotation lifts are not likely to be used in the future.

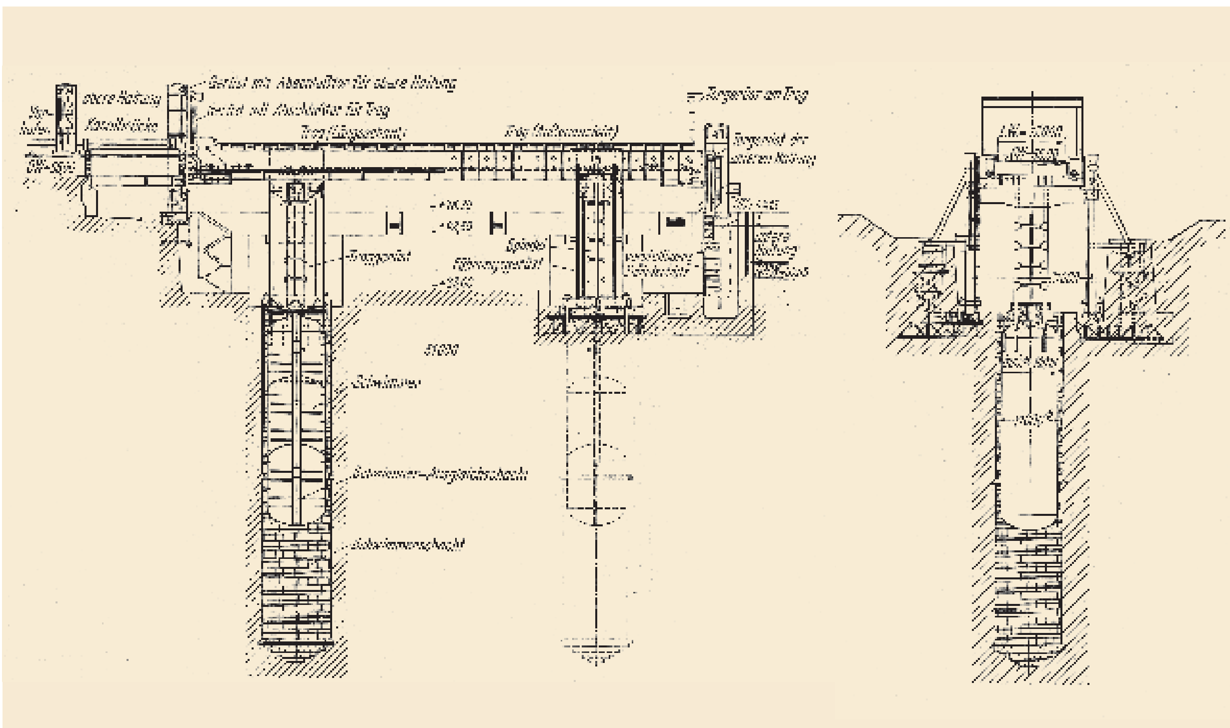
Lodní zdvihadlo s protizávažími u Niederfinowa na průplavu Havola–Odra, překonávající spád 36 m, se stalo ve čtyřicátých letech „prototypem“ pro vyšší zdvihadla na propojení D-O-L.

A counterbalanced lift at Niederfinow (the Havel–Oder Canal) overcomes a rise of 36 ms. In 1940s it was considered a prototype of higher lifts on the Danube–Oder Canal.









Lodní zdvihadlo Niederfinow na průplavu Havola–Odra v Německu bylo dokončeno v roce 1934.

The counterbalanced lift Niederfinow on the Havol–Oder in Germany was completed in 1934.

Lodní zdvihadlo Rothensee na Středozemním průplavu v Německu je v provozu od roku 1938.

The flotation lift Rothensee on the Central Canal in Germany has been working since 1938.

Plovákové lodní zdvihadlo Rothensee se stalo ve čtyřicátých letech obdobně prototypem pro „nižší" zdvihadla na vodní cestě D-O-L.

Similarly, the flotation lift Rothensee became a prototype of lower lift on the Danube–Oder Canal.

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Pod žlabem plovákového lodního zdvihadla Rothensee se nacházejí podpěrné konstrukce, uložené na plovácích ve dvou šachtách, jejichž dno je 70 m pod terénem. Při jejich hloubení bylo nutno zvodnělé horniny nejprve zmrazit.

Under the caisson of the flotation lift Rothensee there is a supporting construction connected with two flotation tanks in deep shafts. Their bottom is 70 ms under the surface. At their excavation the watered ground had to be frozen to prevent water influx.

Žlab plovákového zdvihadla Rothensee je opatřen velkými matkami, které se otáčejí okolo průběžných vřeten, a zajišťují tak s minimálním výkonem pohyb žlabu. Toto uspořádání však neslouží pouze pohybu. Může především bezpečně zablokovat žlab při ztrátě rovnováhy (např. v důsledku úniku vody ze žlabu nebo vniknutí vody do plováků) a udržuje celý systém (který je vlastně labilní) ve vodorovné poloze. Takové „samosvorné" zabezpečení vyžadují i zdvihadla s protizávažími.

The caisson of the flotation lift Rothensee is fitted with massive rotating drive nuts and threaded spindels. With a minimum force the system moves the caisson. At the same time it safeguards the operation in case of imbalance (either due to leakage of the caisson, or due to water infiltration to tanks) it can keep the otherwise unstable system in the horizontal position. Similar self-blocking systems are crucial for the counterbalanced lifts.

In accord with new opinions the route and longitudal section of the D-O-E water corridor were later modified so that the height differences were concentrated in as high "stairs" as possible – with rise between 20 and 47 meters. it would be possible to make use of boat lifts, flotation up to 25 ms and with counterweights with higher differences of water levels. The longitudal section was enormously simplified that way. The number of locks (and lifts) between the Danube and the Oder was lowered to 16 thanks to three boat lifts, and between Přerov and the Elbe the number was even mere 10 – 8 out of which were supposed to be boat lifts. It looked that this advantage would prevail over the disadvantage connected with the use of lifts. Their caissons enable only passing single boats while locks can be lengthened so that the whole boat train consisting of a tugboat and several barges can pass through. This concept was followed until the 1950s. The number of lifts on the route between the Danube and the Oder was even increased and the total number of locks and lifts decreased to 14. The reigning trend in Europe of that time was decreasing towing and increasing sailing of individual motorized vessels so that the disadvantage of lifts because of problems with constructing long caissons gradually ceased to exist.

The progress of push navigation in the second half of the last century brought about a question, though, whether dividing longer pushed convoys while passing through lifts is compatible with the development of this new technology. It became obvious that in this case short caissons of lifts are even more of a disadvantage than in the times of towing. Further doubts concerning advantages of lifts were discussed due to developments of construction and hydraulics of locks. It soon became possible to increase the maximum rise of locks up to 25 ms (as is the case of the highest locks on the Main – Danube Canal), or even up to 30 ms (as is the case of the highest lock on the Seine–North Canal), i.e. to the former domain of lifts. On the route between the Danube and the Oder the idea of lifts was abandoned without any significant change in the number of locks and dams. The situation on the Elbe branch between Pardubice and Přerov was more complicated as the height differences are bigger and the morphology of terrain enables concentrating the rise to a small number of extremely high lifts. In the 1960s a brand new solution of this branch was successfully proposed. It was based on a principle that can be briefly characterized as follows: "If possible, no boat lift should be used. If any lift is used after all, then it should be as high as possible as only very high boat lifts have undoubted advantages when compared to locks."

8-10 "stairs" were sufficient in this solution, while only two of them were planned with boat lifts – each of which had to overcome the rise of about 100 meters.

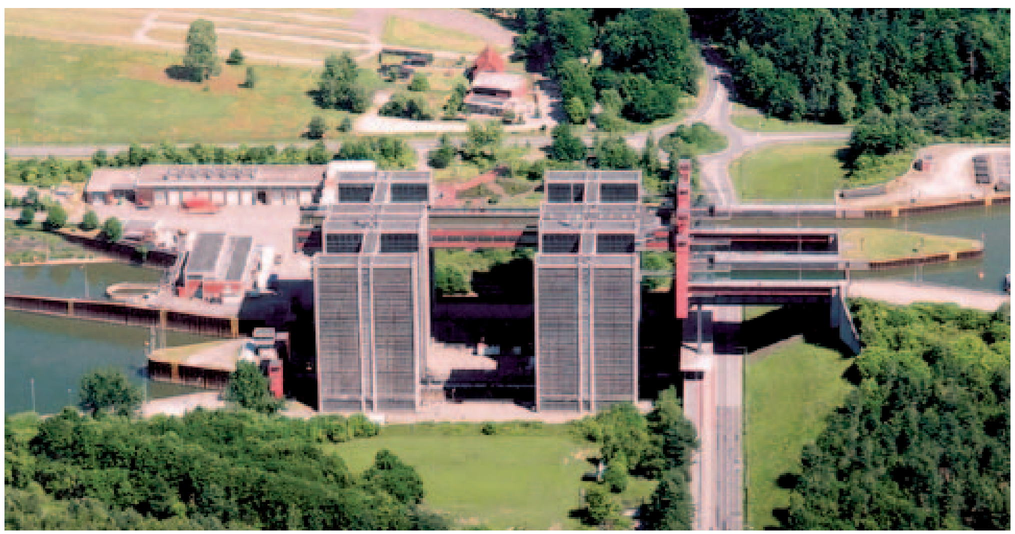
If we do not put things into broader context, the proposal of 100-meter lifts could look too daring, but the reality was far from that. Two progressive projects, whose building began in the 1960s, served as a kind of inspiration – the Belgian Ronquieres inclined plane (boat railway) and to some extent also the Krasnoyarsk inclined plane. The first of them was overcoming the rise of 68 ms, the second one even over 100 ms. These objects were designed for roughly the same or even bigger vessels than the ones on the D-O-E water corridor. Both of them benefited from the winning project of the "Přerov competition" and therefore from the actual idea of the D-O-E connection. The time showed, however, that the initial idea of a promising perspective of modern inclined planes (boat railways) would not hold. The reason was not only some operational problems that came to light in both cases of the above inclined planes, but mainly the fact that the transport capacity of the inclines proved to be very low. This is caused by low admissible values of "acceleration" and "retardation" the caisson, which leads to limitation of its speed.

It can be demonstrated on the following schematic experiment with a fairly simple procedure – put a bowl on a table and fill it up with water; imagine it is a model of a caisson of a boat railway. Try to push it with sufficient speed to the other edge of the table and suddenly stop just before reaching it. When tidying up the effects of your attempt, just think about the fact what would be the effect of a sudden stop of a fast moving caisson on a slightly tilted route, which could be a result of a fault in operation. Do not forget that it would not contain several liters as the bowl, but several thousand tons of water with a boat of a similar weight on its surface. The conclusion is unambiguous – the caisson of a ship railway has to move very slowly, at hardly more than 3 kms/h on average. If the difference of water levels is say about 100 ms, its movement requires dozens of minutes and the whole procedure of passing a vessel through it takes a long time as the capacity is insufficient.

Let's continue the attempts with the bowl full of water. If we descend or ascend it at any speed and stop the movement suddenly or not, the level will not (supposing the movement is strictly vertical) move an inch. From the point of view of capacity the vertical boat lifts are much more suitable in places with big differences in rise. Overcoming the difference of water levels of some 100 ms would require some 30 minutes in the case of a boat railway, and just some 5 minutes in the case of a lift.

Opinions on solving very high locks and dams on the Elbe branch of the D-O-E water corridor were changing in accord with the above mentioned thoughts. A concept of two high "stairs"with approximately a 100-meter rise was preserved; inclined planes were substituted by vertical boat lifts with counterweights, though. Their suitable usage needs a very marked difference in terrain. This condition is fulfilled in the given case. Choosing lifts with counterweights was obviously helped by the ever improving experience with them, namely by the fact they are planned and implemented for ever rising differences of water levels abroad as the following survey shows:

- a double vertical boat lift with counterweight was launched at Lüneburg-Scharnebeck on the Elbe Lateral Canal (corresponding with class IV to Va) in 1976 – it overcomes the rise of 38 ms and has measured up in operation;
- a similar double vertical boat lift Strépy-Thieu on the du Centre Canal in Belgium corresponding with class Va and overcoming the rise of 73 meters was finished in 2001;



Dvojité lodní zdvihadlo s protizávažími u Lüneburgu na Labském laterálním průplavu dokončené v roce 1975. Za povšimnutí stojí soustředění kladek do čtyř věží. Architektonické ztvárnění tohoto díla dokazuje, že ani vysoké lodní zdvihadlo nemusí být technokratickou ocelovou konstrukcí jako v případě zdvihadla Niederfinow.

A double counterbalanced lift at Lüneburg on Elbe Lateral Canal, finished in 1975. Wire ropes, rope sheaves a counterweights are conveniently concentrated into four towers. The architecture of the lift proves that even design of a very high lift can steer away from the technocratic steel construction of the Niederfinow lift.

Pohled z „ptačí perspektivy", z velína lodního zdvihadla Lüneburg na plavidlo ve žlabu v dolní poloze a na „osnovy" nosných lan.

A bird's eye view from a control room of the Lüneburg lift with a vessel in the caisson and its cable "cobwebs".

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– a boat lift of the same type with even a bigger caisson size is being built at the Three Gorges Dam on the Chang Jiang in China. The maximum difference of water levels is up to 113 meters in this case.

Overcoming the watershed between Přerov and Pardubice using the minimum number of locks or lifts, while using two very high boat lifts is by no means such a fantasy as it might seem at first sight as it is based on principles implemented successfully abroad. On the other hand, though, it cannot be said that the advantage of lifts with rise of up to 100 m is so overwhelming that it would negate other alternatives. It is possible to implement (certainly at the cost of different routing proven and operationally more suitable high locks with rise of up to 25 ms on this section. This way the number of locks would be significantly reduced, particularly if decreasing the height of a dividing pool by a canal tunnel.

Pohled do jedné ze dvou strojoven lodního zdvihadla Strépy-Thieu. Strojovny jsou umístěny na vrcholu celé konstrukce. Projektanti zde rezignovali na samosvorné zabezpečení žlabů. Místo toho nahradili část kladek bubny, spojenými s pohonnými jednotkami, propojenými mechanicky a vybavenými brzdami. Netrvali ani na přesném vyvážení a připustili určité kolísání hladiny ve žlabech. Celá mechanická výstroj je proto mnohem mohutnější než u jiných zdvihadel. Tomu odpovídají i rozměry strojoven. Přesto se vedle nich našlo dost místa pro stálou expozici včetně promítacího sálu pro návštěvníky a vyhlídkovou restauraci.

One of the two machine rooms of the the Strépy-Thieu lift situated on the top of the whole construction. The lift designers resigned on the usual self-blocking system. Some of the rope sheaves (pulleys) were replaced with drums equipped by synchronization shafts and brakes. They did not insist on precise water depth balancing in caissons either. Consequently, the whole mechanical device is more robust than in other lifts, as well as the corresponding dimensions of the machine rooms. Still, they found enough room for an exhibition and a projection room for visitors, and a lookout restaurant.

Lodní zdvihadlo Strépy-Thieu na průplavu du Centre v Belgii bylo uvedeno do provozu v roce 2001.

The lift Strépy-Thieu on the Canal du Centre in Belgium is in operation since 2001.

Pohled do žlabu lodního zdvihadla Strépy-Thieu při proplavování dvou lodí typu „péniche". Vzhledem k rozměru žlabu (112 x 12 m) by se ovšem dala proplavit současně 4 plavidla tohoto typu. Za povšimnutí stojí kompenzátory napětí v lanech a mohutné nárazníky, zajišťující oboustrannou ochranu vrat při nárazu plavidel.

Two „péniche" type vessels in the caisson of the Strépy-Thieu lift. The dimensions of this caisson (112 x 12 ms) can accommodate four vessels of such type. The photo shows cable tension compensators and robust buffer protection of the gate.

Pohled z horní vody na lodní zdvihadlo a horní akvadukt v belgickém Strépy.

A downstream view of the lift and the upper aqueduct in Belgian Strépy.

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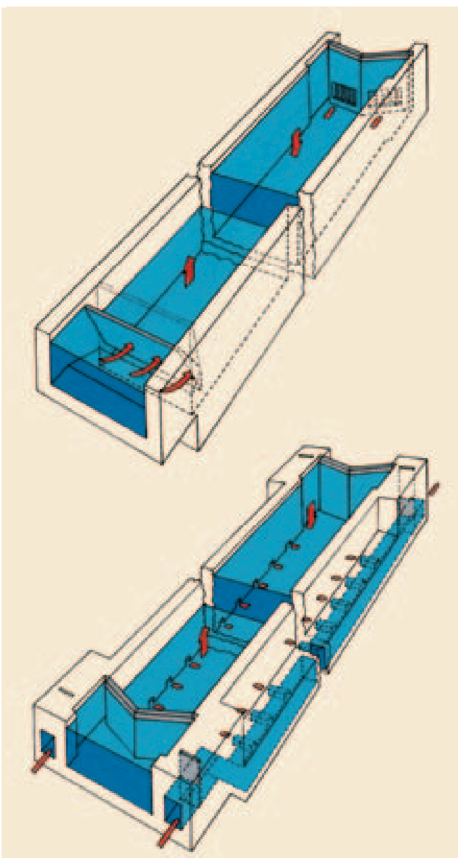
In the previous parts we have – just as in the case of the part on routing the way – returned several dozen years back into history. We have shown that the development of a technical solution of connecting D-O-E has sensitively reacted to pan-European tendencies and has respected specific conditions on route at the same time. The current solution of the longitudal section of the D-O-E water corridor can be considered as very well thought out and so relatively stable. It would be naïve, though, to consider it as a final one and not to accept its further optimation.

The main principles of the current solution of the longitudal section of the D-O-E water corridor can be characterized as follows: To overcome individual locks and dams in the longitudal section, the best solution is using locks of the Vb class with size of 190 x 12.5 m and depth of 4.5 m above sills; this solution enables passing pushed convoys with two barges. The given depth corresponds with the depth of locks on the Danube. Considering the possibility of rare encounters with ships from the area of the Dnepr and the Volha it will be purposeful to increase the width of locks to 24 – 25 meters on the section from the Danube to the first port in the Czech Republic. This will not require further investments into locks with lower rise on this section. A similar enhancement is out of question on other sections with locks of medium and higher rise, though. Boat lifts can be considered as an alternative only on the Elbe branch between Pardubice and Přerov where it could be possible to incorporate two lifts of approximately 100-meter rise into the longitudal section. Locks of the above size and rise are quite common on European waterways nowadays. Their construction can obviously differ according to local conditions and depending on the rise.

Simply designed locks made of reinforced-concrete semi frames or even of light fixed walls prove to be the best solution when the differences of water levels are small to medium – up to 10 ms. Direct filling and emptying using the gates can be applied in this case and therefore the total span of this operation takes 3 – 5 minutes. This ensures high operational capacity. Direct filling and emptying cannot be applied when the differences of water levels are higher and so for the sake of security of lockage, high locks must be fitted with a dividing system (longitudinal nad cross culverts) securing balanced division of inflow to the lock. Moreover, installing saving basins is purposeful as a part of water is let in them during emptying to be



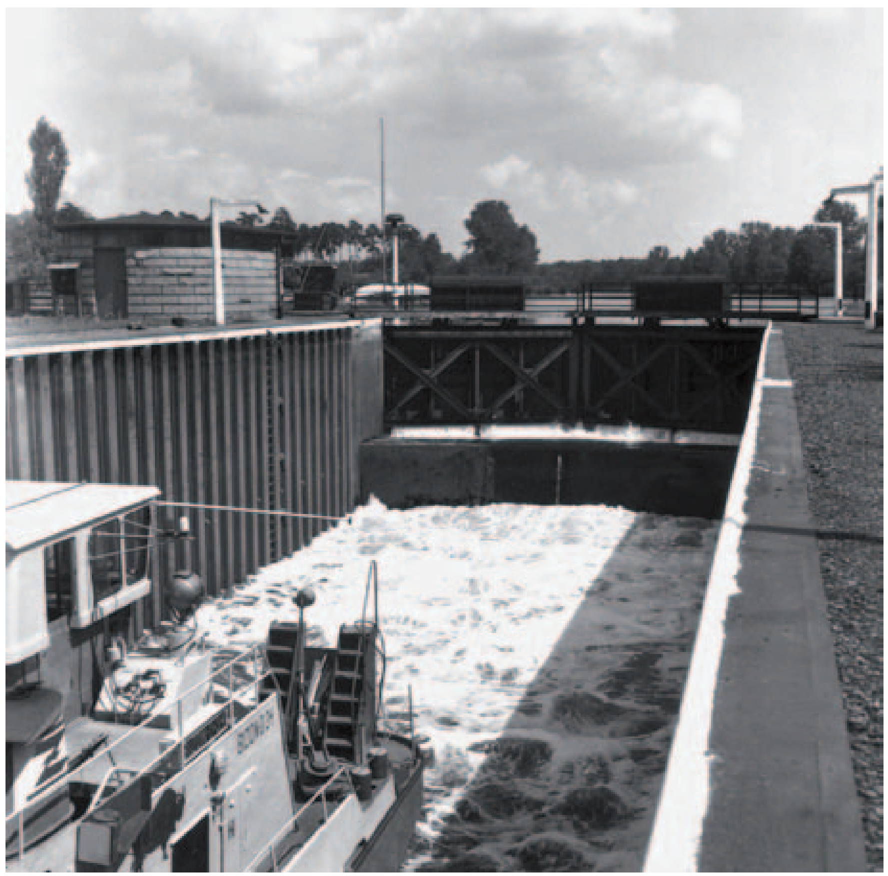


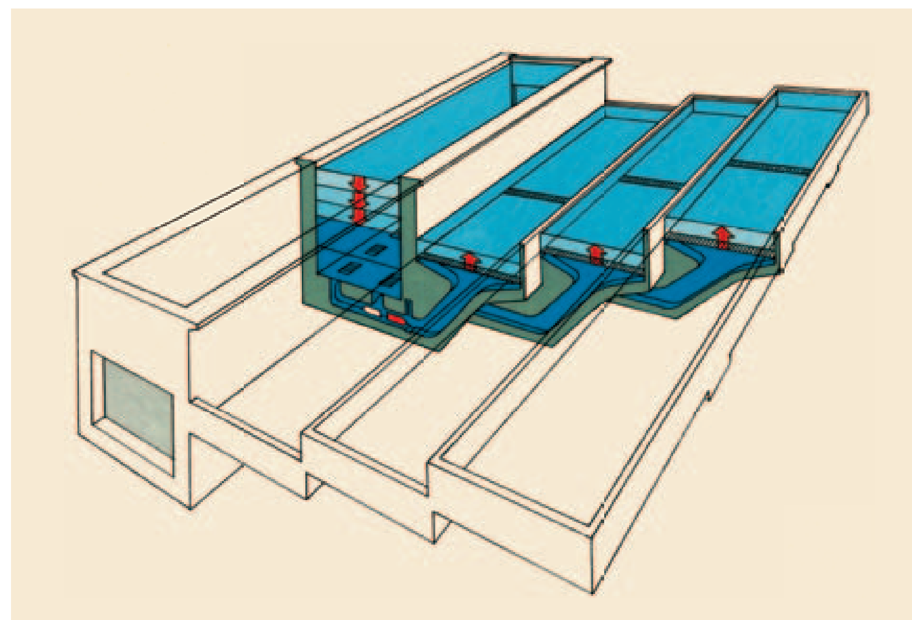
Schéma nízké plavební komory. V horní části obrázku je plavební komora s přímým plněním pod vraty a přímým prázdněním otvory ve vratech. Dolní schéma zobrazuje klasické provedení plavební komory s plněním a prázdněním pomocí obtoků.

A schema of a low rise lock. Above, a lock with direct filling under the gate and direct emptying through openings in the miter gate. Below, a lock equipped with a filling and emptying system with longitudinal and cross culverts.

Plavební komory na Hlivickém průplavu v Polsku mají stěny z ocelových štětovnic, což neumožňuje zřízení obtoků. Jejich plnění a prázdnění je tedy přímé – používá se jednoduchých otvorů ve vratech.

All locks on the Gliwice Canal have simple sheet pile walls, which do not allow the culvert system. The locks are filled and emptied directly through openings in the miter gate.

returned back to the lock during subsequent filling. This way the requirements for the amount of water in the lock are lowered – the more saving basing are used, the lower the requirements are. Three basins are considered to be an optimum – in this case the saving amounts to app. 60 %. They are arranged in storeys or step-like. This solution is usual on the Main – Danube Canal, the Central Canal and elsewhere. The total time of filling and emptying locks is longer in this case, though, and amounts to some 12 – 15 minutes. This is because of a higher rise and also because of interrupting the filling or emptying in the moment of change individual basins. If the rise exceeded 25 or even 30 m, the total time of the procedure would be unfavorable. This rise can be considered a limit, which would most probably be not exceeded on canals in the future. It would be possible to object that significantly higher locks exist in the world – their rise exceeds 30 or even 40 meters. All of them were built on bigger rivers where filling and emptying does not influence the level in adjoining pools. In narrow canals the operation of such high locks would cause periodical "flood waves" if it was to be fast enough. Operating locks with saving basins needs an ideal interplay when handling valves between the lock and the saving basins or between the lock and the pools. The interplay is usually fully automated and does not need non-stop attendance these days. On the Main – Danube canal the non-stop attendance is only on every third lock. It controls the operation of the other two locks round the clock. Scheduled revision, maintenance and repairs never last longer than ten days a year and in the case of double locks it is never necessary to close them. The experience from this canal can be used also on the D-O-E water corridor. The last proposals of the longitudal section of the D-O-E water corridor fully reflect the above possibilities of locks and prove that height differences can be overcome with a small number of locks and ensure fluent and relatively favorably fast operation. Depending on the chosen alternative, the Danube-Oder section would do with 21 – 22 locks and the Pardubice-Přerov section with 15 of them; the alternative with a longer tunnel would need only 11 locks. Even if not using boat lifts, the number of locks could be significantly lowered compared with previous ideas. A reasonable height of locks would also mean better agreement of the route with the terrain and its better look in the landscape.



Plavební komora s úspornými nádržemi na průplavu Mohan–Dunaj.

A high lock with saving basins on the Main–Danube Canal.

Schéma plavební komory se třemi úspornými nádržemi.

Schema of a high lock with 3 saving basins.

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Tato fotografie dává symbolickou odpověď na otázku účelnosti plavebních komor a lodních zdvihadel, resp. na hraniční rozdíl hladin, při kterém už plavební komory nejsou se zdvihadly konkurenční. Vpravo je viděl lodní zdvihadlo Rothensee, vybudované v roce 1938. V rámci modernizace Středozemního průplavu se řešilo nové napojení průplavu na Labe. Ukázalo se, že pro vzrůstající provoz větších plavidel je při spádu 18,67 m jednoznačně vhodnější plavební komora s úspornými nádržemi, která byla vybudována v letech 1997–2001. Má užitné rozměry 190 x 12,5 m.

This photo symbolically answers the question of lock or lift solutions, i.e. the maximum rise at which locks cannot compete with lifts any more. (Right) the flotation lift Rothensee was built in 1938. As the Central Canal modernization sought a new connection to the Elbe, in 1997–2001 the difference (18.76 ms) was solved by a lock with saving basins (left). The lock (190 x 12.5 ms) proved to be substantially better in increasing traffic of larger vessels.

*Otázka napojení Středozemního průplavu s průplavem Labe–Havola na pravém břehu Labe (v blízkosti průplavního mostu) měla podobnou historii. V třicátých letech bylo navrženo překonání spádu 19,3 m dvojitým lodním zdvihadlem, jehož výstavba byla neprodleně zahájena, v důsledku vypuknutí druhé světová války však nebyla dokončena. V letech 1998–2003 byly části zdvihadla (včetně nákladných plovákových šachet) demolovány a vybudována byla dvojitá plavební komora s úspornými nádržemi. Její užitečné rozměry jsou 2 x 190 x 12,5 m.
V pozadí je vidět průplavní most přes Labe.*

Connection of the Central Canal with the Elbe–Havol Canal on the right side of the Elbe (near the canal bridge) has a similar history. In 1930s the difference of 19.3 ms in head was proposed to be solved by a double lift. Due to WWII its construction was never completed. In 1998 – 2003, parts of the lift (including expensive floatation shafts) were demolished and a double lock with saving basins (2 x 190 x 12.5 ms) was constructed.

How much water does a waterway need?

The question in the title of this chapter invokes a lot of misinterpretations, namely as for canals and securing water for their operation. Let's try to explain it by concentrating on the main objections and queries overheard on various discussions about the projects.

The first objection: The volume of water needed to fill up canal sections as such is vast. Where does this water come from and how is it transported to the canal? Is it pumped into it?

The answer is easy, but needs at least basic knowledge about hydrology and a calculator. Let's use the canal sections on the ascending branch of the canal from the Danube up to the dividing pool as an example and calculate the volume of water needed for filling it up. The total length will differ for individual alternatives, but will never exceed 150 kilometers. A running meter will accrue 200 m^3 of water or slightly more. The initial filling up will then need some 30 mill. m^3. Let's leave aside the fact the majority of sections will "fill themselves up" with underground water – just like dozens of gravel pits and sandpits in Moravia that have the character of spontaneously created lakes. It often does not matter how the water gets to the canal, but what is important is how to get rid of it during the construction. Even then we can presume the whole amount of water will have to be got from the streams in the Morava catchment area. Approximately some 3,000 mill. m^3 pass through the river bed under the Dyje mouth in an average year so strictly theoretically speaking it would be needed to take only about 1 % of it by a single application. If this procedure should be applied in the whole section at once (which is another theoretical presumption as the waterway will be launched gradually within several years) at the time of medium discharges, which would be used by some 50 %, the whole procedure would not even take seven days, or even hours in the case of floods. There is no need to add anything more.

The second objection is based on the thought that operating the waterway itself would require extremely high volumes of water.

Let's leave aside a bit naïve apprehension that the water in canal sections has to flow in big enough volumes to create a sufficient depth. In fact the depth in pools on the waterway (canal or river ones) is practically independent on discharge in normal situations. Even at zero discharge, when the level of water would be absolutely horizontal, the depth would correspond with the proposed value. A certain amount of water is needed only for operation of locks as boat lifts work without water demands.

During the whole lockage cycle, which consists of passing one ship or pushed convoy (respectively more ships that will fit into the lock at once) through to the higher pool and one ship or convoy in the opposite direction, the lock has to be filled up and emptied. Let's presume the lock is of a low to medium rise. A volume of water given by the water column between the minimum and maximum level in the lock will pass from the upper to the lower pool. Let's use the calculator again. With the proposed lock length of 190 ms (practically about 210 ms), width of 12.5 ms and rise of 10 ms, the corresponding volume will be 26,250 m^3. Even higher locks will not require more. Saving basins will save at least 60 % of water so the column will not exceed 10 ms in case the rise will be about 25 ms. Approximately 24 cycles will be accomplished within one day if the intensity of traffic requires it. Current prognoses prove that the lock capacity will be utilized only partly in most sections. Despite this we can count on their full utilization – max. 630 000 m^3 would pass through a lock in a single day, which means a discharge per second of approximately 7.3 m^3s^{-1}. Which is not that much compared to average discharges of the Morava, Oder, Bečva and other streams parallel with the connection. An average Morava discharge under Dyje hovers around 100 m^3s^{-1} and even above the Bečva it is not lower than 15 m^3s^{-1}. Some serious problems are arising, though. First of all the calculations cannot be based on average values as in dry periods of the year the actual discharges are just fragments of the above values. Let's look into common hydrological classification characterizing low discharges by a number of days, in which they are reached or exceeded in an average year, and let's assess the discharges of the Morava above the mouth of the Bečva. We will arrive at the following conclusion:

A discharge reached or exceeded in 270 days a year, which is marked as Q_{270}, has the value of 10.4 m^3s^{-1}. Similarly the Q_{330} value is only 7.0 m^3s^{-1} and the Q_{355} (critically low discharge) even just 5.2 m^3s^{-1}. If a waterway operation were to be based on natural discharges, it would be possible, on the section parallel with the Morava before its confluence with the Bečva, for some 330 days in an average year without limitations. The situation would be more complicated in a dry year. Even less favorable conclusions would apply for sections parallel with the Bečva or the Oder above the mouth of the Opava at Ostrava. Resulting from the above, the operation of a waterway can by no means be subsidized from natural discharges in rivers. Moravia is an area not exactly abundant in water sources.

The second problem is even more serious. Discharges in rivers parallel with a canal cannot be lowered in favor of a waterway as it would have a negative impact on users of water or even on the environment. The "other" users are agriculture using water

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mainly for irrigation, industry and also systems of drinkable water supplies, which are dependent on the yield of underground sources, which react sensitively to the level of water in rivers. As for the environment, it could be seriously and irreversibly impaired by critical lowering discharges, mainly due to the worsening of the quality of water in the river. **An absolutely obvious condition of operating a canal is its entirely independent supply of operational water, which can by no means affect the discharge regime in rivers. This condition is always valid.** Various ways have been used for securing it, though. In the past supplying water was solved via constructing storage reservoirs accumulating flood discharges and supplying necessary water to the canals, namely to their dividing pools fluently during the whole year. This concept was supposed to be the base of the D-O-E waterway even at the time of adopting the Waterways Act in 1901. One of the planned reservoirs for supplying water to the dividing pool of the canal between the Danube and the Oder was built at the time this act was in effect, on the Bystřička stream, affluent of the Vsetínská Bečva, between 1908 and 1912. The same purpose was supposed to be served by a later built reservoir on the Divoká Orlice at Pastviny near the Elbe branch between 1933 and 1938.

Přehrada na Bystřičce vybudovaná v letech 1908–1912 měla být prvkem systému, který by zachycoval vodu pro zásobení vrcholové zdrže průplavu mezi Dunajem a Odrou.

The dam Bystřička built in 1908–1912 was to become a unit of the water supplying system for the dividing pool of the Danube–Oder Canal.

Celkový pohled na přehradní nádrž Bystřička.

A general view of the reservoir Bystřička in 2004.

The above "classical" way of ensuring operation water for canals had some serious disadvantages, though. If the water was to be supplied to the dividing pool gravitationally, dams would be able to hold discharges only above the dividing pool, i.e. often from a very limited catchment area where the sufficient amount of water would be hardly available. The water would have to be pumped over from lower sources with a sufficient amount of water. Out of various compromising solutions, modern waterways use the principle of "pure pumping", i.e. recirculation of water on individual locks. Using this system, the water resources management of a canal can be fully divided from the water balance of parallel streams. Water demands are practically zero then and are substituted by energy consumption needed for pumping. The only exception is evaporation from the water surface of the canal, which is negligible anyway, especially if understood as the differential value as compared to evaporation from the soil. Small losses can also be caused by seepage from insufficiently sealed sections, but these are not losses from the point of view of water balance as the seepage enriches underground horizons as well as streams in a given river basin. At first sight, it could look like such a concept is economically unfavorable, but exactly the opposite is true. Investment and operational costs of necessary pumps are usually lower than corresponding costs of constructimg and operating a system of reservoirs.

This concept also has other advantages:

- Possibility to restrict pumping to the time when there are surpluses in the energetic system, i.e. night. It is possible to take advantage of lower prices of electric energy and contribute to a more balanced utilizing of sources of energy and better stability of the energy system. The condition is dimensioning pumps to about triple of the average demands.
- At the times of higher discharges in rivers it is possible to utilize a part of the water, lead it over to a canal and stop pumping. If there are reverse pumps installed, it is even possible to use this discharge energetically.
- The system of pumps can effectively contribute to non-traffic functions of a waterway, i.e. to supplying areas lacking water with it.
- Pumping over can satisfy the operation of a waterway any time its intensity rises. There is no such limit as for supplying water from reservoirs, which have just a given yearly run-off.

So it can be said that getting water for the D-O-E water corridor will by no means affect natural hydrological conditions of parallel streams – if they do not even get better.

Přehrada na Divoké Orlici u Pastvin, postavená v letech 1933–1938, měla zachycovat vodu i pro vrcholovou zdrž průplavní větve k Labi. Slouží však i jiným účelům, a to včetně využití vodní energie a rekreace. V budoucnosti může být zapojena do vodohospodářské funkce vodního koridoru D-O-L, ovšem zcela jiným způsobem, než se původně předpokládalo.

A dam on the Divoká Orlice at Pastviny, built in 1933–1938, was to supply a dividing pool of the canal branch for the Elbe. However it serves very well its other purposes: recreation and hydropower utilization. In future it should contribute to the water-managing function of the D-O-E water corridor, however, in a different way than it was originally assumed.

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Kamil Lhoták

It‘s very depressing to live in a time where it’s easier to break an atom than a prejudice.

Albert Einstein

Vodní koridor D-O-L

The water corridor D-O-E

V předchozí kapitole jsme se pokusili vysvětlit konstrukci jednotlivých prvků vodního koridoru. Věnovali jsme však málo pozornosti jeho funkci, či spíše jsme předpokládali, že tato funkce je jediná a spočívá v umožnění vodní dopravy. **Skutečnost je však pro vodní cesty mnohem příznivější – jsou jedinými dopravními cestami, které nabízejí i využití v mimodopravní sféře. Tyto další funkce se svým významem mohou vyrovnat funkci dopravní, a v některých případech mohou být i dominantní.**

V

In the previous chapter we tried to explain construction of individual parts of a water corridor. Not much notice has been paid to its function; or rather, it has been assumed that there is merely one – to enable water transport. **However the actual situation of waterways is much more favourable as they remain the only traffic route allowing utilization outside the transport domain. Such functions can equal the transport purposes, and at times even dominate them.**

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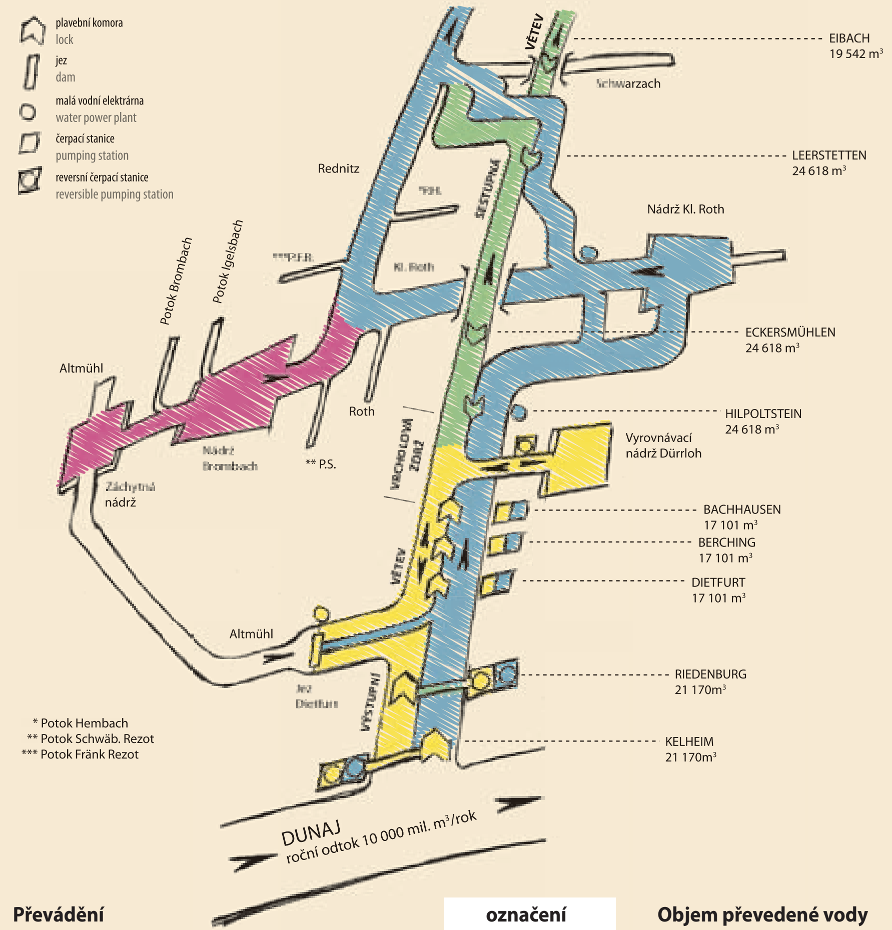
Positive water management balance

In the chapter on supplying waterways and namely canals with water, a modern approach based on fully autonomous "circulation" of water thanks to pumping was explained. Pumping is a procedure, during which it is possible to eliminate any interference with hydrological regime of parallel streams. This "neutral" role of canals can still be changed into an active one when a canal connects areas with different water resource. It can improve a water-resource balance in regions where the lack of water endangers not only economic development, but the environment as well.

First of all, it is useful to describe transporting the water of the Danube through the Main – Danube canal in neighboring Germany. This system is the most similar to opportunities offered by the D-O-E water corridor. The major initiator of this solution was the Bavarian State Ministry for the Regional Development and the Environmental Issues.

The territory of the Free state of Bavaria is divided into two different parts from the point of view of water resources. The southern part located in the catchment area of the Danube and its alpine affluents is abundant in resources, while the northern part in the Main catchment area is relatively drier. Taking into account the population, the difference is particularly significant. Streams in the north are able to feed about a third of water per capita compared to the south. The disproportion is even bigger in dry periods. Discharges of the Regnitz, which is a Main's affluent and drains the Nuremberg agglomeration drops down to 12 m^3/s at the time of drought. Half of these discharges is waste water at that. Even though the quality of water is favorably influenced by high efficiency of municipal and industrial sewage plants, it is impossible to treat the water as clear enough at all. The quality and quantity balances have shown that it would be necessary to keep the discharge of the river at minimum 27 m^3/s in the summer and at 22 m^3/s in the winter. Consequently, an additional volume of water that amounts to 150 mill. m^3 would be necessary. Such an amount of water could not be held by any reservoirs in the densely populated area with a minimum of usable possibilities of the dam realization. A partial solution could have been a gravitational transfer of a part of discharges from the upper section of the Altmühl leading to the Danube. This solution would have needed a system of storage reservoirs in the catchment area of the upper Altmühl and their interconnection by tunnels. This way an average annual supply of only 25 mill. m^3 would have been ensured.

Due to the insufficiency of the above solution, the attention of water management experts has shifted to the Main – Danube canal, which was being built at that time. Its locks and dams should include pumps with the output of 14 m^3/s for ensuring the traffic. It would be enough to increase the output by further 21 m^3/s, i.e. install five instead of two machine sets and solve the water-resource problem for good. It would be necessary to transfer the missing 125 mill. m^3 from the Danube watershed to the Main watershed, resp. to the Regnitz River and its affluents.



Převádění průtoků pro účely: Water transer for:	označení shading	Objem převedené vody (mil. m^3/rok) Volume of transferred water (mil. m^3/year)
plavebního provozu (recirkulace vody na výstupní větvi) operation of locks (recirculation on the ascending branch)		0
plavebního provozu a vodního hospodářství, resp. životního prostředí (dotace plavebních komor na sestupné větvi) operation of locks and water management (dotation of lock on the descending branch)		90
vodního hospodářství, resp. životního prostředí (přečerpávání vody z Dunaje) water management (transfer from the Danube)		125
dtto (gravitační převod z horního Altmühlu) dtto (transfer from Upper Altmühl)		25
CELKEM **TOTAL**		**240**

Schéma systému převádění vody průplavem Mohan–Dunaj.

A schema of the water transfer system of the Main–Danube Canal.

Pohled na dolní ohlaví stupně Berching na průplavu Mohan–Dunaj. Vpravo je přečerpávací stanice, jejíž vtokový objekt je kombinován se svodidlem plavební komory. Je vybavena dvěma čerpadly hltnosti po 7 m^3/s, která plně zajišťují potřeby plavebního provozu, zároveň však i dalšími 3 čerpadly stejné hltnosti, která přečerpávají vodu pro vodohospodářské účely. Instalováno je tedy celkem 5 čerpadel.

A view of the lower approach and gate of the lock Berching on the Main–Danube Canal. On the right, a pumping station with an intake structure, also serving as a guiding wall. The pumping station has 2 units with the capacity of 2 x 7 m^3/s, which fully provide for needs of navigation, and 3 units of the same capacity for water management purposes. Altogether there are 5 units installed.

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Přivaděč vody do vodohospodářského systému průplavu Mohan–Dunaj pod nádrží Brombach má v některých případech tvar umělých a vzájemně propojených jezírek.

Water supply of the water management system of the Main–Danube Canal below the dam Brombach sometimes takes shape of interconnected small artificial lakes.

Obnovený malý jez Eisenhammer na říčce Roth. Snímek ze srpna 2003, tj. z období mimořádného sucha, dokumentuje stav průtoku na říčce, která by byla bez přívodu vody z Dunaje téměř vyschlá. Spád jezu je využíván v malé vodní elektrárně u bývalého hamru, který byl obnoven a slouží jako muzeum staré techniky.

The renewed small dam Eisenhammer on the Roth Creek. The photo from August 2003, i. e. during an extreme drought, shows the creek discharge as it had almost dried out without water supply from the Danube. The weir rise is used in a small hydro-power station at the former iron-mill, reconstructed as a museum of historical technology.

Rybí propust u jezu Eisenhammer byla vytvořena jako umělý biokoridor.

A conventional fish ladder at the Eisenhammer weir constructed as biocorridor.

This solution was environmentally friendly but needed a few more arrangements. It was necessary to ensure pumping at cheap night current, resp. at its surplus during holidays. The allowed water level fluctuation in a relatively short dividing pool of the canal was still not sufficient for daily and weekly outbalancing of the discharge. Therefore the Dürrloh smaller balancing reservoir was built in the vicinity of the dividing pool of the canal. The system also required a kind of seasonal balancing as the amount of needed distribution of discharges fluctuates during the year, as well as surplus discharges in the Danube. Even the Danube discharge, no matter how much higher it is than the one in the Regnitz, cannot be affected in dry periods of the year an so taking water from the Danube is possible only when the discharge at the canal mouth does not drop under 140 ms^3/s. Therefore it was necessary to ensure a sufficient reserve for a short-term intervention, namely in the Kleine Roth reservoir in the vicinity of the canal, which is fed by pumped over water. The Brombach reservoir on the creek bearing the same name was further built – it is supplied by water from the upper stream of the Altmühl, led to it by a tunnel. This system has proved good as it offers reliable operation as well as relatively stable level of water in both reservoirs, which are actually a sort of emergency reserve. The level in them is almost always stable, which is favorable for recreational use and for creating shallow zones, strictly divided from recreational facilities. These zones compensate the decrease of natural wet biotopes that happened in the aftermath of intensive utilization of the environment.

In suitably modified boundary parts of these reservoirs, preserved natural and bird areas stretching almost 400 ha were declared.

The approach of Bavarian authorities to revitalization of streams fed by the Danube water from the canal was similarly sensible. The whole amount of water is not led via the bed of the canal just to the Nuremberg agglomeration, but smaller streams are fed if necessary as well. These streams were revitalized at the same time, the existing historical water projects renewed and conditions for periodical irrigation of meadows were created. The conditions for fish migration were improved as well.

It might seem that increasing discharges by pumping is energetically costly and economically disadvantageous. The opposite is true, though: in the case of the Main – Danube canal the energy balance of the whole system is positive because of several facts:

- If the demands on "passing through" water are solved via pumping over and the correspondent costs debited to the traffic function, it basically does not matter whether the pumping takes places on the ascending and descending branch of the canal or if it concentrates on the ascending branch, in the given case on the section from the Danube to the dividing pool. Part of the water gets to the water utilization passive area absolutely automatically.

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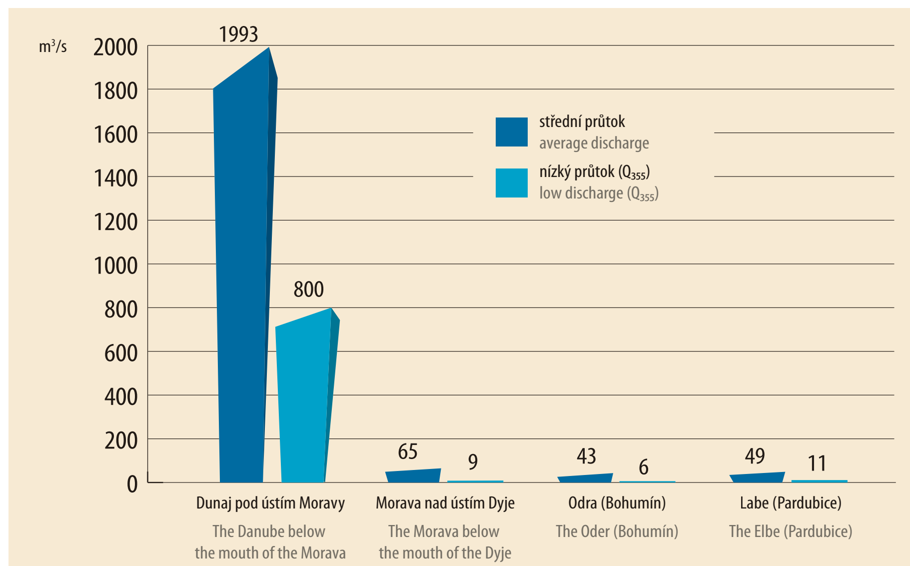
• In the case of the Main – Danube canal the total rise of the descending branch to the Main is some 100 meters higher than the rise of the ascending branch. This is significantly beneficial from the point of view of energy balance.
• The volume of water exceeding the need of locks is transferred because of water utilization reasons and makes for a bit different balance. This volume has to be pumped up to the level of the dividing pool, which shows as a minus in the energy balance. There are power plants installed on the descending branch, including small ones at reconstructed historical water projects, though, that can make use of energy of the water. Also in this case the rise of the descending branch, which is higher by 100 meters will take effect.
• The price of energy is not the same as cheaper night energy is used for pumping, while the descending water sees fluent return of energy or even valuable peak energy.
• The pumping does not take place all the time, and at the time of high discharges it is possible to utilize energy of the water flowing through the low part of the canal to the Danube. This is the case of two locks – at Kelheim and Riedenburg where the locks are fitted with reverse sets.

It is an unambiguous fact that the system water distribution in the Main – Danube canal is energetically active and contributes to gaining renewable water energy.

Readers may reprehend this explanation that we are trying to pursue an idea of a kind of perpetuum mobile. Not exactly. We just want to show that the water management function of the Main – Danube canal is an efficient, energetically undemanding and well thought of combination of interests of transportation, water utilization and environmental care. Let's try to answer the questions how much a similar function would be possible, useful and efficient in the case of the D-O-E water corridor.

• **Question number 1:** Are there similar differences from the point of view of water resources in the regions that should be connected by the D-O-E water corridor? The answer is easy enough. There are, and they are even much more significant than in Bavaria. Medium discharges of the Morava and the Oder in sections parallel with the waterway, as well as the Elbe at the mouth of the waterway in Pardubice are lower by two place values than the Danube discharges at the deflection of the water corridor. The differences are even more significant at the low-water stage. The Danube is already a large stream at the mouth of the Morava. Six times more water flows through its bed than at the Main – Danube canal deflection at Kelheim, namely due to rich affluents from the Alps feeding the Danube downstream Kelheim. Moreover, due to these affluents fed by glaciers from the Alps, the Danube shows a completely different hydrological regime to rivers with springs in lower altitudes and so critically low discharges do not occur at the same time. The answer is obvious then. **The differences among catchment areas connected by the D-O-E water corridor are much more telling and conditions for redistribution of water are more favorable than in the case of the Main – Danube waterway.**
• **Question number 2:** If talking about pump stations on locks, should they be approximately the same as the ones on the Main – Danube connection? The answer reads – yes. It would be purposeful to use more reverse machine sets, though.
• **Question number 3:** Is it vneeded to ensure – similarly to the Main – Danube canal – reserve resources, i.e. large reservoirs, which would substitute the function of the pumping system at the time of low discharges in the Danube? The answer depends on the time horizon in the case at hand. The expected demands in the near future should be met by the existing reservoirs in the Dyje catchment area as managing their volumes combined with the incoming Danube water could be transformed so that they would give a sufficient reserve. The system of redistribution would not be dependent on the Danube water only, but would provide interesting possibilities thanks to interconnecting water management in the Dyje and the Morava catchment areas. There are relatively large storage spaces available in the Dyje catchment area, in which over 20 % of natural run off can be caught. In the Morava catchment area above the Dyje, the storage spaces in existing smaller reservoirs are naturally smaller and correspond with not even full 5 % of the run off. In the more distant future – after the passive water-resource balance becomes worse and the potential of existing reservoirs in the Dyje catchment area will have been exhausted – the additional reserve resources will have to be taken into account. Well, exactly at that time the benefits of the D-O-E water corridor will come to the fore. The currently valid concept of the water-resource utilization is trying to solve balance deficiencies in a conventional way, i.e. by building further reservoirs. Optimum dam sites should conform from both the morphological (i.e. enable a large volume of held water on a relatively small inundation area with minimum impact on the settlements, transport infrastructure and ecologically valuable areas) and hydrological (i.e. manage sufficiently big natural run off) point of view. It is a rare sight to see both conditions fulfilled at the same time – and about never on the Morava above the mouth of Dyje, in the Oder catchment area and in the Elbe catchment area above the Vltava mouth. This is exactly the situation when the "redistribution" function of the D-O-E water corridor will become most significant as it will enable transferring discharges from a number of hydrologically favorable river sections to one or two sites favorable from the morphological point of view. **It can**



Srovnání charakteristických průtoků Dunaje, Moravy, Labe a Odry.

A comparison of characteristic discharges of the Danube, Morava, Elbe, and Oder Rivers.

be said that exactly this function of the D-O-E water corridor will enable ensuring making use of even the "last drop" of the Czech part of the Morava, Oder and Elbe (above the Vltava mouth) catchment areas without any need to inundate large spaces due to a high number of not very efficient reservoirs.

- **Question number 4** involves investments costs and overheads and answering it is not that difficult. **Analyses show that unit costs of water supply, say for irrigation in south Moravia, would be significantly lower making use of the D-O-E water corridor function than in the case of building further reservoirs.** The same applies to distant future and with even more significant results. While the effect of the pumping system can be gradually increased with minimum investments, the traditional system of water-resource utilization using reservoirs has it limits and after exceeding them the costs start growing rapidly and the efficiency of the system decreases down to zero.

As last but not least we have to ask a principal question: Is a radical improvement of the water-resource balance in the areas along the waterway needed?

A snapshot of the Morava River in Hodonín, taken at the time of low discharges, gives us a clear answer. The drought in this critical section from the point of view of balance brings about not only deficiencies in covering urgent requirements (taking water for irrigation, demands of the thermal power plant), but also situations when all the water is taken out of the river by a race supplying the above power plant with water for cooling so that no water flows through a dam and the water plant and almost three kilometers of the river remain without any discharge. Further worsening of the water-re-

Kritický profil na řece Moravě se nachází v Hodoníně. V období nízkých průtoků odtéká veškerá voda náhonem k tepelné elektrárně, a průtok přes jez či malou vodní elektrárnu klesá na nulu, jak snímek názorně dokumentuje. Navíc jsou nároky tepelné elektrárny uspokojeny zpravidla jen částečně, takže dochází k omezování jejího výkonu. Na závlahy – které jsou právě v suchých obdobích naléhavě potřebné – již nezbývá prakticky nic.

A critical nodal point of the Morava River in Hodonín. During dry periods the whole discharge is led through a branch canal to the steam power plant, while no water flows over the dam or through the hydropower station. As the steam power plant needs are usually met only partially, the electricity production is reduced anyway. The irrigation system, particularly needed in such conditions, then practically stops working at all.

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source balance and increasing of the number of sections with passive balance is expected in this section in the future as the "demanding" part of the balance will undoubtedly increase as a result of further economical development that will lead to higher take-outs of the water. The fact that vast areas along the route of the D-O-E water corridor lack in water, particularly southern Moravia, will come to the fore. From the point of view of circulation, the south of Moravia is affected by westerly winds coming from the Atlantic only partly and lies in the rain shadow of the Czech-Moravian Highlands and the eastern part of the Alps. The average annual precipitation is as low as 300 mms, which is a limit of the steppe climate. The area boasts relatively high temperatures and the longest time of sunshine, which reaches a record 2,000 hours in Strážnice at the same time. Often stronger south-easterly drying air currents further increase evapotranspiration, which is also helped by a mass production of biomass in this most fertile part of the country. The southern Moravia holds an unpleasant record as for how long the continuous dry periods last. The longest drought was recorded between February 1932 and February 1935, i.e. for 37 months. Similar disastrous periods had been recorded in numerous old chronicles as well.

The water-resource balance does not worsen only due to the increase of demands, but also due to the decrease of resources, which is even a more important problem. It is connected with global changes of the climate, i.e. with the ever more discussed issue. Probably nobody doubts the dangers of these changes, although there are different opinions about the extent of human activities in it. In any case, it is so complicated and ambiguous issue that it needs a chapter of its own.

Thoughts of the water management function of the D-O-E water corridor would not be full without mentioning the fact the delays of its implementation has enforced a construction of a substitute system for taking the Danube water to the area of Marchfeld in Austria. The water management situation of Marchfeld has been gradually worsening in the past decades, which was seen mainly in continuous descending of underground water levels and in worsening their quality as well as in bad quality of surface water in creeks flowing through this area, intensively exploited by agriculture. Therefore it was necessary to decide for its redevelopment by taking the Danube water to the area via a canal complemented with devices for controlled seepage of water to underground horizons. According to one of the alternatives, the first section of the D-O-E water corridor should have served as such a canal, but the uncertainties about the time of its construction led to a single-purpose option. It is the so-called Marchfeldkanal, unable to serve traffic (not mentioning pleasure navigation}. **It leads approximately in the route of the D-O-E water corridor as it was drawn in projects from the times the Waterway Act was adopted. The 18 kilometers long canal was actually built only for ecological purposes and takes 15.2 ms^3/s of water into the area. This water partly seeps and partly feeds the suffering creeks. It was an investment that could have been fully substituted by a timely implementation of the D-O-E water corridor.**

Rakouský Marchfeldkanal – investice pro podporu vodního hospodářství a životního prostředí, jíž bylo možno předejít výstavbou vodního koridoru D-O-L. Dnes je využíván i pro plavbu sportovních plavidel.

The Austrian Marchfeld Canal is currently used for sports and pleasure boats too. Its functions of water management and environmental conservation could have been fully satisfied by the D-O-E corridor.

The D-O-E water corridor and global warming

A significant shift of opinions on global warming was helped by a report of the United Nations' Intergovernmental Panel on Climate Change (IPCC) published at the beginning of 2007. Over two thousand experts from 130 countries had been working on it for three years. According to the report, the rise of the global average temperature has been proven in several past decades with a higher certainty than before. The majority of the growth is most probably due to a higher concentration of greenhouse gases, especially CO_2. The reliability of this verdict is higher than 90 %. This is a significant shift from the former IPCC report published in 2001, in which the reliability was evaluated significantly lower (a mere 67 %). At the same time the report states that the higher concentration is fully connected with human influence, particularly with burning fossil fuels. Although the ratio cannot be quantified as yet, it undoubtedly exists and cannot be underestimated.

The role of the D-O-E water corridor in the effort to eliminate or reduce the risk resulting from global warming can be of two kinds.

First of all, it can contribute to eliminating causes of global warming, i.e. to lowering greenhouse gases immissions, especially CO_2. This effect is particularly perceivable when transferring freight from roads and highways to waterways.

According to EU data, the water transport CO_2 immissions hovered around 30 g/tkm in 2002, while in the case of road freight transport the figure reads some 110 g/tkm (in usual conditions) or about 160 g/tkm respectively on overloaded roads where congestions occur. Taking into account a conservative estimate of a difference, i.e. 100 g/tkm, and estimating the volume of transportation output that can be transferred from roads and highways to waterways thanks to the D-O-E water corridor in the final state to 10,000 mill. tkm/year, the corresponding reduction of CO_2 immissions would reach an approximate value of 1 mill. t CO_2/year.

In the case of electrified railways supplied by electricity mostly from renewable resources or from nuclear power plants, the comparison with railways is not that marked but is still in favor of a waterway.

For the time being we can ignore the fact that one of the sorts of renewable energy is the energy of streams. Utilizing it can be helped by development of waterways a big deal – but we will return to this issue in the chapter called "Benefits of utilizing renewable sources of energy". It is also necessary to note that water transport offers significant chances of further reduction of the immissions thanks to its specific features. These rest in continuous reducing of energetic demands as well as in utilizing "cleaner" kinds of energy, while maintaining the independence of traction. The return to the above mentioned electric locomotives, once the usual sight on old French canals, is no longer on the agenda and "wiring" canals by trolleys is out of question as well.

The first step will undoubtedly be the implementation of "ecological" vessels with newly shaped bodies, "quattro propulsion" and a device for reducing friction resistance by blowing air under the body, which reduces fuel consumption by 35 %. The first prototypes attain even lower immisions of nitrous oxide by 30 % and intercept of 99 % dust particles as a result of better combustion and efficient filters. Another promising step is the substitution of classic fuel by hydrogen. This ecological fuel will influence the immisions balance favorably only providing the hydrogen will be a product of electrolysis using renewable sources of energy, i.e. in the case it is a kind of an "energy tin".

Říčně-námořní loď RMS Kiel je prvním plavidlem typu „Futura Carrier", jehož vývoj vzhledem k významným přednostem ve sféře ochrany životního prostředí finančně podporovalo i Spolkové ministerstvo životního prostředí v SRN. Pohled na neobvykle tvarovanou příď prozrazuje, že byl uplatněn tzv. „kvatro pohon" pomocí čtyř vrtulí (po dvou na zádi i na přídi). Loď má být nasazena na linkách mezi říčními přístavy na Rýnu a Velkou Británií.

The river-sea going vessel RMS Kiel is the first unit of the "Futura Carrier" type. For its significant environmental advantages, its project was subsidised even by the German Federal Ministry of Environment. The unusually shaped bow suggests a use of "quatro drive" of four screws (two at stern and two at bow). The vessel will connect river ports on the Rhine and in Great Britain.

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Solární katamaran Sun 21 po překonání říčně--námořní trasy z Basileje do Dominikánské republiky. Spotřeba paliva – nulová.

The solar catamaran Sun 21 upon completing the river-sea route from Basel to the Dominican Republic. Its fuel consumtion – zero.

Solární panely katamaranu Sun 21.

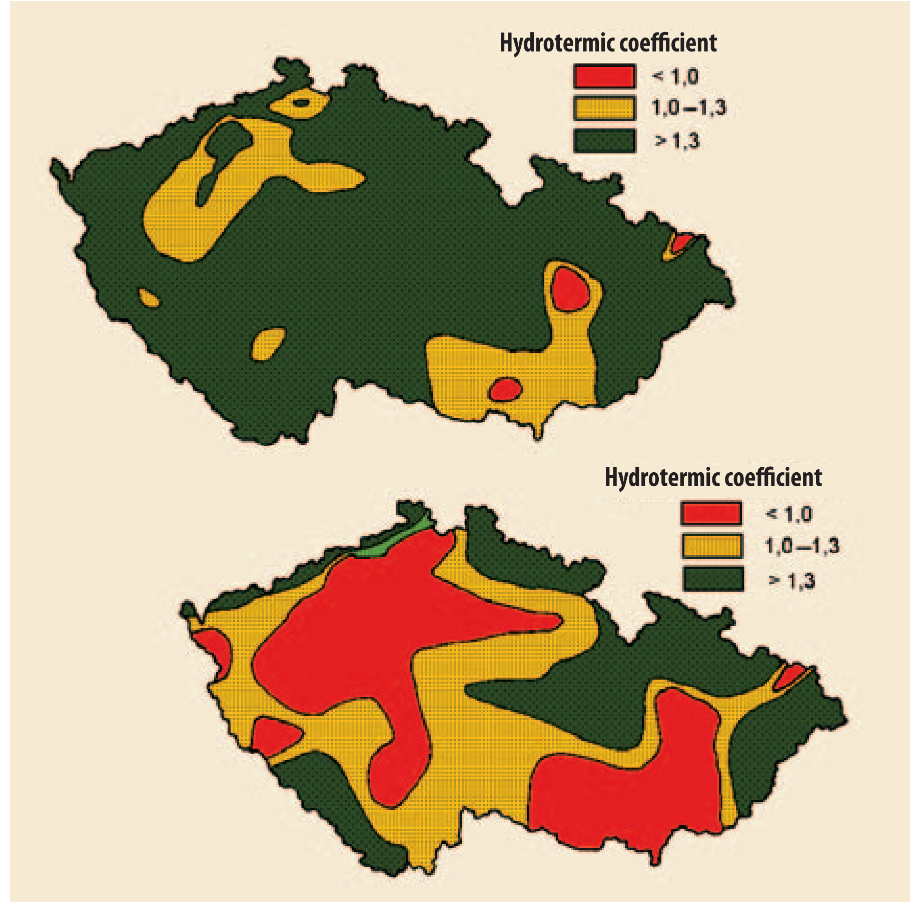
Solar panels of the catamaran Sun 21.

The final step could certainly be the immediate utilization of the omnipresent solar energy. This used to be quite common in water transport, but only providing the wind came into the equation as it is the direct product of the solar energy, i.e. at the time ship were fitted with sails. The romantic return to sailboats is not on the agenda of the day, though. The direct utilization of the solar energy is possible thanks to using solar cells. Unfortunately, they are so space-consuming that installing them on any road or railway vehicle would pose a problem. Wide and long river boats with relatively energetically undemanding propulsion are an exception in this respect. Placing large-scale solar panels on cargo hold covers of river boats is not that impossible. In spring 2007 the first successful sail of an experimental solar-energy-driven catamaran called Sun 21 took place from Basel to Rotterdam via the Rhein and then to America over the Atlantic.

Well, let's leave the sphere pursued only by R&D so far for now and turn to the second benefit resting in removing the impacts of global warming. If there is no doubt that the temperature will rise, it is necessary to expect problems on the resource side of the water-resource balance as we mentioned in the previous chapter. A recent study commissioned by the Ministry of the Environment of the Czech Republic issues a warning about these impacts of the climate changes and prognoses vast decrease of low, summer, discharges in rivers by at least 15–25 % or even by 20–40 % in the worst-case scenario. The same apprehensions are shared by agricultural experts of the Mendel Agricultural and Forestry University in Brno who have investigated the impact of global climate changes to the needs of irrigation in two alternatives – the optimistic and the pessimistic one. As a criterion for demarcation of area with a certain level of lack of moisture was used the so-called hydrotermic coefficient (HTC) which characterizes the moisture conditions in agroclimatology. The < 1 value presents a dry area, in which the agriculture clearly depends on irrigation. The 1 to 1.3 interval represents a mildly dry area and the > 1,3 value means an area with optimum natural moisture. **The maps show clearly how the dry area will probably enhance from the south of Moravia to Haná and to the area along the Elbe. As a matter of coincidence the route of the D-O-E water corridor crosses exactly these areas. The lack of moisture can certainly jeopardize agriculture as well as hydrological regime of the environment, especially river flood-plains, flood-plain forests and wet biotopes. It is necessary to point out that the volume of water prospectively caught of brought by the D-O-E water corridor is manifold higher than in the case of any water reservoir system. The described water management function of the water corridor offers a security against the threatening energy crisis, which is economically more beneficial and much more efficient than building further reservoirs in complicate locations.** So far, neither experts for water management, nor environmentalists do not realize the threat or rely on conventional and less efficient or even inefficient approach for the future. We have to admit, though, that some backhanded projects of pumping water over from the Danube have already occurred, but not always with the use of the D-O-E water corridor. A sad proof of total misunderstanding of its water-management and ecological functions is the apprehension that it would lead to lowering discharges in rivers on the contrary. They are naïve and based on regretfully little knowledge of the technical solution or even the intention of the project, but they are widely spread.

Intenzivní závlahy jsou na jižní Moravě i v sousedních oblastech Slovenska a Rakouska podmínkou prosperity zemědělství. Příslušné nároky na vodu jsou však již v současné době nedostatečně bilančně zajištěny. V budoucnu budou pravděpodobně absolutní nutností.

In Southern Moravia, as in the adjacent regions of Slovakia and Austria, intensive irrigation is a key to prosperous farming. The respective water demands, currently poorly accommodated, will become an absolute must in the future.



Prognóza vývoje hydrotermického koeficientu v důsledku globálních klimatických změn podle odborníků z Mendelovy zemědělské a lesnické univerzity v Brně. Nahoře optimistická, dole pesimistická verze prognózy, zaměřené na nejbližší padesátiletí.

Prognosis of the hydrothermic coefficient development considering the global climate changes according to the specialists of Mendel University of Agriculture and Forestry in Brno. Above, the optimistic prognosis of the near 50 years; lower, its pessimistic version.

The canal would divert water from sections of the Morava, Oder and Elbe Rivers – rivers whose water resources are already limited. These limited water resources for operating the canal would be diverted, for example the section Vienna – Hodonín (lower Morava) and for the highest sections of the Oder and Elbe during their low water periods. Natural rivers would suffer from reduced discharge and become stagnant – this stgnant water would exacerbate the eutrophication processes in the artificial canal and impounded river stretches. Disruption of hydrological regimes threatens unique floodplains, meadows and forests, and negatively impacts upon wetlands that are dependent upon river hydrology.

The Danube-Oder-Elbe canal – international threat for European rivers. Daphne, WWF and BUND, Berlin 2002, (original English text)

Just outstanding things
are worth blaming.

Jean Cocteau

Politicians' proverb:
If you repeat a lie several times,
The truth will pall on you.

Miroslav Horníček

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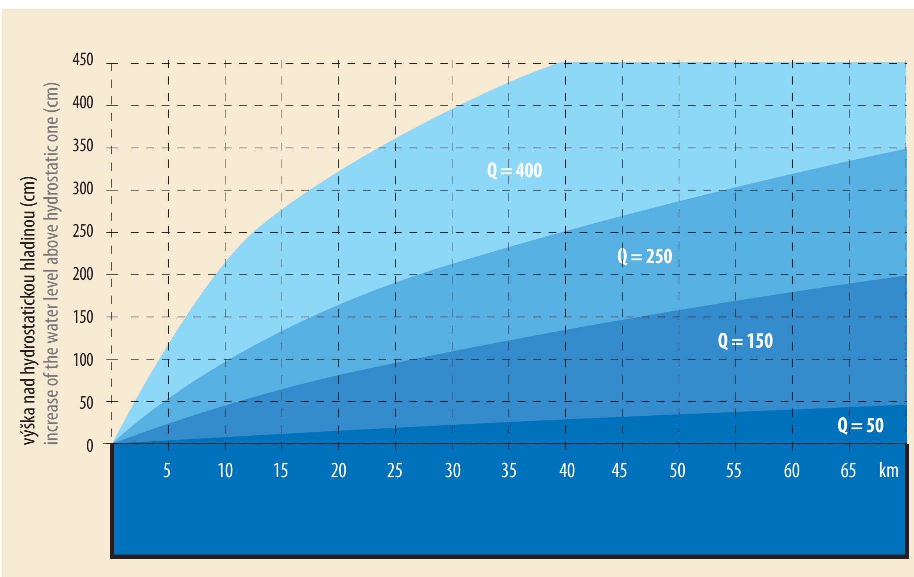
The D-O-E water corridor as a flood control device

For a long time, the inhabitants of Moravia and Silesia learned about the flood threat only from TV news from exotic countries and were convinced that disasters like the ones from which people in Bangladesh or eastern China suffered were simply impossible to happen in civilized Central Europe. **The more shocked they were by a July flood in 1997, which affected vast areas along the Morava, Bečva and Oder and reminded them how illusive can be the feeling of safety that was evoked by a very long time without huge discharges. The enumerable material damages reached CZK 62 billion and there were also 52 deaths due to that disaster. It was very difficult to express non-economic damages too.**

In connection with that disastrous flood and another, even more damaging one in the Vltava and Elbe catchment areas, a lot of experts share the opinion that there will be a higher probability of flood occurrence in the Czech Republic in the upcoming decades.

Up to 1997, possible impacts of floods were underestimated even by some experts for water management and engineers responsible for the D-O-E water corridor concept. It was thought that this project did not necessarily have to fulfill a flood measure function. The July 1997 flood affected most of the area along the waterway route and urged a revision of the general opinion of that time. The results were surprising.

The attention was first concentrated on a canal sections of the waterway that led parallelly with larger streams on which flood discharges could occur. The water does not flow through pools under normal circumstances – if we ignore slight flows due to filling or emptying locks or due to pumping, the water surface is practically horizontal. Flood discharges were not supposed to get into the canal sections according to the original project. What would happen if we stop traffic for a short period of time and transfer a part of a flood discharge to a canal, though? The level of water would most probably rise and would no longer be horizontal – it would take on a shape that is called a drawdown curve. The pools would see a flow of discharges which volume would depend on how much higher level of water would be admitted on the upper end of the pool. The calculations prove that it would be possible to transfer 500 ms^3/s of water with the given size of the section under ideal conditions without inflicting excessive stress on banks. Hundreds of cubic meters of water per second could still be considered under not very ideal conditions. It is clear that transferring such a volume of water via locks would need a suitable type of the upper gates of locks. Falling gates were successfully used on small locks on the lower Elbe for example.



Průběh hladiny ve vodorovné průplavní zdrži délky L při převádění povodňového průtoku Q v m³/s.

Shape of the water level in a canal pool of the length L at the corresponding flood discharge Q in m³/s.

Horní klapková vrata plavební komory na Labi, podpíraná hydraulickým válcem, jsou vhodná i pro převádění průtoků. V případě potřeby mohou zmírnit i povodňový průtok.

The upper falling gate of an Elbe lock, supported by a hydraulic cylinder lead discharges. In emergency it can lead even a flood discharge.

V plavební komoře Přelouč na Labi byla dodatečně instalována klapková vrata jen z důvodu, aby plavební komora za velkých vod odlehčila jezu jehož kapacita není dostatečná. Samotná plavební komora funguje jako účinný vývar. S podobným typem vrat se počítá také u plavebních komor na průplavních úsecích vodního koridoru D-O-L, aby bylo možno bezpečně převádět část povodňových průtoků z jedné zdrže do druhé.

A falling gate was additionally installed to the lock Přelouč on the Elbe. In high water it will relieve the dam of insufficient capacity. The actual lock chamber works as an efficient stilling basin. Similar types of gates are to be found on canal stretches of the D-O-E water corridor to lead some of flood discharges from one pool to another.




Vysoké hráze přívodního kanálu vodního díla Gabčíkovo účinně chrání Žitný ostrov od povodní, které mívaly katastrofální následky – jako např. velká povodeň v roce 1965. Část povodňových průtoků je navíc možno převádět neškodně přímo kanálem a plavebními komorami stupně Gabčíkovo (obrázek dole). Toho bylo poprvé využito při povodni v roce 2002.

High dams of Gabčíkovo headrace canal protect Great Rye Island against disastrous floods, e.g. the big flood of 1965. In addition, part of the flood discharges can pass straight through the canal and locks of Gabčíkovo (the photo below). The system was first used in the flood of 2002.

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Can we consider offloading of parallel riverbeds by a discharge expressed in hundreds of cubic meters per second a significant benefit? Definitely, especially if we consider that for example the Morava discharge in Olomouc culminated with around 800 ms³/s in July 1997 while the capacity of its bed is approximately 50 % of that discharge. The water that could not fit into the bed naturally found its way to Olomouc streets. If it was offered an easier route around the city via the D-O-E water corridor, huge damages would have been prevented. A canal section taking away a part of the flood discharge from the Morava above Litovel would help all towns and villages from Litovel to the junction of the Morava and the Bečva. The Oder branches could have been used for offloading from the existing dam at Osek nad Bečvou to Kojetín – a vast area would have been safeguarded, including the town of Přerov and the disastrously affected village of Troubky. Creating parallel beds would prove similarly beneficial in the area above Uherské Hradiště, from Uherský Ostroh to Rohatec, near Ostava and Bohumín on the Oder, etc.

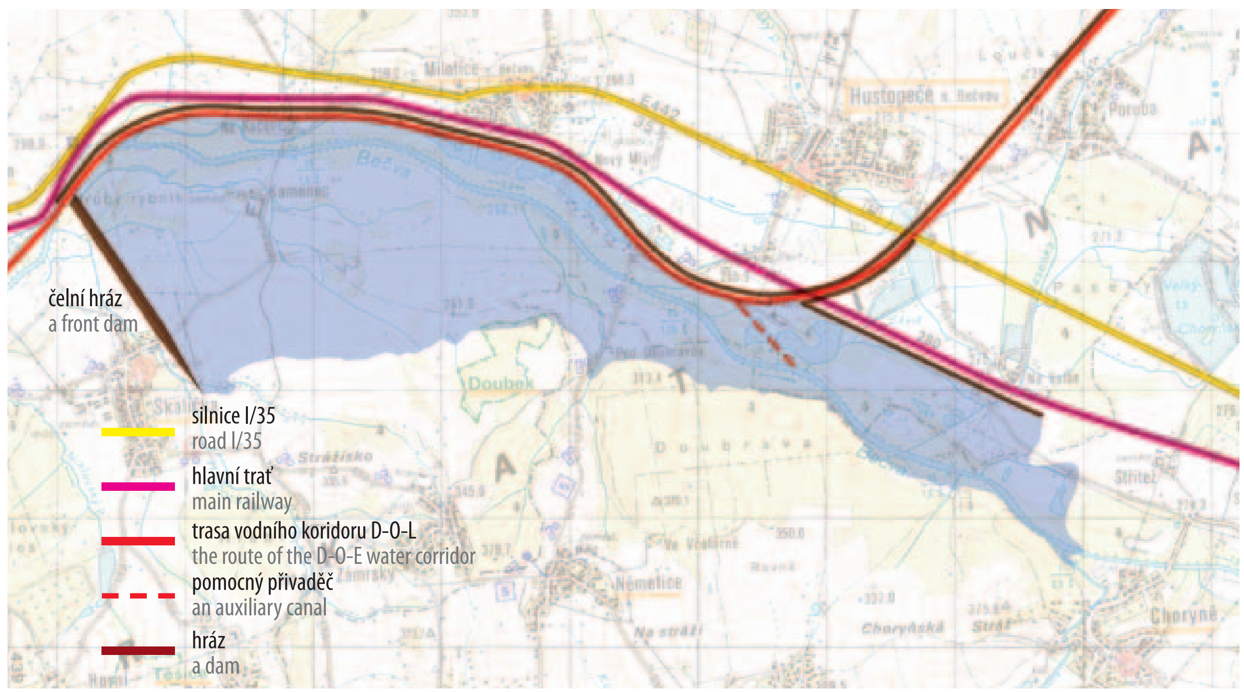
In places where the waterway route leads via an existing stream, the effect would be lower and would arise only from deepening the actual bed. It would be significant only on the Oder in the Ostrava territory as the bed can be not only deepened but also partly widened there.

After the above elaboration we can certainly expect an objection that a mere rising of discharge capacities is not the best way to prevent a flood threat as it is mainly necessary to reduce culminations of flood waves. This is certainly true. The reduction can be achieved by "cutting off" the peak of a flood wave and holding a corresponding amount of water in a sufficiently large reservoir. The most suitable solution is represented by dry reservoirs, the so-called polders. A polder can be ideally created in a flood area, which is flooded during a flood anyway. Only a river valley has to be dammed for the water to be able to rise up to the height corresponding with the needed volume. Well, the thing is that an easy creation of polders on the Morava, Bečva and Oder is not actually possible as their bottom land is lined by important communications – especially by main railway routes – and villages, which would find themselves in the polder area in the case of flood, i.e. deep under water. Therefore it is necessary to stake out the flood zone by long longitudinal dams. A suitably designed canal can create such a longitudinal dam automatically and make the building of a polder significantly cheaper. There are quite a few examples of it. A typical example of a suitable combination is a polder on the Bečva at Teplice, which was much easier than a considered reservoir in that location. Moreover the water management impact of the reservoir would be just a fraction of what the D-O-E water corridor can offer. An interesting idea is the one to create the Dubicko polder under Zábřeh as well.

In connection with the water management function of a waterway, lowering storage volumes of some existing reservoirs in favor of corresponding protective volumes can be considered. This way the flood protection would be more effective, too.

The role of a waterway in the flood prevention system has never been thoroughly looked into. Estimations lead to a conclusion that if the D-O-E water corridor had been in place in 1997, the inhabitants of Olomouc, Přerov, Troubky and other towns and villages would have known the impacts of the flood still just from TV screens.

To get an idea of the extent of endangered areas along the route of the D-O-E water corridor and its possible impact on the flood situation can be better seen on snapshots taken during the 1997 flood. They show some typical areas that would have been fully protected if the D-O-E water corridor had been implemented by then. And would be protected if similar extreme discharges in the Morava, Bečva or Odra occurred again.



Optimální dispozice poldru na Bečvě u Teplic. Jeho ohraničení může tvořit ze severu těleso vodního koridoru D-O-L plně chránící hlavní trať, silnici I. třídy i obce Milotice a Hustopeče nad Bečvou.

An optimum concept of a flood control reservoir on the Bečva at Teplice. The water corridor D-O-E, constituting its northern border, can fully protect a main railway, a first class road, and the townships of Milotice and Hustopeče nad Bečvou.

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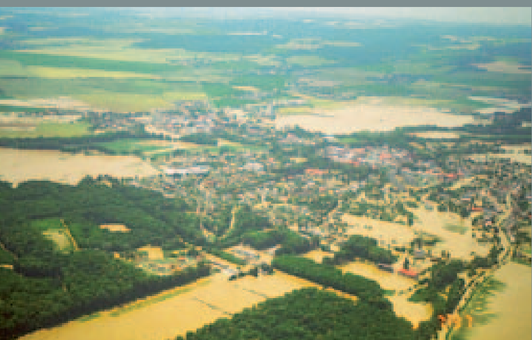
Povodeň na moravských tocích v červenci 1997

1997 flood on the Moravian rivers

Malý přehled následků povodně z roku 1997 může být inspirativní ze dvou důvodů. Jednak dokumentuje většinu míst, která by nebyla povodní vůbec dotčena, kdyby již v roce 1997 existoval vodní koridor D-O-L. Za druhé nutí k zamyšlení, neboť 10 let po katastrofální povodni nedošlo k žádným radikálním zásahům, které by podobným budoucím katastrofám zabránily. A to přesto, že frekvence mimořádně zhoubných povodní má být v perspektivě v důsledku globálních klimatických změn častější.

A small survey of resulting damage of the 1997 flood could inspire for two reasons: firstly, it documents most places which would have been left untouched had there been the D-O-E water corridor in 1997; secondly, it makes you wonder why even 10 years after the flood no proper measures have been taken to prevent any similar disaster event in future – despite the forecasted increasing frequency of extremely destructive floods due to the global climate changes.



Město Litovel – „Hanácké Benátky“. Červencová povodeň potvrdila jeho přezdívku.

Litovel – the Venice of Haná. The June flood warranted the nickname.

Záplavy nad Olomoucí u obce Horka nad Moravou.

Flood above Olomouc at the village Horka nad Moravou.

„Jezero“ v centrální části Olomouce.

The “lake” of the centre of Olomouc.

Kroměříž, v pozadí zaplavená Podzámecká zahrada.

Kroměříž, behind, the flooded Podzámecká Garden.

Rozlitá řeka Morava nad Kroměříží.

The flooding Morava above Kroměříž.

Záplava v Otrokovicích – čistírna odpadních vod, závod Barum Continental a letiště.

The flood in Otrokovice – the sewerage plant. Barum Continental and the airport.

Uherské Hradiště.

Uherské Hradiště.








Záplava v Olomouci se nevyhnula ani kolejišti hlavního nádraží v popředí.

Even the Olomouc main railway station did not escape flooding.

Snad nejvíce zkoušená obec Troubky na břehu Bečvy.

Troubky on the Bečva bank, a village tried the hardest of all.

Zatopená Kroměříž.

Flooded Kroměříž.

Zatopený průmyslový areál v Přerově.

A flooded industrial zone in Přerov.

Veselí nad Moravou.

Veselí nad Moravou.

Hlavní nádraží v Ostravě vyhovovalo v povodni spíše lodím než vlakům.

The main railway station in Ostrava temporarily fitted rather for boats than trains.

Ostravské průmyslové areály v Mariánských Horách a v Přívoze.

Indrustrial zones of Ostrava in Mariánské Hory and Přívoz.

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Ostrava-Nová Ves za červencové povodně v roce 1997. Díky ochranné funkci vodního koridoru D-O-L bude možno podobné kalamitní situace eliminovat.

Ostrava-Nová Ves in the flood of July 1997. The protective function of the D-O-E water corridor will eliminate any such disaster situation.

Zatopená Olomouc – červenec 1997. Koncepce vodního koridoru D-O-L pamatuje na prakticky absolutní ochranu tohoto města.

Flooded Olomouc – July 1997. The concept of the D-O-E water corridor guarantees a practically foolproof protection of the town.

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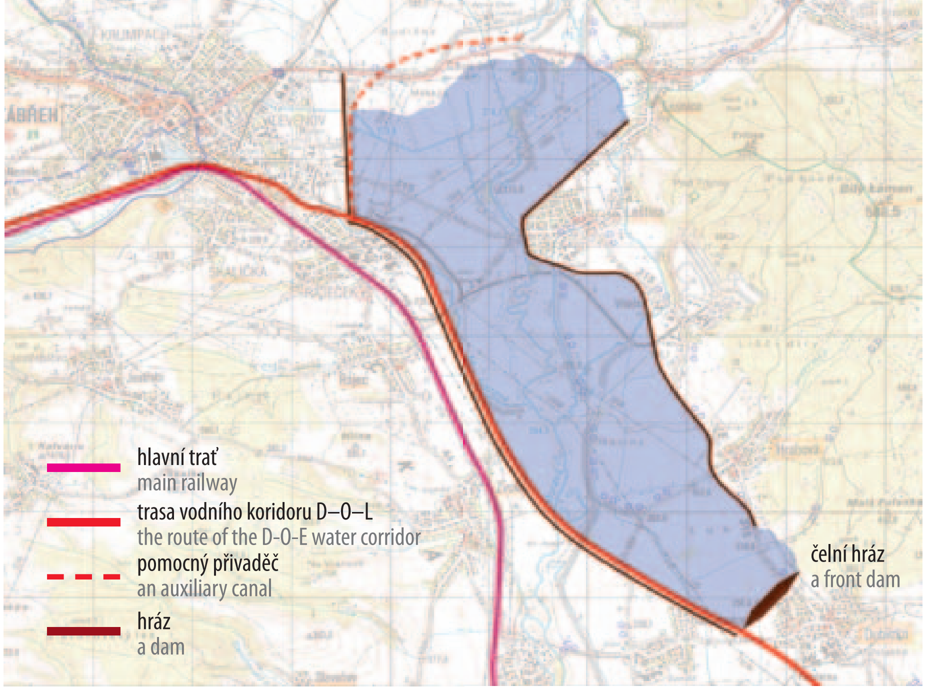

Návrh poldru Dubicko pod Zábřehem na Moravě. Vodní koridor D-O-L vytváří v tomto případě západní ohraničení poldru i čelní hráz.

A project of the flood control reservoir Dubicko below Zábřeh na Moravě. The water corridor D-O-E outlines the western border of the reservoir as well as its main dam.

Údolní niva řeky Moravy u obce Leština, zaplavená při povodní v červenci 1997. V pozadí město Zábřeh na Moravě. Toto území se nabízí ke zřízení kapacitního poldru Dubicko.

The alluvial plain of the Morava at the village Leština, flooded in July 1997. Behind, the town of Zábřeh na Moravě. The area is highly suitable for a high-capacity flood control reservoir Dubicko.

Positive impact of water transport on water quality

General ideas of water pollution in canals or other waterways are usually misrepresented. Sometimes it seems that using the word canal (meaning also a sewer in Czech) is at fault. No wonder then that some Czech critics equal a canal with a sewerage then.

Let's try to find where it is at and prove how far such an opinion is based on facts. The fact remains that the quality of water in quite a few streams or canals, on which there is no water traffic, is not always ideal. It is a result of certain natural conditions and artificial influences given by sources of pollution, efficiency of sewage plants, self-cleaning procedures in the water, etc. We would definitely find quite a few waterways – especially in industrial areas – in which the quality of water is far from satisfactory due to the above mentioned phenomena. This does not mean, though, that water transport is the culprit, i.e. that it is one of the sources of pollution. It might be enticing to draw such a conclusion and some critics of the project nurse wild imaginations of oil leaking from vessels.

If they read the legislature that is valid and complied with in Europe (with some massive penalties in place for those who fail to comply), they would find out that it is forbidden to pump even the water that accumulated under the engine room floor and can be contaminated by oil products out of a vessel to a stream. The skipper must be able to present (at any time) a full record about pumping it out to special collecting vessels. Vessels, if they are to stay afloat, must be tight as they are submerged into the water and subjected to its overpressure. Untightness results in getting water inside the vessel – also into an engine room. The only way of getting the water out of the engine room is to a special collecting vessel or another device. Well, vessels cannot be considered a similar source of pollution as locomotives or road vehicles that do not have to be tight and often are not. **According to surveys, water pollution by water transport (to 1 tkm) is not higher than in the case of railway transport and is multiply lower than in the case of road transport. So it would be daft to hold water transport responsible for the quality of water in streams.**

The more cargo will be shifted from trucks to barges, the better the quality of water will be. The relation between the quality of water and water transport has one more dimension, too. Intensive traffic leads to massive water aeration and therefore to a higher efficiency of self-cleaning procedures.

It has been proven not only by theoretical analyses based on comparing energy necessary for oxidation, but also by practical observation. The results of such observation on the Elbe are interesting as a sudden improvement of the quality of water on the section from the Chvaletice port downstream where there was intensive coal transport was spotted. When this transport was moved from the Elbe waterway to railway, the effect of cleaner water has disappeared.

Not often, but in regular intervals, the water transport induces water pollution (due to pumping oil and cleaning water from the bottoms of vessels) and accidents also happen.
Plánovaná vodní cesta Dunaj–Odra–Labe z pohledu ochrany přírody a životního prostředí.* (*The planned D-O-E waterway from the point of view of protection of nature and the environment*) *Veronica, Brno 2002

Any idle gossip is enough
To do harm.

Publius Syrus

A significant influence on water oxidation and therefore self-cleaning is the one of operation of locks, especially their emptying. Saving basins of high locks, through which the water flows repeatedly, are actually very efficient aerators.

Happening aktivistů hnutí Duha v Olomouci na jaře 1994 svědčí o nefalšovaném odhodlání jeho aktérů, současně však i politovánihodné neznalosti obvyklé kvality vody v průplavech a vlivu vodní dopravy na ni.

A happening of Duha Association in the spring 1994 proves not only their genuine determination, but also a sad unfamiliarity with the usual canal water quality and how navigation traffic influences it.

Moderní ekologická servisní loď v Praze na Vltavské vodní cestě odčerpává z lodí odpadní vody i vody nádní. Dodává pro lodě pitnou i užitkovou vodu a naftu. Její provoz je pod přísnou ekologickou a logistickou kontrolou.

A modern ecological service boat on the Vltava waterway in Prague drains waste water and ship bottom leak-water from the vessel, and supplies it with potable and utility water and diesel. The operations are under a strict ecological and logistic control.

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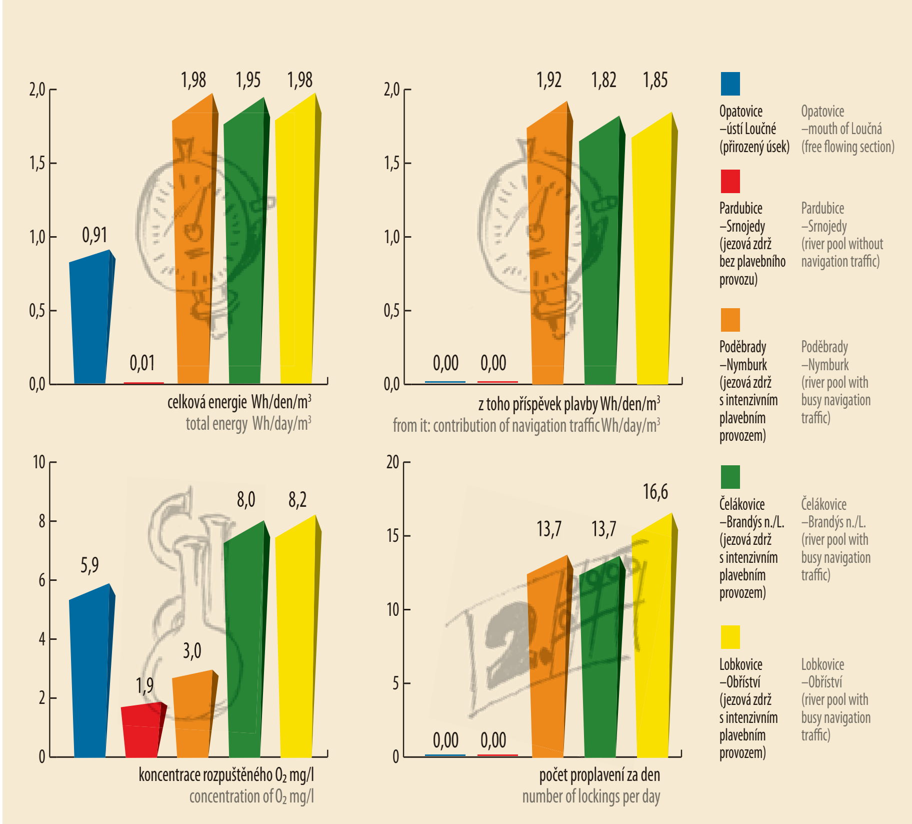
Část kyslíku, dodávaného do vody pohybem plavidla, souvisí s vytvářením vln na hladině průplavu...

A part of oxygen added to water by vessel movement is connected with the wave creation on the canal water surface…

...několikanásobně účinnější jsou však pohonné orgány – lodní vrtule nebo kolesa. Intenzivní provzdušňování vody za loděmi plujícími průplavem Mohan–Dunaj dává současně alespoň vizuální představu o kvalitě vody na této vodní cestě. Snímky byly pořízeny v období sucha, kdy se projevuje přečerpávání dunajské vody, která má vyšší kvalitu než vody Altmühlu. Obdobně by dunajská voda podstatně zlepšovala i čistotu vody v řece Moravě.

… propulsion systems like screws or paddle-wheels are much more efficient. Intensive water aeration behind a cruiser on the Main–Danube suggests at least visually the water quality of this waterway. The picture was taken in a dry period, when it is influenced by drawing of the Danube water of a higher quality than water in the Altmühl. Similarly, the Danube water could improve the water quality of the Morava.



Grafické znázornění kyslíkové bilance na Labi ukazuje, že ve zdržích s intenzivní plavbou je tato bilance příznivější než v přirozených úsecích řeky.

A graph of oxygen balance of the Elbe shows that in busily navigated pools the balance is more favourable than in natural stretches of the river.

Intenzivní provzdušňování vody při prázdnění plavební komory.

Intensive water aeration at lock emptying.

Při vypouštění vody z vysoké plavební komory do úsporné nádrže funguje tato nádrž jako účinný areátor.

While emptying a high lock to a saving basin. This basin works as an efficient aerator.

We should not ignore the objection that building dams, i.e. creating pools with dammed slow-moving water, will negatively affect the self-cleaning ability of water. The opinions of experts on either side of the argument are absolutely different. In the case of the current D-O-E connection project it is possible to avoid the disagreement as bar negligible exceptions the route of the D-O-E water corridor leads via existing river pools. Discussing this topic is therefore more or less a matter of academic debate.

We can conclude by saying that water transport influences the cleanliness of water, but the influence is positive.

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The D-O-E water corridor in the landscape

Integrating a waterway into the landscape certainly poses a problem that cannot be underestimated at all. It is stigmatized by the fact that there has been a certain discontinuity in this sphere. Trying to evaluate a landscape pattern, we tend to tolerate its radical changes due to huge human interventions in the past centuries. Prime examples are for instance the creation of pond systems in the Třeboň region, which is now a strictly protected area, or building a railway network, which was a firm and uncompromising hit to the landscape. Nevertheless the railway serves a pattern of a "sparing" transport and many a route is used for nostalgic steam rides to an idyllic landscape. Current criteria are different, though. Much experience has been forgotten and a lot of projects influencing the landscape just a little bit or just seemingly are subject to demonstrative exclamations. Sections led via existing river pools, whose length represents a minor part of the actual length of a waterway, do not affect the landscape pattern as not even the change of water level regime is expected, and often not even the charge of the route of a stream or character of its banks either. If the need to correct the lines of banks or some sharp bends arises, new banks will correspond more with the natural banks than the existing revetments built in the past decades. When those were built, vegetative or other natural-like bank protection methods were not preferred at all. Dead river arms will be created occasionally and they will not be filled up with soil as it was usual in the past. Contingent islands or islets will create quiet zones, too.

The vast majority of the route will have a character of canals parallel with connected streams. Bar some minor exceptions, they will lead out of ecologically sensitive bottom land with flood-plain forests and other valuable landscape segments. Contrary to other infrastructure projects, the canal sections should not bring new elements into the landscape (like, for example, concrete and asphalt surfaces of roads and highways or gravel ballast and trolleys of

Promyšleně navržené splavnění toku nemusí vést k ochuzení nivy o lesní a mokřadní polohy, jak dokazuje snímek polabské krajiny u Poděbrad. Může naopak podmínky pro vznik takových poloh podpořit.

As shown in the picture of the Elbe landscape at Poděbrady, a sophisticated design of a navigable waterway does not deprive the alluvium of its forest and wetland areas.

Ukázka krajinářského plánu, zpracovaného pro úsek průplavu Mohan–Dunaj, procházejícího údolím Altmühlu u obce Essing. Nahoře původní stav, dole návrh a na následující straně realizace. Čísla v plánku odpovídají snímkům na protější straně.

An example of a landscaping project of the stretch of the Main–Danube canal in the Altmühl valley at Essing. Above, the original disposition, below the plan. The realization is shown on the following page. Figures of the plan correspond with the photos on the opposite page.

Krajinářská úprava na úseku Mohan–Dunaj

Landscaping on a stretch of the Main–Danube Canal

Pohled na dřevěnou lávku pro pěší na začátku řešeného úseku.

A wooden foot bridge at the beginning of the tackled section.

Pohled z lávky k obci Essing pod skalnatým svahem a pohled z tohoto svahu na obec. Na snímku je vidět zachované staré rameno Altmühlu, za ním silnici, přeloženou z původní trasy (procházející obcí) a obklopenou oboustranně zelení, a konečně samotný průplav. Staré rameno je napájeno krasovými prameny, což se projevuje na zabarvení vody, a jeho hladina leží níže než hladina vodní cesty, takže její výška musí být udržována čerpací stanicí.

A view of Essing under a rocky slope from the foot bridge, and a view of the village from the slope. The photo shows a preserved old branch of Altmühl, a road behind it, surrounded by vegetation on both sides, moved from its former route cutting through the village and the actual canal. The old branch is fed from karst springs, which shows in its water colouring. As its water level is lower than the level of the waterway, its depth is controlled by a pumping station.

Opuštěný úsek starého Ludvíkova průplavu, sloužící také jako přivaděč vody k dříve zrušenému vodnímu dílu byl v duchu zásad krajinářského plánu zachován, zejména kvůli starým alejím na jeho březích.

A deserted section of the old Ludwig Canal, formerly used as a water supply to the abolished factory, was preserved in the landscaping project especially for its old river bank tree alleys.

Pohled z cyklistické stezky, vedené v tomto místě podél Ludvíkova průplavu na novou vodní cestu, za níž se nachází území, kam byl přístup turistů záměrně omezen ve prospěch nerušeného přírodního prostředí.

A view from a cycle track along Ludwig Canal to the new waterway. The access to the area behind is purposefully limited in order to conserve the natural environment.

Vedle trasy průplavu vznikl v souladu s krajinářským plánem rozsáhlý umělý biotop Schellneck, který je součástí chráněné přírodní oblasti (NSG) Weltenburger Enge.

The landscaping plan of the canal surroundings created a wide artificial biotope Schellneck, which became a part of the protected area (NSG) Weltenburger Enge.

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V krajinářském plánu průplavu Mohan–Dunaj byly řešeny i detaily – příkladem je vyústění průsakového kanálu do spodní zdrže pod plavební komorou, které připomíná přirozenou kaskádu na potoce.

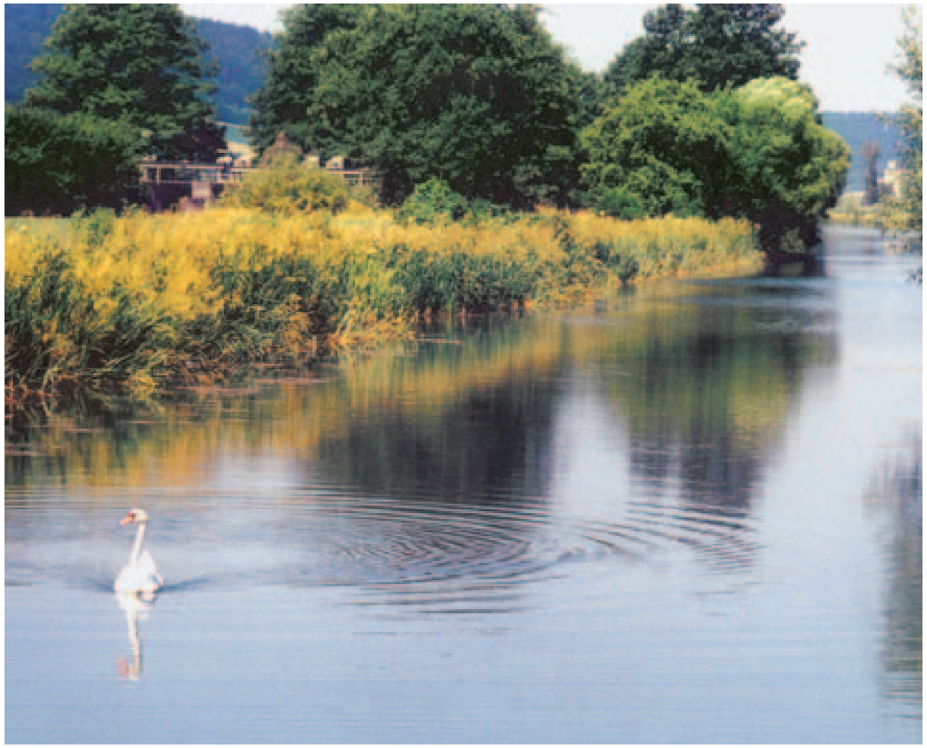
The landscaping project of the Main–Danube Canal tackled even details: e.g. a mouth of a seepage canal to a lower pool under a lock which resembles a natural creek.

Vrcholová zdrž průplavu Mohan–Dunaj protíná zemědělsky intenzivně využívanou krajinu, kterou obohacuje o vodní plochy a zeleň. Na svazích hlubších zářezů se střídají luční a lesní plochy. Součástí krajinářského plánu v tomto úseku byla i obnova sítě polních cest, stromořadí a drobné venkovské architektury (kapliček, božích muk, čekáren na autobusových zastávkách apod.).

The dividing pool of the Main–Danube Canal cuts through intensively farmed landscape. It adds water areas and vegetation to the scenery, meadows and forests alternate on slopes of its deeper cuts. The landscaping plan included renovation of the field path system, tree alleys and small country architecture (little chapels, calvaries, bus stop shelters etc.).

V krajinářském plánu průplavu Mohan–Dunaj bylo dbáno i na zachování technických památek, především zachovalých částí zrušeného Ludvíkova průplavu, starých plavebních komor s dřevěnými vraty, starého přístavu v Kelheimu včetně historického ručního jeřábu apod. Škoda, že jiné dlouhé úseky historického průplavu se staly obětí výstavby nových silnic a dálnic, které využily jeho trasy – např. v oblasti Norimberku.

The project saw to protection of technical monuments, especially the preserved parts of the abolished Ludwig Canal, old locks with wooden gates, the old port in Kelheim with a historical hand crane etc. It is a pity that other sections of the historical canal fell victims to new roads and motorways constructed in their path, e.g. in Nuremberg.




Konstrukce mostů v krajinářsky citlivých úsecích vodní cesty Mohan–Dunaj respektuje charakter okolí. Za nejzdařilejší objekt se pokládá lávka pro pěší u Essingu z lepených dřevěných nosníků. Stala se mimo jiné motivem pamětní známky, vydané při příležitosti otevření průplavu v roce 1992.

Construction of bridges in landscape sensitive sections of the Main–Danube waterway takes into account the character of surroundings. The foot bridge of glued beams at Essing ranks among the most successful. Its motive appears on the postage stamp remembering the canal opening in 1992.

railways), but first of all deeper as well as shallow water spaces lined by low and high greenery, i.e. elements belonging to the nature and having a long history in it will be created. Better to say, they used to be there before they were pushed out by agricultural meliorations, reallotment of land, river regulations, drying out wetland, liquidizing forests and other human interventions.

A detailed creation of new or rather renewed landscape will definitely ask for individual approach and close cooperation of technicians, landscape architects and experienced ecologists. **Parallelly with the technical project, a landscape project has to be elaborated as well. The same situation was in the case of the Main – Danube canal, which route via the Altmühl River valley, which is a declared national park, required such a solution on a larger scale. A similar methodology of landscape projects was proposed then as it is usable in the case of the D-O-E water corridor.** It is obvious that it is impossible to achieve a satisfactory harmony with the waterway at the moment the machinery leaves the site. It is necessary to respect the nature also in the way it can be left to evolve freely as it is exactly the nature that can take care of a lot of things better that even experienced project managers.

Landscape plans from the time before the construction of the Main – Danube waterway emphasized the role of a gradual succession when creating complementary vegetation and proposed only technical measures to support it. The fact remains that this approach was the right one, as proven by a current research comparing the original suppositions with the achieved results, which observe biodiversity in the landscape and other phenomena as well.

It is also necessary to mention that the landscape plan in the Altmühl valley secluded any storage of surplus spoil in the valley or filling up old branches. All surplus mass had to be transported to deposit sites outside the valley.

Applying the knowledge gained during building the Main – Danube waterway when solving the D-O-E water corridor has to respect some local specifications. As a rule, fewer conflicts can be expected than in the Altmühl valley, though. For example, some canal sections of the D-O-E water corridor should lead via routes of existing irrigation or flood protection canals. Just widening and adjustment of banks will have to be done in these cases – which means the “technocratic” character of the existing canals will be “softened” in a way. Short sections between Přerov and Pardubice should lead via narrow river valleys resembling the ones in the Altmühl valley – some specific solutions will come to the fore in this case.

After reading the above paragraphs, the reader might have got a feeling that the authors are – despite numerous gloomy forecasts warning against damaging Czech

It is obvious that the prospective construction of the D-O-E water corridor would inflict vast, irreversible damages to the nature and the landscape, although it would be the landscape with the basic level of protection in most cases…

The above mentioned facts make it clear that the prospective construction of the D-O-E water corridor would induce one of the largest ecological disasters in our territory, they say it would be the second largest one, just after the devastation of the Ore Mountains and the basin under them by intensive mining and burning lignite.

Jan Zeman: K efektivnosti případné výstavby kanálu Dunaj–Odra–Labe. Seminář „Vodní cesta Dunaj–Odra–Labe – ekologie–ekonomika–krajina". (About the efficiency of the prospective construction of the D-O-E water canal. Seminar called The Danube-Oder-Elbe waterway – ecology-economy-landscape.)

Olomouc 2003

Who listens to his own lie
Will finally arrive at the fact
He cannot tell the truth:
Neither inside himself, nor around him.

Fjodor Michajlovič Dostojevskij

It is dangerous to be sincere unless
you are also stupid.

G. B. Shaw

and Moravian landscape due to building the D-O-E water corridor – a bit overoptimistic.

We certainly realize that our voice is a lone one in the ocean of counter opinions. Still we assume that the weight of each voice should bear a proportion to the extent of knowledge of the actual project. Therefore we cannot really appreciate the opinions of people "voting" without the actual knowledge of the project as they have not even read the basic documentation. However, their influence on the public opinion is not to be underestimated. A certain emotional approach to assessing the project cannot be prevented either – it is more than understandable.

Of course, it would be ideal to use strictly objective and numerically expressible criteria of evaluating the human intervention in the landscape. It would be easy to prove which party is nearer the truth then. However, no suitable methodology of such an evaluation has been designed in the Czech Republic so far, let alone officially implemented. The only tool enabling at least a partial quantification of the intervention can be just the evaluation of the ecological function of an area according to the so-called Hessen method, declared officially in the Hessen Land in Germany in 1992. The method enables evaluating the ecological value of an area according to its character and therefore also enables quantification of technical interference changing its character. Respective unit ecological landscape "prices" have been adjusted to the conditions in the Czech Republic. Their comparison is very interesting, particularly in the case of landscape elements on the waterway route at present (regular script lines in the chart below) and elements that will be created as a result of the construction (italicized lines in the chart below).

Type of the area		Value of the ecological function of the area (CZK/m²)
2.1.1	Non-irrigated arable land	149
2.2.2	Permanently irrigated arable land	161
2.3.1	Meadows and pastures	496
3.1.3	Mixed forests	688
5.1.2	*Water sheets*	*744*
4.1.1	*Wetland, everglades and bank edge consisting of woody species*	*620*

Due to the fact that the route leads most often via areas with arable land, it is possible to presume that the ecological value of the area will rise thanks to the construction of the D-O-E water corridor.

Baťův průplav nebyl sice budován podle jakéhokoliv krajinářského plánu, nepůsobí však po letech v krajině nijak násilně. Jistě přízniveji než železnice či dálnice.

Although Baťa Canal did not follow any landscaping plan, even today it does not feel unnatural; certainly more natural than railtracks or a motorway.

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Note on exploitation of natural resources

A vast majority of canal sections of the D-O-E water corridor leads via areas, in which mighty layers of sands and gravel were deposited in the past geological eras. These materials are sought after mainly in building industries now. In such sections, large surplus of spoil, including the above mentioned materials useful in building industries, would be a result of constructing a canal cut deep into the terrain. Could this fact be considered a benefit of the construction of the D-O-E water corridor? Let's leave the judgment up to an objective reader. Let's hint, though, that critics of the project highlighted this possibility as "plundering" the natural resources. Well, mining in dozens of locations out of the way of the route – be it the Marchfeld in Austria, Lower Morava River Valley or Haná – is seemingly not classified as "plundering", even though ever more agricultural land is cut away due to it.

Jedna z velkých štěrkoven na Moravském poli v Rakousku se nachází v bezprostřední blízkosti trasy vodní cesty.

One of the large gravel-pits in Moravian Field in Austria is to be found immediately next to the waterway.

Rozsáhlé zemědělské plochy zatopené po vytěžení štěrku a písku v prostoru Tovačova. Tyto dalekosáhlé zásahy do krajiny by se daly přinejmenším zmírnit využitím přebytku materiálů z výkopů na trase vodní cesty. Poslední odhady svědčí o tom, že by se jen na území České republiky a Rakouska (případně Slovenska) dalo v průběhu výstavby získat více než 20 mil. m³ štěrkopísků. Na polském území by se mohlo jednat v souvislosti s těžbou pod hladinou nádrže Racibórz asi o desetinásobné množství.

Large farmland, deluged after sand and gravel quarrying near Tovačov. Such vast interference could have been easily diminished by using the surplus excavated material for the waterway construction. According to recent estimations, in course of the construction the area of the Czech Republic and Austria (and Slovakia) can provide over 20 mill. m³ of gravel sand. Considering the underwater quarrying in Racibórz reservoir, the Polish territory alone would bring ten times the amount.

Contribution to utilization of renewable resources

We could list a number of cases when the canalization of rivers has been combined with utilization of water energy on locks and dams. This has led to a significant increase of the economic effect of the investments and generally also to gaining more energy than the water transport in a given section requires.

Exaggerating just a little bit, one could claim that energy demands of water transport on such waterways equal zero. As a matter of fact, the gained energy is certainly not used directly to propulse boats, but the traffic system can make use of it in a different way. Some of the power stations on the canalized Main transfer the energy directly to the network of German railways – not just with the required parameters (voltage, frequency), but in cooperation with a consecutively built pumped storage water power station and also in accord with daily load of the power supply network of the railways. It is worth mentioning in connection with these power stations that their construction would not be economically efficient independently on the river canalization on the one hand, and on the other hand the revenues of the produced energy were used for partial self-financing of the other sections of the waterway, including the Main – Danube canal.

Waterways led mainly via canal section can contribute to rational gaining of energy very little, though. Still, there are some possibilities to coordinate traffic and energy interests. As it has been mentioned, the energy balance is affected positively also by pumping water on the Main – Danube canal. Energy production is just a byproduct of the pumping system in that case anyway. Even in the case of the D-O-E water corridor, a similar byproduct can be considered. Apprehensions of the total energy balance are just preliminary for the time being, but it can be claimed for sure that energy production will be significantly higher than its consumption required for pumping in the first stages of the construction. However, parallelly with the advancement of the construction and with the rise of water traffic, the consumption will rise faster than the production and so after finishing the D-O-E water corridor, the balance will equilibrate and both the consumption and the production will attain the same level – approximately 190 GWh/year. To compare, it is more than the Vltava water power station at Lipno generates (162 GWh/year), but less than the largest Vltava water project Orlík generates (351 GWh/year). The economical balance of the D-O-E water corridor will remain positive even in the case of equal production and consumption as the cheap night energy (at the cost of app. 0.70 mill. CZK/GWh) will be used for pumping while the produced energy can be sold at app. 1.50 mill. CZK/GWh. The cost of 133 mill. CZK/year is safely outweighed by revenues of 285 mill. CZK/year and so the system will “make” approximately 152 mill. CZK/year. Of course, we are talking in terms of current price levels, which can change. The proportion will most probably not, though.

A more important and very positive influence on the energy system is the one of the regulatory ability of the D-O-E water corridor due to the sum of installed intake of pumping stations and energy output, which would be as high as approximately 300 MW in the final state. It would be possible to discontinue the pumping at any time and opt for a turbine operation – sudden drop-outs on the sides of production or consumption of the whole system could be balanced out this way. The D-O-E water corridor can play a role of a middle-sized pumped storage power station to a large extent as can be seen on regulatory abilities of a small pumped storage power station at Štěchovice (90 MW) or the largest station of that kind in the Czech Republic – Dlouhé Stráně (1300 MW).

The energetic system of the D-O-E water corridor could also cooperate with wind power plants in the future, which could be beneficial for both sides of the cooperation. Wind energy is “ecological”, but it occurs accidentally, i.e. also at times when it cannot be rationally utilized. Reverse pumping stations on the connection would be able to take over those accidental surpluses of energy and return them to the system at any time – say at the time of low winds or high demand for energy.

The transport function of a waterway as such could also make efficient concentrating of fuel to power plants using biomass easier. Such power plants are being built in German river ports, for instance.

Využívání větrné energie jakožto obnovitelného zdroje má značnou nevýhodu, tj. závislost na nahodilém výskytu větru. Ve spojení s provozem reverzibilních stanic na vodním koridoru D-O-L by však bylo možno tuto nevýhodu zcela eliminovat.

Utilization of the renewable resource of wind power has a significant disadvantage: dependance on random occurrence of wind. Together with the reversible stations on the D-O-E water corridor, such drawback could be entirely eliminated.

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Life on the surface and on the waterway banks

We have already mentioned the fact that waterways are usually a momentum for economic expansion of the adjacent regions. The expansion does not take place just in the sphere of industry, trade of logistics and is not confined only to industrial zones in ports. It applies to other activities as well, should their economical character be obvious, primary, or just secondary. Some of such activities are pursued almost solely and exclusively on waterways.

We are talking about sports and recreational activities requiring water in the first place, i.e. water touring – particularly with motor boats, yachting, canoeing and rowing.

The D-O-E water corridor, just like any other waterway, can offer ideal conditions for pursuing these activities. Ensuring basic prerequisites of this kind of use is taken into account already during the construction. Bays suitable for creating sports ports (marinas) are created. Special ramps for trailers with motor boats (enabling simple manipulation with them) and sometimes also special locks for sports vessels are built. Consequent facilities, like clubhouses, hotels and restaurants, servicing stations for small boats, rental shops, etc. are left to sports associations and entrepreneurs who initiatively welcome new opportunities.

Proplavování plachetnic a motorových jachet v plavební komoře Harderwijk v Nizozemsku.

Locking of sailboats and motor yachts in the lock Harderwijk in Holland.

Putování po hladině průplavů je atraktivní jak v nizozemské rovině…

Travelling along canals of the Dutch flatland is very attractive …

…tak průplavem Mohan–Dunaj vysočinou Franský Jura. Vodní cesty umožňují dálkové plavby motorových jachet napříč Evropou.

… as well as along the Main–Danube Canal in the highladns of Franknian Jura. Waterways allow long distance cruises of motor yachts across Europe.





Zdrže kanalizovaného Neckaru vyhovují i plachetnicím.

Pools of the canalized Neckar suit even sailboats.

U stupňů na vodní cestě je možno s výhodou zřizovat umělé slalomové trati. U trojského jezu na Vltavě k tomu bylo využito původní vorové propusti. Slalomová trať byla již vícekrát využita pro mezinárodní závody a není vyloučeno, že se stane dějištěm olympijských soutěží.

Some waterway projects offer convenient places to raise artificial slalom tracks. At the Troja weir on the Vltava it was built in a former raft sluice. The slalom tract has been widely used for international competitions; quite likely it may become a site of an Olympic one.

Setkání veslařů s nákladní lodí u plavebních komor v Roudnici nad Labem.

Rowers meet with a cargo vessel at the locks in Roudnice nad Labem.

První sportovní veřejný přístav na dolním Labi byl otevřen v roce 2006 na žernoseckém jezeře v překrásném prostředí Českého středohoří.

The first public marina on the lower Elbe opened in 2006 on Lake Žernoseky in the lovely surroundings of the České Středohoří region.

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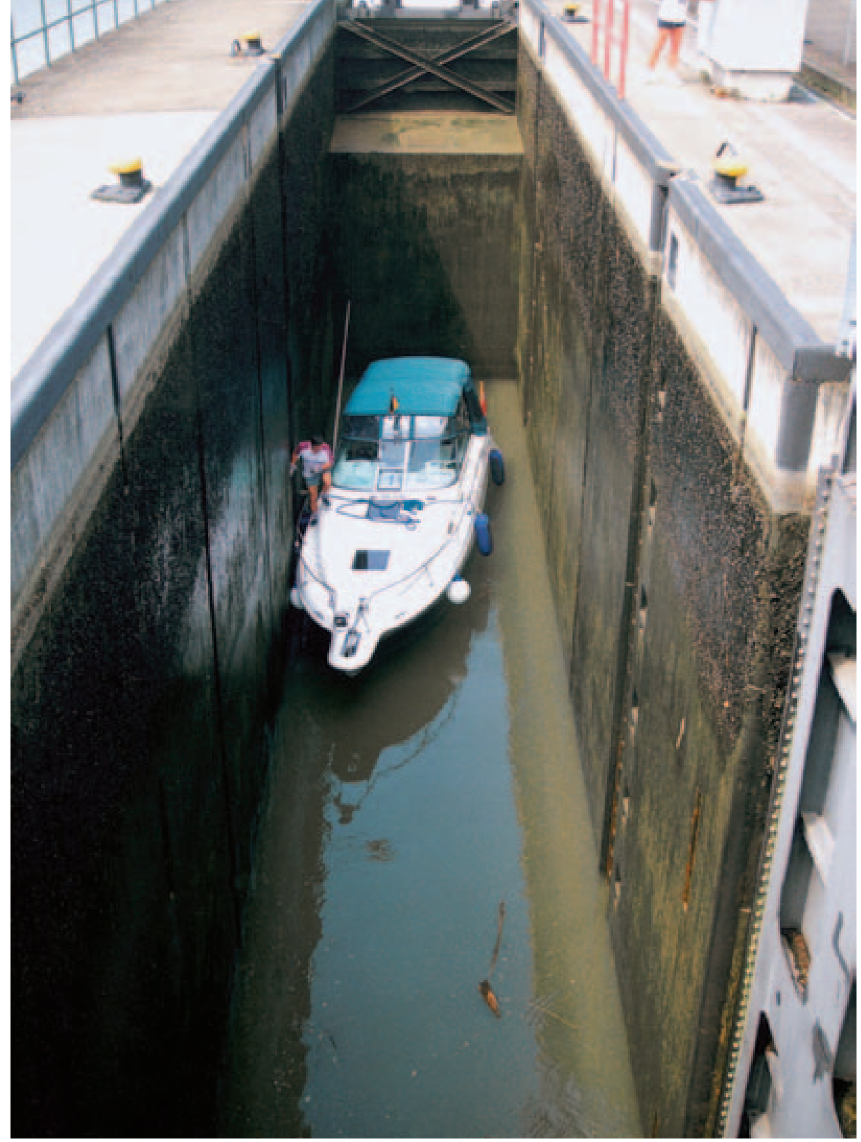

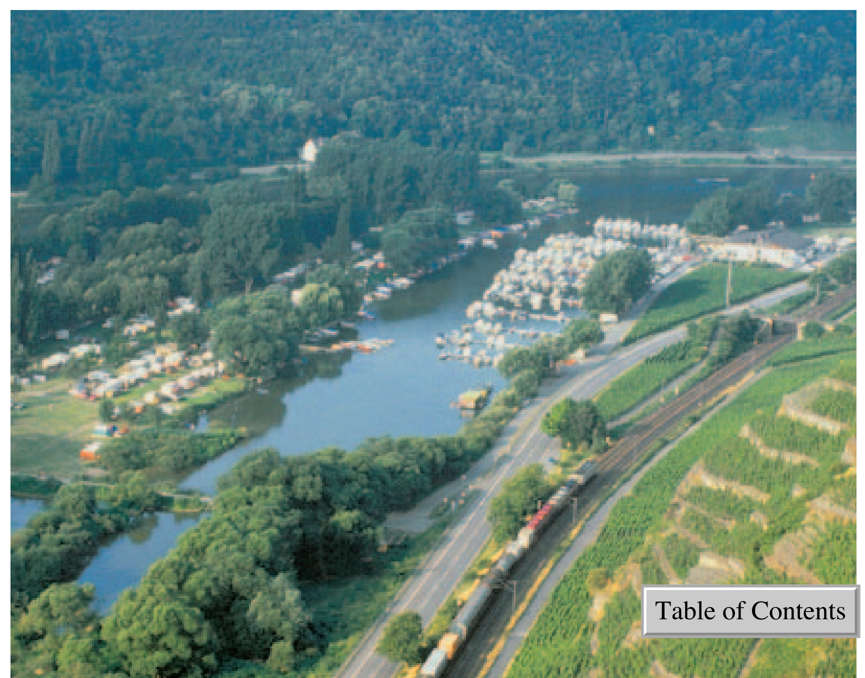

Pleasure navigation is currently, together with the effort to preserve valuable technical projects for future generation, the only reason why some old waterways of insufficient parameters are still maintained in operational conditions. This is mainly the case of old canals in the UK. The same reason was behind the idea of gradual renovation of dozens of years unused and deteriorating Baťa Canal.

Setkání sportovních plavidel s osobní lodí v komoře na Neckaru u Heidelberku dosvědčují možnost koexistence „velké“ i „malé“ plavby…

Meeting of sport boats with a passenger vessel on the Neckar at Heidelberg proves plausibility of the large-and-small navigation coexistence...

…stejně tak jako provoz v plavebních komorách Lelystad v Nizozemsku, kterými např. v roce 1987 proplulo 30 000 nákladních plavidel s nákladem 21 mil. t a kromě toho i 23 000 sportovních lodí.

… as well as traffic in the locks Lelystad in Holland; in 1987 they let through 30,000 cargo vessels carrying 21 mill. tons, plus another 23,000 of sport boats.

Tam, kde by společné proplavování sportovních lodí s velkými plavidly nebylo z kapacitních či bezpečnostních důvodů vhodné, se zřizují speciální plavební komory pro sportovní lodě.

Where joint locking of sport and large vessels is not possible for capacity or safety reasons, special locks for pleasure boats are built.

Camping a marina na řece Mosele u Winningen.

A campsite and marina on the Mosel River at Winningen.

Velmi intenzivní rekreační provoz se rozvinul na historických průplavech ve Velké Británii. Ty sice již dávno ztratily význam pro komerční vodní dopravu, pro „vodní turisty“ jsou však atrakcí. Nevadí jim ani zdlouhavé proplavování nesčetnými plavebními komorami, jako např. stupnicí 21 komor u Hattonu (Grand Union Canal).

A busy recreational traffic has bloomed on the canals of Great Britain. While they have long lost their commercial significance, they remain highly attractive for the “water” tourists, as they do not mind lengthy locking through the numerous locks, e.g. a flight of 21 locks at Hatton (Grand Union Canal).

Obliba starých tradic inspiruje Brity k tomu, že před moderními motorovými jachtami dávají přednost upraveným (zkráceným) tradičním nákladním „úzkým“ člunům (narrow boats).

The British respect to tradition inspires their preference of modified (shortened) traditional narrowboats to the modern motor yachts of today.

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Na 1. máje 2002 odhalil Tomáš Baťa ml. pamětní desku na počest Baťova kanálu.

On May 1, 2002, Tomáš Baťa Jr. dedicated a memorial plaque of Baťa Canal.

Baťův průplav navštíví ročně až 50 000 turistů a sportovců.

Annually Baťa Canal is visited by almost 50,000 tourists and boaters.

Čilý plavební provoz sportovních i rekreačních lodí na Vltavě v Praze.

Busy traffic of passenger vessels and pleasure boats on the Vltava in Prague.

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Nejnovější kajutové lodi typu Twin Cruiser mají oddělitelnou motorovou část, která je vlastně tlačným remorkérem, od hotelové části. Příkladem může být loď Flamenco dlouhá 135 metrů a široká 11,40 metru. Nabízí lůžkovou kapacitu pro 172 až 196 osob a může plout rychlostí až 22 km/h. Svými rozměry i výškou pevného bodu (6 m) je „šita na míru“ pro vodní cesty charakteru D-O-L. Na snímcích je vedle celkového pohledu i vyhlídková kavárna a dvoulůžková kajuta.

A hotel part of the newest cabin cruisers of Twin Cruiser class can be detached from its engine unit, which is in fact a push boat. E.g. the cruiser Flamenco, 135 ms long and 114.40 ms wide, sleeps 172 to 196 people, and reaches the speed of 22 kms/h. Her dimensions and the fixed point height (6 ms) is taylored for the waterways of the D-O-E. The photos show a general view, an outlook café, and a double cabin.

A special category of recreational use is the passenger water transport, which is actually not transport as such, but rather a recreational service. There are two kinds of this service. The first of them comprises a few hours' sightseeing cruises, while the second one offers a few days' or, say, three weeks' cruises via European rivers and canals. In the later case, river cruisers, the comfort of which is on the level of higher-category hotels, are used. They are equipped with stylish restaurants and bars as well as with sunny view decks, sauna and pools. They have been ever more favorite with tourists lately and it is not a coincidence that they are a usual sight on the Rhein-Main-Danube route from Rotterdam to Budapest or even further downstream on the Danube. The route offers fascinating sceneries as well as sightseeing tours of historical towns and cultural monuments. It is not difficult at all to imagine cruises from Vienna or Bratislava up to the north with stops among Moravian vineyards, in the vicinity of preserved river meanders near Strážnice, near Kroměříž, in Olomouc and in other attractive locations.

The recreational use of canals does not usually include swimming as it is forbidden due to safety reasons in lively water transport. It is to say, though, that this restriction is often not observed. Therefore it is preferred to build parallel natural swimming pools during the construction.

The canal construction creates very favorable conditions for cycling. Service paths on the banks are routes sought after by cyclists, who appreciate peaceful and safe traveling in pleasant environment as the paths do not cross frequented roads anywhere and it is also strictly forbidden to drive cars on them. The paths alongside the Main – Danube canal are most likely the most frequented cycling paths in Germany and ignited the boom of consequent activities in the sphere of restaurant and hotel services and bike rental shops. Sure, compared with other functions and benefits of the canal, these benefits are just a secondary matter, but there is still a good chance to compare – how many cyclists would dare to ride on the side of a highway and how many tourists would set off on a walk on a railway?

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In connection with contemplating the utilization of the area along the D-O-E water corridor in Austria, an architectural study of developing "dwellings near the water level" has been commissioned. This project supposes development of colonies of family houses with their own access to the water level – and in the above-standard version they would include a garage for a motor boat and a jetty or a pier for a yacht. It is not a matter of wild fantasy any more either: there are new colonies of family houses being built along the Main – Danube canal, making good use of favorable microclimate near the water level and zero risk of flooding that would be a major drawback on the banks a natural river. In this respect, there is one more rhetoric question: How many quiet garden quarters are built near highways or electrified railways?

Activities on the edge between economic utilization and sports also include game-fishing. The opportunity of pursuing it on canals is at least the same as on rivers. Game-fishermen's catches were recorded on the Main – Danube canal near Nuremberg, i.e. in highly urbanized area where the waterway has an absolutely artificial character, and compared to the artificial offspring of suitable kinds of fish – especially of pike, eel, and pikeperch. Recounting the gains of the fish, we get a figure of approximately 80 kgs/ha per year. Sure, particularly fertile and intensively managed ponds gain hundreds of kgs/ha per year, but the ones in worse condition provide much less than 100 kgs/ha per year. So the fish production partly compensates for the loss of agricultural production on soil seized due to the canal construction. At least it is yet another clear proof that canals are neither sewers, nor stagnating reservoirs full of foul water.

Stezky podél průplavu Mohan–Dunaj mají sloužit služebním vozidlům správy průplavu, jsou však především vyhledávanými cyklotrasami, na kterých si cyklisté mohou ověřit svou zdatnost v „závodění" s proplouvajícími loděmi.

Trails along the Main–Danube Canal, originally intended for the canal management service vehicles, have become sought-after cycling routes as cyclists may test their abilities in a competition with passing vessels.

Cyklistické stezky podél průplavu Mohan–Dunaj nejsou vedeny monotónně...

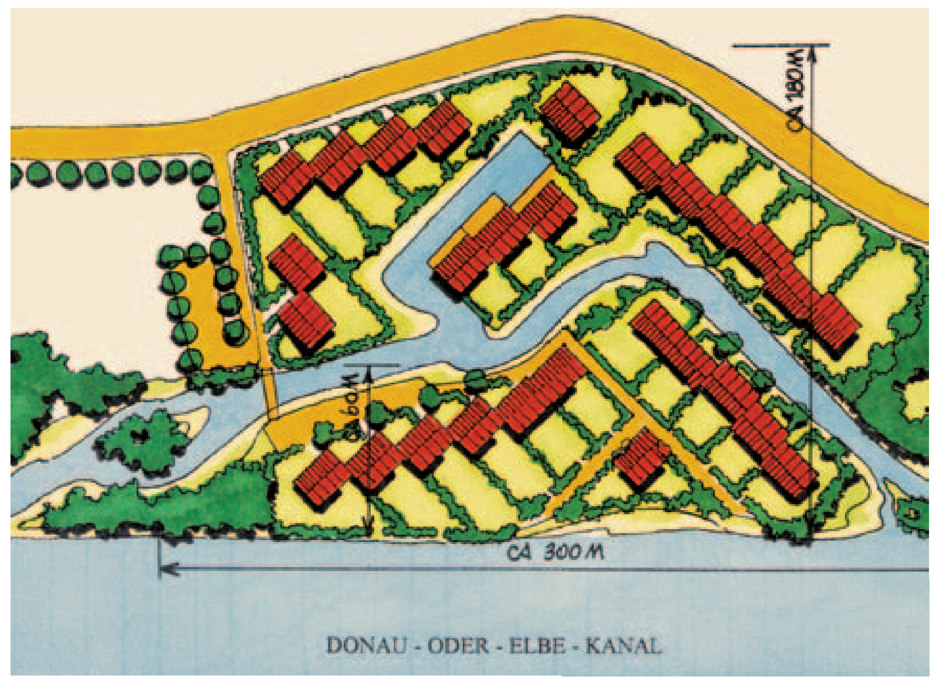
Cycling routes along the Main–Danube Canal do not appear monotonous …

...někde odbočují do stinných alejí či obcházejí stará ramena a pobřežní zóny...

… sometimes they detour through shadowy alleys, or around old branches and shallow zones...

...a jsou vedeny okolo malebných domků vybudovaných před více než 150 lety pro obsluhu plavebních komor starého Ludvíkova průplavu (mimochodem důsledně typizovaných).

… they pass picturesque houses built more than 150 years ago for the operating staff of locks on Ludwig Canal (stricktly typified, actually).



Koncepce bydlení na břehu průplavu podle návrhu rakouských architektů.

A project of canal-side housing designed by Austrian architects.

Transport politics and multimodal corridors

The previous chapters concentrated on non-traffic functions of the D-O-E water corridor. Still, we have to return to its transport function once again, namely to the issue how much it could influence the whole transport system and development of other kinds of transportation – to its transport-political function.

The major role of the transport policy is the regulation of dividing transportation output in transporting passengers and freight in cases when the transport market itself cannot achieve the optimum division.

One of efficient tools of transport policy is a balanced development of the transport infrastructure, which was shown on scenarios of the transportation output development in EU countries. It can be further illustrated by a few examples.

If no perfect waterway enabling rational, reliable and cheap container transport with departures of vessels on a daily basis or even more frequently is available, motor vehicles reign on respective routes despite all attempts to reflect their damaging impact on the environment in the price of this kind of transportation. What is more efficient than any restrictions is an offer of a better quality service, though.

We tried to show that in the first chapters in connection with servicing the Rotterdam harbor. Another example: if the railway transport does not offer comfortable and safe traveling, say, from Prague to Ostrava with the time of the journey not exceeding two hours, it will not be very successful in comparison with a car (although there is a much higher risk of an accident in that case) or a plane (although time losses due to checking-in depreciate the advantage of its speed to a large extent).

It is possible to say that an optimum transport infrastructure should not lack in two elements on its main routes – the elements able to suppress further uncontrollable development of road transport. One of the elements could be modern waterways, on which freight transport on long distances can be slower, but at significantly lower costs. The other one could be railways of a new generation – high-speed tracks – offering safer and mainly faster passenger transport. The Czech Republic lacks both fatally.

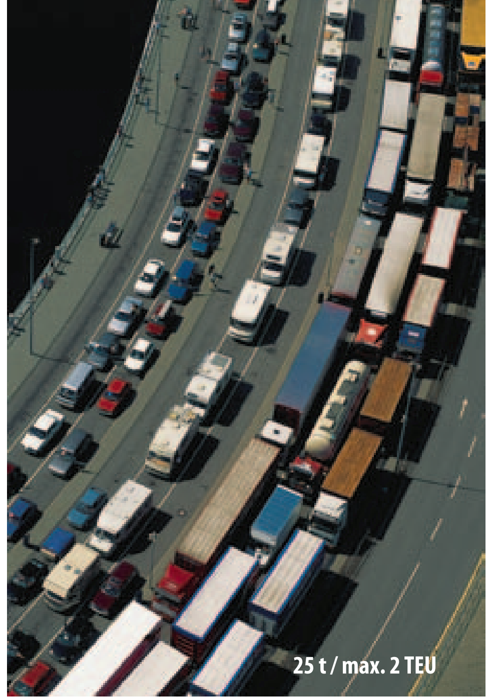
It is true that landscape plans usually contain drawings of both prospective routes – the one of the D-O-E water corridor and the one of high-speed railways. Unfortunately, nobody racks the brain about the interconnection between them and among all communication axes as such – especially among the so-called railway transit corridors that are being modernized. The aim of their modernization is ensuring the track speed of 160 kms/h, albeit with quite a few compromises. Building of railway transport of a new generation is certainly not the case – it might be achieved only in very distant future at huge costs of further high-speed tracks, more or less parallel with the existing transit corridors.

A fleeting glance at the map of the Czech Republic reveals a strikingly tight concourse of railway transit corridors I and II with the navigable route of the Elbe and the D-O-E water corridor. An inquisitive question springs to mind then – how large transport streams will remain on these railway corridors if a part of the costs is transferred to the integrated network of waterways and a part of passengers opts for high-speed tracks? All these routes lead practically via conjoint corridors that should not be treated as multimodal corridors with all possible consequences. Will the corridors from Děčín to Břeclav and Ostrava and from Ostrava to Břeclav not be overrated in a way? Will the classic railway not become a less attractive feature due to its worse endurance against the competition of parallelly led highways? Would it not be better to make use of redistributing the load in existing transport corridors to launch a gradual segregation of traffic (i.e. deflection of freight streams to other tracks) and a gradual conversion to high-speed tracks with projected speeds of 200 – 300 kms/h instead of a demanding construction of a new network of high-speed tracks?

The above solution would have several advantages: costs of investments of high-speed railways transport would decrease to a fraction and it would be possible to proceed step by step. The first advantages of very fast railway transport would be achieved faster, although a vast majority of the network would enable the operation at the speed of maximum 160 kms/h at the beginning. The concourse of the high-speed network with waterways would be very tight. High-speed tracks would connect the major terminals of passenger transport in district cities that are approximately 100 kilometers far from each other. A waterway would then connect major planned public logistical centers representing places where the freight is taken over from highway to railway and water transport. What objection can be expected against such a concept? It can be certainly and understandably admitted that a waterway cannot take over all freight transport from existing transit corridors. Coincidentally, parallel diversion routes with sufficient capacity for freight trains are available practically everywhere. Another objection will probably be aimed at regional and suburban trains, the operation of which is impossible to reduce. Moreover, they should operate in short and regular intervals so that they remain attractive for passengers. Even this function can be not only preserved at relatively low costs, but can even gain more better quality as these trains can concentrate streams of passengers to high-speed terminals. As last but not least we can suppose references to very unfavorable direction conditions of railway corridors in narrow river valleys from Choceň to Česká Třebová and further to Zábřeh where there are also problems with routing the waterway that should be led very near the existing railway track in this section. This issue will be addressed later on, in detailed description of the waterway solution.

The above consideration has seemingly led us a little bit astray from the main topic and we have found ourselves in a distant future and on a pretty thin ice of very daring thoughts or even speculations. However, we believe such contemplations belong to this book – if for no other reason, then because a complex view of transport is given little attention in our country.

A typical example of an incomprehensive approach is the "Politika územního rozvoje České republiky“ (Policy of regional development of the Czech Republic) document from 2006, which served as a basis for the government decree No. 561/2006. The document clearly defines developing regions of the state and respective axes of development, including transport corridors among them. The main developing regions are situated along the Elbe River, sometimes even alongside the route of the D-O-E connection, and the important corridors almost copy the route. It could be rightfully presumed then that the policy of regional development should consider the D-O-E water corridor one of the basic elements of the transport infrastructure as well as water management and would look into respective interactions, be it the above mentioned connections with the development of high-speed railway tracks or ties to “locations for accumulation of surface water”, i.e. spaces for the future construction of reservoirs. However, the policy of regional development, unlike other, beyond comparison less necessary projects) does not even use the term “the D-O-E water corridor”! Is that not strange? It is necessary to remember that the idea of a trimodal transport backbone of the republic, an equivalent element of which would be a waterway, was laid down already by J. A. Baťa in his book called “Budujme stát pro 40 000 000 lidí“(Let’s build a state for 40,000,000 people) that was published in 1937. We cannot resist highlighting at least a few interesting excerpts from the book on the following page. It is true that a lot has changed during the past 70 years, but the principal advantages of rationally routed trimodal corridors remain and it is necessary to reflect them in the policy of regional development.



Přeplněná silniční síť vyžaduje přesun přeprav na kapacitní železnice a vodní cesty, a to z důvodů ekonomických i ekologických.

Congested road system calls for shifting the burden of transport to the capacity railways and waterways for both economic and ecological reasons.

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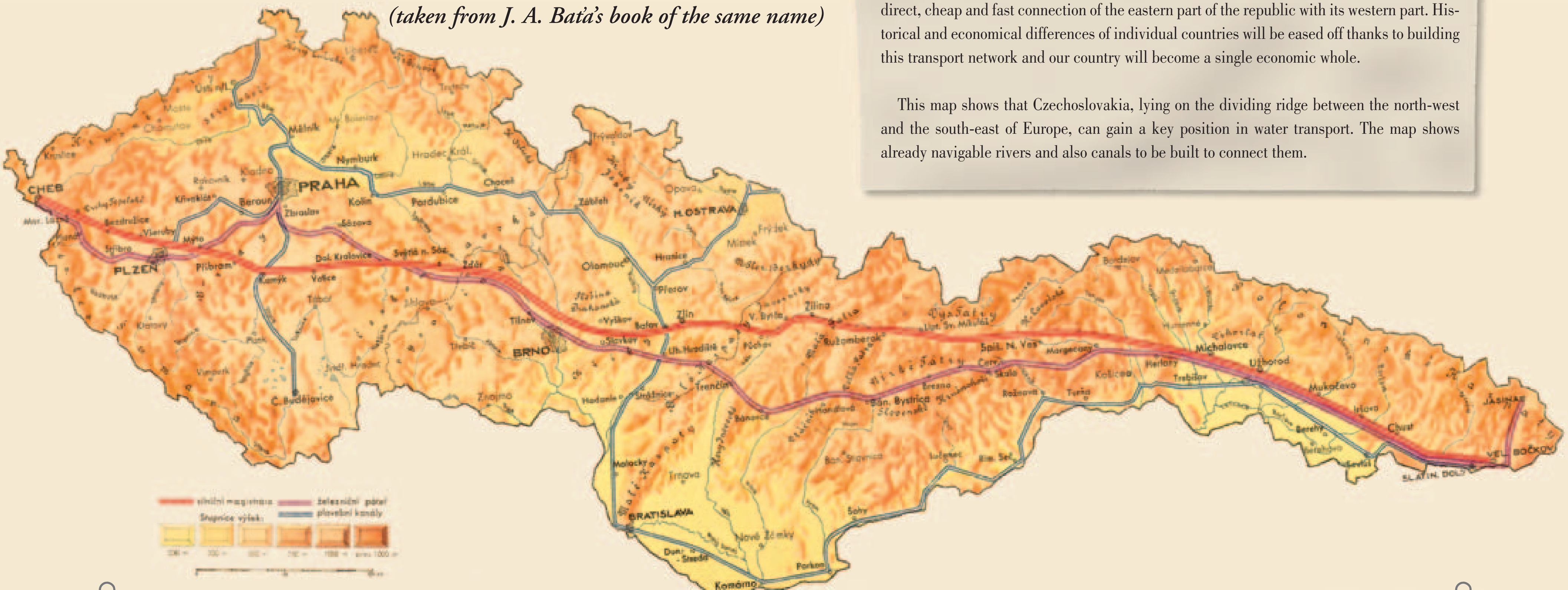
Budujme stát pro 40 000 000 lidí
(Let's build a state for 40,000,000 people)

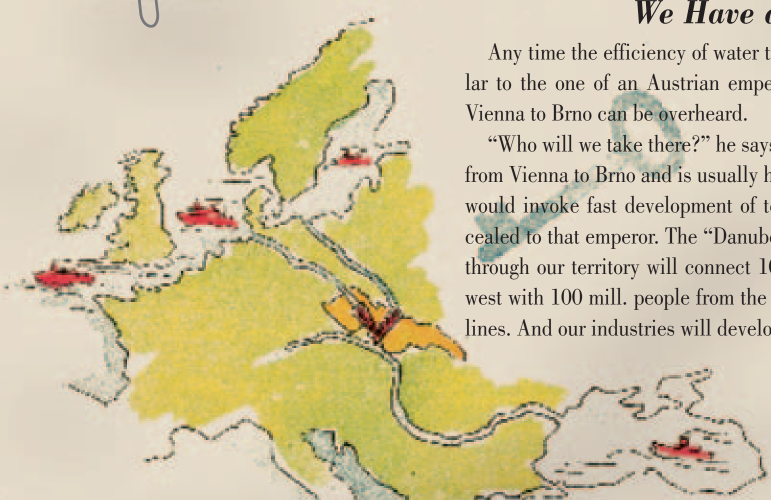
(taken from J. A. Baťa's book of the same name)



TRANSPORT BUILDING OF CZECHOSLOVAKIA

Road and railway thoroughfares together with a network of transport canals will ensure direct, cheap and fast connection of the eastern part of the republic with its western part. Historical and economical differences of individual countries will be eased off thanks to building this transport network and our country will become a single economic whole.

This map shows that Czechoslovakia, lying on the dividing ridge between the north-west and the south-east of Europe, can gain a key position in water transport. The map shows already navigable rivers and also canals to be built to connect them.



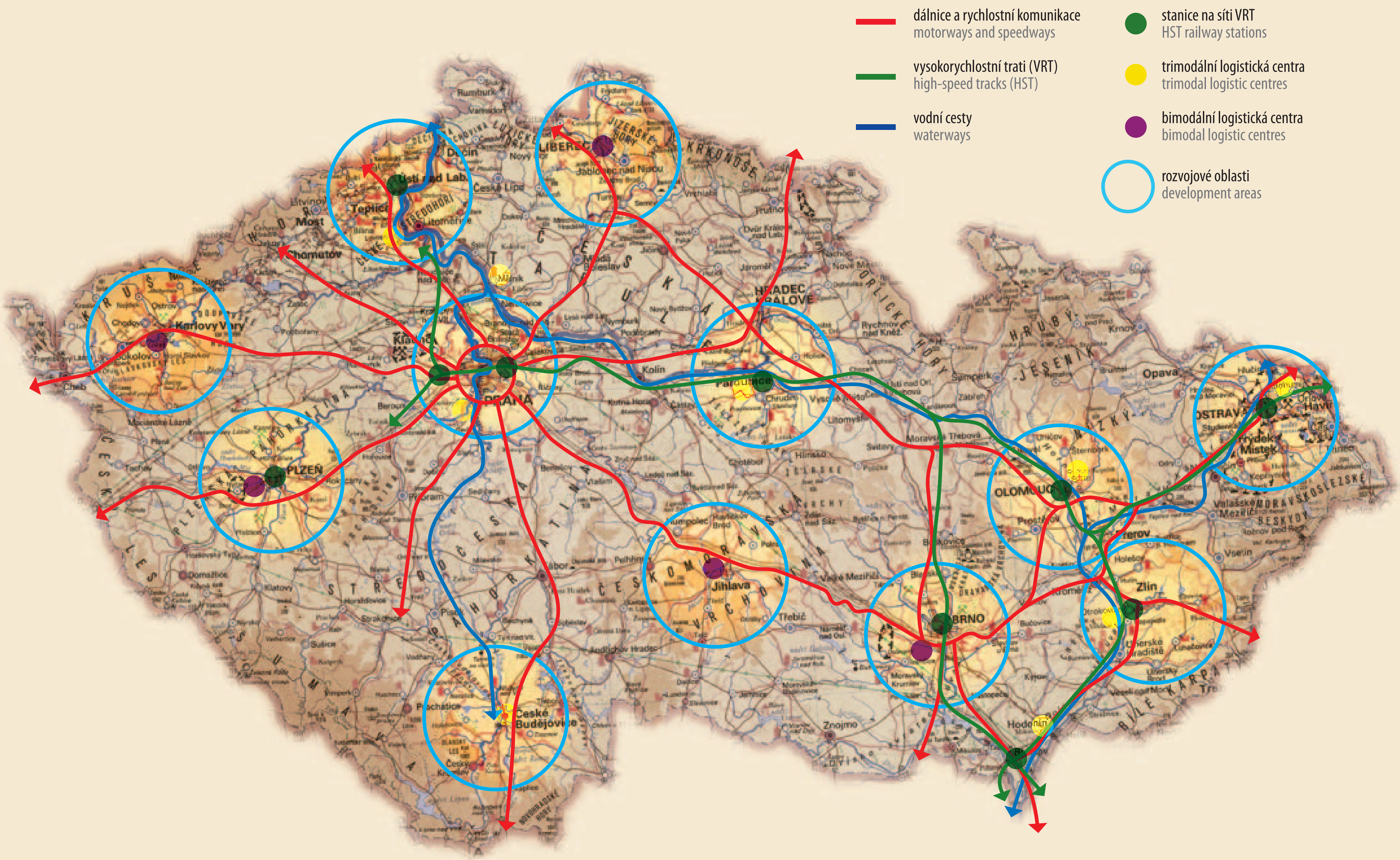
We Have a Key Position

Any time the efficiency of water transport is contemplated, opinions similar to the one of an Austrian emperor opposing building the railway from Vienna to Brno can be overheard.

"Who will we take there?" he says. "A stage-coach rides two times a week from Vienna to Brno and is usually half-empty." Well, the trick that transport would invoke fast development of textile industries in Brno remained concealed to that emperor. The "Danube-Elbe- Oder" network of canals leading through our territory will connect 100 mill. people from the north-west and west with 100 mill. people from the south and south-east by cheap transport lines. And our industries will develop and thrive at that.

INTRODUCTION • *All periods, in which people quarreled what should be done by the authorities and what should be done by popular initiative were characterized by uncertainty and inhibited activities. The history knows eras when the state built large monuments and projects. However, they never survived as the state acted poorly in their building and maintenance. And there were also eras when popular initiatives gained the whole continents, but lost them due to neglecting the care of common interests. Citizens and states have been able to create the best monuments or projects, both technical and cultural, when they cooperated, respecting each other and having common aims. The State Investment Committee, which I am a proud member of, was established by the leading personalities of our country to contribute to such cooperation. All technical projects and proposals I am talking about have been discussed with the most experienced people in our country and the most serious ones were born thanks to their initiative. All these projects were born out of an enormous will, in which all inhabitants of our republic can agree: the will to "build our state").*

What the map from the Baťa's book could look like today



Mapka rozmístění rozvojových oblastí podle materiálu „Politika územního rozvoje České republiky" z roku 2006. Z dokumentu jsou beze změny převzaty i trasy dálnic a rychlostních silnic. Navíc je však doplněn vodní koridor D-O-L, možné trasy vysokorychlostních tratí včetně stanic a logistická centra.

A layout of development areas according to "Regional development policy of the Czech Republic" of 2006. Without changes the document shows routes of motorways and speedways; additionally it maps the D-O-E corridor, possible routes of high-speed railway tracks, including stations and logistic centres.

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Kamil Lhoták

Nature granted us enough virtue
to be able to use it properly.

Johann Wolfgang Goethe

Vydejme se po trase
Along the route

Většina kritiků, ať už proti vodnímu koridoru D-O-L vznášejí výtky z obav o poškození přírody a životního prostředí či z jiných důvodů, si stěžuje na nedostatek relevantních podkladů o detailním vedení trasy. Zde je nutno říci, že takové podklady ve skutečnosti existují a jsou také každému dostupné. Odpovědné orgány, zejména Ministerstvo dopravy ČR, zajistily zpracování dokumentace o současně uvažovaném vedení trasy dokonce na mapách v měřítku 1 : 10 000. Námitky typu „Nevím sice, jak průplav vypadá a kudy jeho trasa vede, ale jsem kategoricky proti němu!“ ponechme tedy stranou, nebo odpovězme slovy Leonarda da Vinciho: „Kdo málo myslí, často se mýlí.“ Vyjděme však vstříc těm, kteří se s aktuálním řešením a s jeho vztahy k okolí seznámit chtějí, aby mohli zaujmout skutečně spravedlivé stanovisko, nemají však dostatek trpělivosti nebo času, aby se prokousávali horami oficiálního mapového materiálu.

Most critics, whether they dislike the D-O-E water corridor for conservation, environmental, or other causes, complain about a lack of relevant data on detailed routing of the corridor. It is to be said that such records indeed exist, and they are available to everyone. The responsible authorities, namely the Ministry of Transport of Czech Republic, have seen to proper documentation of the route recorded on maps of the scale 1 : 10,000. Let us ignore objections like I-don't know-what-the-canal-looks-like-and-where-its-route-leads-but-I-am-against-it, and respond with Leonardo da Vinci's quote: "He who thinks little, errs much." Let us assist those who truly seek to acquaint themselves with the current solution and its links to the environment. Let us help those who lack the precious time or patience to bite their way through piles of the official map documentation.

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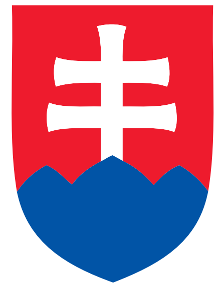
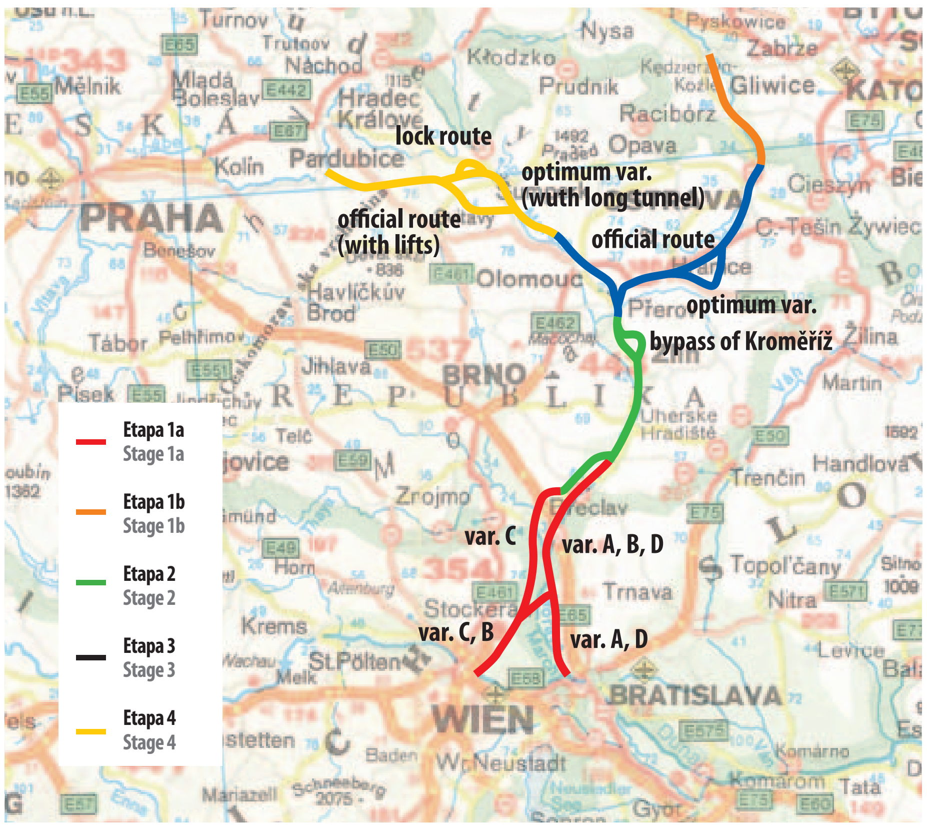
First kilometres to run through Slovakia or Austria



It is quite understandable that the routing, as described further – although leaning on official sources – does not have to be final. The following preparation stages could bring detail specifications or even some bigger changes. It is quite natural with projects of such type. Some sections are proposed as alternatives and the final selection among them might call for further research and studies. We would like to take the liberty to point out some possible, or rather advantageous, alternatives even in cases when they have not been yet officially evaluated. Such critical approach is usually permitted.

Direction of our pilgrimage along the D-O-E water corridor route shall follow the stream of anticipated progress of construction work. We shall set off at the Danube, where the first stage is expected to start, and we should pay special attention to the individual regions. Incidentally, the region (and state) borders fall almost exactly in line with the stages.



Schematická mapa trasy vodního koridoru D-O-L s etapami a variantami.

A schematic route mape of the water corridor D-O-E with stages and variants.

The choice of variants awaits at the very starting line. It has changed few times in the past, although never for technical reasons but rather for the political ones. Proposals drawn in connection with the Waterways Act (1901) presumed that the canal route would run to the west from the Morava all the way up to the Moravian border and on up to Otrokovice, i.e. through Cisleithania, carefully avoiding then the Hungarian territory. Practically it concerned a right-bank line Vienna–Angern–Hohenau–Lanžhot–Hodonín. After the breakup of Austrian–Hungarian monarchy in 1918, the line got cut by the Czechoslovak–Austrian state border, which the Czechoslovak authorities viewed as a serious handicap. Therefore, the project was corrected in order to keep the entire route on the territory of a newly established republic. The new left-bank line, defined by the locations of Devín–Jakubov–Kúty–Lanžhot–Hodonín, did not cross to the opposite bank until above the mouth of Dyje, where a canal bridge was proposed across the Morava at Lanžhot. By the extinction of Czechoslovakia in 1939, the route moved to the right bank again to return back after the Czechoslovak state was re-established in 1945. Currently, after the Czechoslovak federation has been divided, the situation is quite similar to that of 1939.There is neither a chance of leading the route exclusively through one country, nor any pressing political reasons to favour one or the other bank line. For the first time, there is an opportunity to confine the decision strictly to technical, economic, and ecological reasons, while taking into account needs of all the three countries, i.e. the Czech Republic, Austria and Slovakia.

As a basis of the respective international negotiations, a feasibility study of the first D-O-E water corridor stage was drawn in 2003, which registered three alternative solutions, marked as variants A, B and C. Additionally, on the demand of the Slovak Republic, the fourth variant D was included, which was to enable utilization of the renewable water energy of the Morava River in the relevant section. Comparison of the essential features of the variants is summarized in the chart on page 222; the solution covers the route up to Hodonín, where all the variants meet from both the layout and the altitude point of view at 163.2 ms ASL.

Představa o vedení trasy, jak byla zpracována po vydání vodocestného zákona v roce 1901. Pravobřežní průplav měl v prostoru nad soutokem Moravy a Dyje křižovat mimoúrovňově Dyji, částečně protnout lužní lesy mezi oběma řekami a procházet mezi Břeclaví (Lundenburg) a Lanžhotem (Landshut) dále k Hodonínu, a to stále v nadmořské výšce 160 m n. m., odpovídající odbočení z Dunaje. Teprve jižně od Hodonína by musela být vybudována první plavební komora.

A proposed route as designed upon the Waterways Act (issued in 1901). Above the Morava and Dyje junction the right bank canal was to cross the Dyje with a canal bridge, partially cut through the riverine forest between both rivers and pass through Břeclav and Lanžhot towards Hodonín, all that at 160 ms ASL corresponding with the altidude of branching-off from the Danube. Only in Hodonín the first lock was to be needed.

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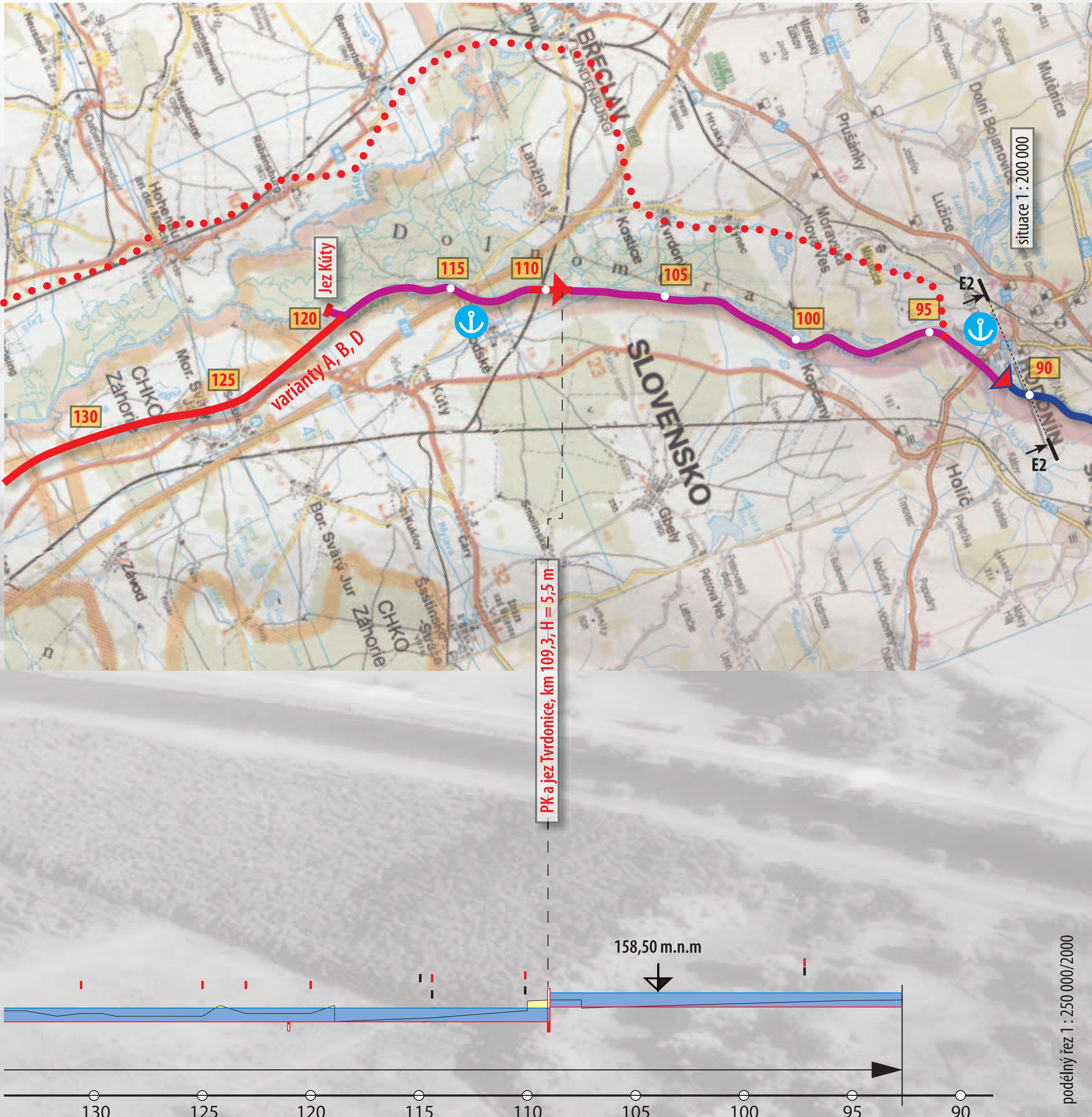
varianty C, B
varianta C
varianty A, D
PK Lobau, km 188,5, H = 1,8 m
PM Morava, km 156,19 - 156,99, D = 800 m
151,20 +3,4 -1,8 m.n.m
153,00 m.n.m
120,00 m.n.m
ETAPA 1: 92,99 - 190,49
km
190 185 180 175 170 165 160 155 150 145 140 135



Legenda | Legend

situace | map

říční úseky (existující jezové zdrže)	river sections (existing pools)
říční úseky (navrhované zdrže)	river sections (proposed pools)
průplavní úseky	canal sections
variantní úseky	variants
plavební komora	lock
plavební komora u existujícího jezu v trase	lock at the existing dam
existující jez (mimo trasu)	existing dam (out of route)
přístav	river port

podélný profil | longitudinal section

terén	terrain
návrhové dno	proposed bottom
návrhová hladina	proposed water-level
existující most	existing bridge
navrhovaný most	proposed bridge
podjezd (průplavní most)	underpass (canal bridge)
plavební komora	lock

Trasa a podélný profil 3. etapy vodního koridoru D-O-L po Hodonín.

The route and longitudinal section of the D-O-E water corridor up to Bohumín in its third stage.

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Řeka Morava je pod ústím Dyje občas využívána nákladními plavidly správců toku. Na vzdálenost 6 km od jejího ústí do Dunaje je dokonce oficiálně považována za využívanou vodní cestu. Snímek charakterizuje úsek řeky v říčním kilometru 3, kdy by z ní odbočovala varianta D, a byl pořízen za nízkého průtoku.

The River Morava below the mouth of the Dyje is sometimes navigated by the river administration cargo vessels. The stretch of 6 kms down to the junction with the Danube is considered an officially operated waterway. The picture, taken at low discharge, illustrates the river section at the third river kilometre, where the variant D would branch off.

Variant	Length (kms)	Elevation of water level at branch-off	Surpassed fall (ms)	Number of locks	Characterization of the route, notes
A	82,3	134,25	28,95	5	The route branches off the Danube at Devín; it can lead through the territory of SR and CR. From the flood control point of view, it is conditionally suitable; the waterpower utilization of the Morava is possible, although not documented.
B	98,8	151,20	12,00	3	The route branches off the Danube at Vienna (Lobau); it leads through the Austrian territory first, then crosses the Morava with an aqueduct and heads on through the SR and CR territories. In terms of flood control and waterpower utilization of the Morava it is lowly suitable.
C	101,3	151,20	12,00	3	The route branches off the Danube at Vienna (Lobau) and leads through the Austrian territory to enter straight into the CR territory at Břeclav, where it cross the Dyje in one level. It offers neither flood control, nor the function of the Morava waterpower utilization.
D	82,3	134,25	28,95	5	The route branches off the Danube at Devín. It could lead through the SR and CR territories (with an exception of the short border stretch of the river at Devín). It offers thorough flood control and utilization of the Morava River water energy, as was documented in detail.

The chart criteria do not allow an outright choice. The routes A and D are shorter, as well as less investment-intensive and technically demanding due to the favourable terrain of Záhorie area. The terrain of the Marchfeld in Austria is also mostly suitable for routing of the variant B and C The variant B is – to some extent – disadvantaged by the expensive aqueduct. The right-bank variant C features one bigger problem that of the section Angern–Dürnkrut, where a longer stretch of a railway double-track would have to be moved in order to avoid the Morava River at Dürnkrut. The section Břeclav–Hodonín would be relatively demanding as well. The main advantage of the B and C variants has to be seen in the smaller altitude difference which they have to surpass, as the water surface of the Danube at Vienna marks about 17 ms higher ASL than at the mouth of the Morava at Devín. It implies a smaller number of locks. The following pages should fully focus on a more detailed description of the "compromise" variant B, which by no means should indicate the final decision to be made.

The route should branch off the Danube in the eastern suburbs of Vienna, in the Lobau district. More precisely, it branches off already, since the first part was built at the end of 1930s and currently the 1-km stretch is used as a canal connection to the port of Lobau. The port specializes in transhipping of liquid substrates and is connected to the refinery of mineral oils in Schwechat through a product-pipe. This fragment of the D-O-E water corridor has been used for water transport for over half of a century. Unfortunately, the same is not true of the next, 6-km stretch, which building started at the same time but never finished. It serves as a sought-after recreation spot offering swimming and water sport activities, as well as continuous development of weekend housing facilities on the water. It is a foolproof evidence of the recreational role of a waterway. Unfortunately, that is only a meek satisfaction in the light of all the historical slips caused by political changes. Decline of interest in further development of the canal after WWII, allowed the unrestrained recreational activities, which have occupied both banks of the unfinished canal to such extent that they now prevent completion of the bank revetments and enlarging of the cross-section according to the contemporary parameters.

In the area, there is a lock of Lobau planned, not to overcome any fall but rather to separate the relatively stable water level of the canal from the fluctuating waters of the Danube. From the lock a new canal bed has to be built, circling around the completed sections and heading northeast across the plains of the Marchfeld to the village of Angern on the Morava River. The proposed route avoids the isolated small-sized protected areas and the body of the safari park at Gänserndorf, to cut exclusively through farmed areas or possible locally common gravel sand deposits; the quarrying could thus conveniently concentrate to the route of the D-O-E water corridor. The designed water level runs mostly slightly below the terrain level or above it, so that the excavation works should be in most cases limited to "cross transfer" of the material. Whatever is excavated in the axis of the cross-section will be used for the parallel dams and any further linear transfers will not be needed. The same is true of the connecting section on the Slovakian territory.

On the way down to Angern the route could feature two ports: at Grossenzersdorf on the outskirts of Vienna and at Gänserndorf, which is an economic centre of Marchfeld. The complete Austrian section of the D-O-E water corridor would also become a valuable recreation refuge of the city of Vienna, offering an axis for housing development "on the water". The water corridor would also provide water for the area as well as beyond the border, where so far the ecological Marchfeldkanal has been in operation, and thus allow progressive agricultural irrigation from the Danube water.

At Angern, the water corridor route proceeds to the Slovak territory, therefore it has to cross the Morava and its inundation area with a canal bridge not to interfere with the water level regime of this river. Although a canal bridge of such length and parameters is not that common in Europe, it is neither an exception. The aqueduct brings a significant simplification of the longitudinal section; incidentally, the elevation of the water level on the bridge is in full conformity with many other level relations and thus allows an approximately 80-km stretch of continuous canal section spanning from the Danube almost to Hodonín, or rather to the village of Tvrdonice below Hodonín. Such altitude conditions are extremely rare in Europe, including the "flat" Netherlands or the north of Germany. Apart from the canal bridge, problems may be involved even in construction of the follow-up 10-km stretch to the Slovak village of Jakubov, where the water level would have to reach 8 ms above the terrain in some places. Even though even such solutions are not unusual, as has been proved on the recently built Elbe Lateral Canal in Germany, in this case it concerns the PLA Záhorie, although not its most exposed part. The vegetation suite will have to be chosen very carefully, the bank dams will need a certain tree garnish, which Jakub Krčín used to master and which is not unknown to the contemporary engineers either.

From Jakubov, the water level clings back to the terrain. In its further course, past the villages of Gajary, Veľké Leváre and Moravský Svätý Ján, the route B is similar to the variants A and D; from the village of Kúty the variants do not differ either in their respective altitudes. The canal section finishes here and the route enters the regulated Morava River, or rather a pool, which the dam in Kúty should create. The right bank of the Morava from

Charakter krajiny u obce Moravský Svätý Ján. Pohled podél trasy (var. A, B a D) k severu dokumentuje, že koridor by protínal hlavně zemědělské plochy, tedy nikoliv ekologicky ceněnou krajinu.

Countryside around the village of Moravský Svätý Ján. The view northward along the route (variants A, B, D) proves that the corridor would cross mainly farmland, not an ecologically valued landscape.

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Pohled na místo odbočení vodního koridoru D-O-L v Lobau (var. B a C). V popředí hlavní koryto Dunaje, za ním nedávno zřízený odlehčovací kanál a dále v pozadí cca 1 km dlouhý funkční úsek průplavu D-O-L (vpravo), vyústěný do přístavu v Lobau (vlevo). Další pokračování průplavu (zcela v pozadí) bylo odděleno povodňovou hrází.

A view of the branching-off place of the water corridor D-O-E at Lobau (var. B and C). At the front, the main bed of the Danube; behind, a recently established floodway; at the back, a cca 1 km long working section of the D-O-E canal (right) flowing into the port of Lobau (left). The other part of the canal (at the very back) was completely separated with a dyke.

Ústí řeky Moravy do Dunaje pod zříceninou devínského hradu. Zde by vodní koridor D-O-L odbočoval v případě, že bude zvolena varianta A nebo D.

The site of the Morava influx into the Danube under the ruins of Devín. The water corridor D-O-E would branch-off here in case of the variant A or D.

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Kúty is already on the territory of the South Moravian Region of the Czech Republic. The river was regulated in 1960s within the general adjustments to the water management situation in the region.

The regulations paid too much attention to reduction of the periodical inundation of the riparian woodland of the right bank in the unique forested area between the Morava and the Dyje. Today, it is obvious that certain steps back will have to be taken towards its original condition to achieve an optimal water regime in the area, possibly even providing for regular inundation of the woodland. However, the designers of the regulated section should be praised for choice of its radii, which allow navigation of the entire river stretch from Kúty to Hodonín. Unfortunately, the originally planned movable weirs at Kúty and Tvrdonice, which would provide the necessary navigation depths as well, were not realized. Instead, only "budget-wiser" provisional rubble-stone fixed dams or unreliable tube rubber ones were built.

What changes await this river stretch if its navigability is completed? First of all the provisional dams will be replaced with the originally proposed movable ones in order to guarantee the needed navigation depths. The movable weirs will not obstruct flood flow, therefore at extreme discharges the discharge capacity of the bed will increase. It will be further supported by deepening in some sectional areas. The riverbank landscaping should grow more natural, including the side lagoons, thus creating favourable conditions for development of the riverside vegetation. The elevated water levels above the Kúty and Tvrdonice dams will provide for systems of controlled inundation of the right-bank riparian woodland as well as the agricultural irrigation. Both dams allow construction of small hydropower stations with a reverse machinery unit for water repumping at the Tvrdonice one.

In total the relation between the above-stated adjustments and the valued complex of riparian woodland at the confluence of the Morava and Dyje, could be evaluated as either neutral or rather positive, when considering the threat of dehydration of the area and drop of the groundwater horizon. It is again necessary to point out the reflection of the problem in the chapter "The D-O-E water corridor and global warming" and consider to which extent are relevant the often-pronounced fears for the fate of the South Moravian riparian woodland after the corridor has been completed.

The waterway will then call for a number of bridges to cross with the other traffic routes. In the river section below Hodonín only a few bridge constructions will have to be elevated, while the most crucial bridge of motorway D 2 between Lanžhot and Kúty has already been designed to comply with the D-O-E water corridor needs. Regarding ports and berths, they could be established either on the Austrian side as mentioned before, or in Slovakia (probably close to Malacky).

A larger port should be built on the Czech territory; its capacity should meet standards of the stage one terminal port of. It should be connected to the industrial zone in Hodonín, which offers a convenient relation to the superior transport network (the second rail transit corridor, speedway R 55), which would make it a trimodal public logistic centre. It would serve as a port even for the adjacent Slovak area of Holíč and Senica.

The above-mentioned feasibility study investigated also a possibility to set the terminal port of the first stage in the Břeclav area, with the junction of two rail corridors, highway D 2 and speedway R 55. **The easier accessibility of Brno would also speak for the Břeclav alternative – it would practically become a port of the Brno agglomeration.** However, the solution would imply construction of a longer navigation branch line for Břeclav in all variants except C.

Upstream from the port of Hodonín, there is the Hodonín dam with elevation fully complimentary to the proposed longitudinal cross-section of the waterway. After the Hodonín lock is built, the waterway will enter the Hodonín pool. The existing small hydropower station at the Hodonín dam ought to be reconstructed in order to gain higher capacity with the opportunity of water re-pumping.

Construction of the canal directly or indirectly endangers a number of both large and small-sized protected areas of considerable ecological significance... Especially severe interference will be imposed on the "supra-regional biocentre Confluence", which features a number of highly valued wildwood formations of hardwood tree species. Generally speaking, it represents one of the most valued and best preserved alluvial and riparian woodland regions.

The Proposed Waterway Danube – Oder – Elbe from the view of nature and environment conservation. Veronica Brno, 2002

Our language is wise:
it principally distinguishes
between "I am sure"
and "I have made sure".

Karel Čapek

Upravená řeka Morava mezi Hodonínem a Lanžhotem vedená podél komplexu lužních lesů představuje téměř hotovou trasu vodního koridoru D-O-L (v případě variant A, B nebo D). Provizorní pevné a vakové jezy budou nahrazeny pohyblivými jezy, aniž by byl podstatně změněn dosavadní hladinový systém. Směrové poměry (poloměry oblouků) plně vyhovují plavbě.

The regulated Morava between Hodonín and Lanžhot, running along a complex of riverine forest, represents a practically ready-made stretch of the water corridor D-O-E (in case of the variants A, B or D). Temporary fixed and tube rubber dams will be substituted with movable weirs with no significant change of the current water level system. The radii of bends are fully suitable for navigation.

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Řeka Morava u Lanžhotu. V popředí nový most dálnice D 2, který plně odpovídá požadavkům plavby. Vlevo nahoře provizorní kamenný jez, jehož funkci nahradí pohyblivý jez u Kút při stejné výšce vzdutí.

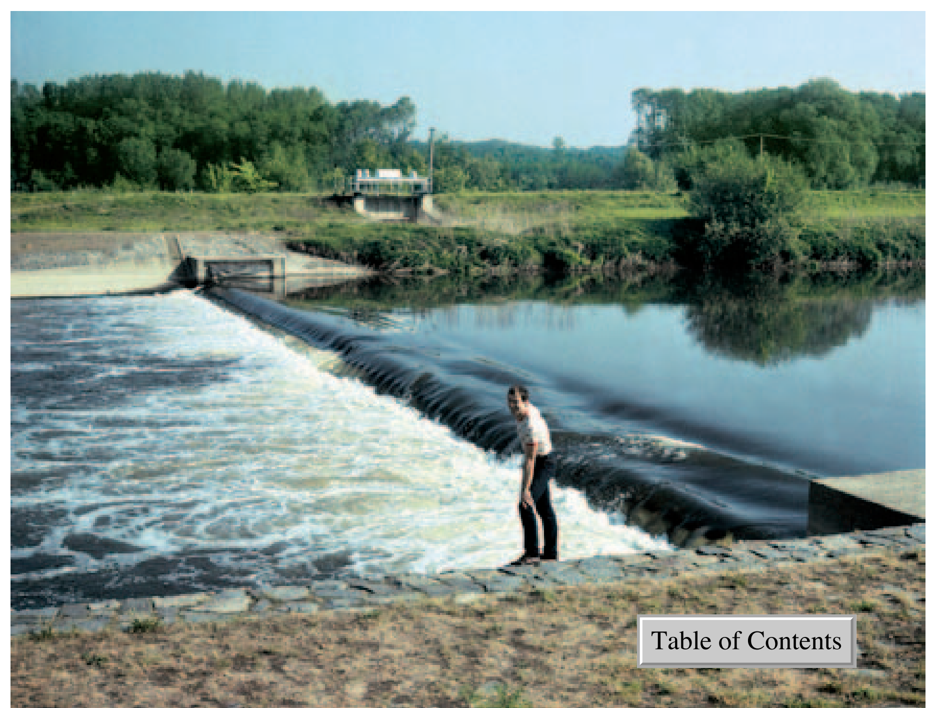
The Morava River at Lanžhot. At the front, a new bridge of the motorway D 2, fully conformed to the navigation standards. At the top left a provisory dam of the rockfill type to be substituted with a movable weir of the identical water level elevation at Kúty.

Provizorní jez z lomového kamene u Lanžhotu nevyniká účelností (komplikuje odtok velkých vod) ani krásou.

A provisory dam (rockfill type) at Lanžhot can boast neither of efficiency (it complicates flood flows), nor of beauty.

Provizorní vakový jez na řece Moravě pod Hodonínem.

A provisory tube rubber dam on the Morava below Hodonín.



Detailní snímek provizorního vakového jezu na řece Moravě svědčí o nespolehlivosti tohoto typu jezu v daných podmínkách. V jejím důsledku nelze zaručit ani optimální výšku hladiny podzemní vody v lužních lesích podél řeky.

A detail of the provisory tube rubber dam on the Morava proves unreliability of this type under given conditions. As a result the optimum groundwater level in the riverine forest is not guaranteed.

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South Moravian Region

As it stretches to 7,062 kms², inhabited by the population of 1.138 million people, it is (apart from the capital city of Prague) the second most populated region of the country after the Moravian Silesian Region. The Morava counts for the most important river of the region. The first stage of the D-O-E water corridor should end here, the second one begin.

The regional capital Brno *with its 373,000 inhabitants is the second largest in the Czech Republic. It spreads around the confluence of the Svitava and the Svratka rivers in the heart of the fertile South Moravia. Although the city is not located right on the D-O-E water corridor, its route approaches it as close as to 50 kms in the Hodonín area.*

Brno – vila Tugendhat.

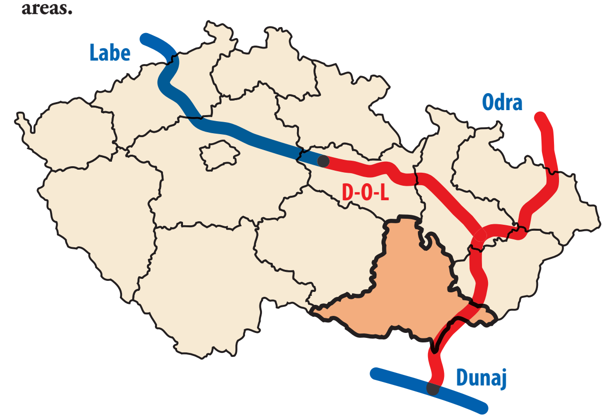
Brno – the Villa Tugendhat.

Some contemporary bests, which portrait the region:

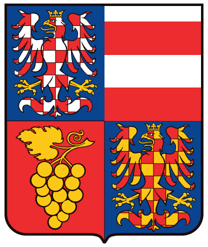
- The city of Brno is the second most important transport junction of the Czech Republic (motorways D 1 and D 2, railway transport, air transport).
- The Brno Exhibition Grounds opened in 1928; its layout and design rank it among the most beautiful facilities in Europe; its impact on the economy and trade development of the country is unambiguously the most significant in CR.
- The Lednice-Valtice Cultural Landscape, also called "The Garden of Europe", belongs among the most exquisite in Central Europe. Stretching between the neo-gothic castle of Lednice on one side and the baroque castle in Valtice with the world-renowned winemaker school, the complex is listed in the UNESCO World Heritage List.
- The most prominent winemaking regions of South Moravia include Znojmo, Strážnice in the Hodonín region and Mikulov in the Břeclav area.
- The battlefield of Slavkov (Austerlitz), where the Battle of Three Emperors took place in 1805, belongs to one of the most tourist-visited places of South Moravia.
- The PLA Pálava is one of the most attractive places of the region.
- The National Park Podyjí is located in the southeast part of the region between Vranov and Znojmo in the Dyje River valley on the border with Austria.
- The confluence of the Morava and Dyje rivers represents the southest, warmest and lowest spot of the Czech Republic where borders of three neighbouring countries touch: Czech and Slovak Republics and Austria.
- The confluence of the Morava and Dyje rivers represents the southest, warmest and lowest spot of the Czech Republic where borders of three neighbouring countries touch: Czech and Slovak Republics and Austria.
- The stalactite caverns of Moravský Kras rank among the most visited caves of the country. The complex includes the lost river Punkva and Macocha 138.7 ms deep.
- The village of Dolní Věstonice is one of the most archeologically significant locations of the country; its exposition tells the story of prehistoric mammoth hunters, who are considered creators of the Venus of Dolní Věstonice.
- The holy shrine in Křtiny counts among the most beautiful ecclesiastical buildings of CR.
- **The Jevišovice dam, built in 1884–1886 on the river Jevišovka, is the oldest Moravian dam and one of the oldest in Central Europe.**
- Upon its completion in 1934, the Vranov dam used to hold the largest content of water in the former Czechoslovakia.
- One of the most significant water reservoirs of the Morava river basin – the dam Brno-Kníničky – was built on the Svratka in 1936–1940.
- **The reservoir Nové Mlýny (1974 – 1988) features the largest water surface of the Morava river basin; at the same time, its construction evoked the sharpest arguments between water managers and conservationists.**
- The other important dams of South Moravia include Znojmo (1962–1965), Letovice (1972–1976), Boskovice (1985–1990).

The list may significantly increase in future:

- **In the area of Břeclav and Hodonín an important transport junction is coming to life, marking a contact point of three countries – the Czech and Slovak Republics and Austria. After the first stage of the Danube–Oder–Elbe water corridor is completed, the place will become a unique terminal of road, railway and water transport.**
- **The same area represents a significant water management centre, which will fully develop other functions of the water corridor in terms of water balance and flood control.**
- **The first stage of the D-O-E water corridor should guarantee a reliable link of CR to the network of modern European waterways, which need is ever more pressing. The South Moravian Region can be rightfully called a base of the Czech water transport development.**
- **Tourist boats vessels and river cruisers will considerably contribute to attendance rate of the major regional sights, especially the Lednice-Valtice Cultural Landscape and the winemaking areas.**



The South Moravian Region – base of the Czech water transport development



Realization of the first stage between the Danube and the stage terminal port in the South Moravian Region is of cardinal importance for the Czech Republic, even though the actual route only touches the territory. It runs either through the neighbouring countries or in the frontier riverbed of the Morava from Kúty to Hodonín. Via the Danube artery, it will link the Czech Republic to the network of reliable European waterways. It should guarantee the future development of Czech water transport, if not its bare existence in future at all. The connection will allow export and import of goods within the southeast corridor along the Danube all the way to the Black Sea, as well as within the west one, along the Upper Danube, the Main – Danube waterway, and along the Rhine to the largest European seaports, including Rotterdam. Although there is an existing access to the Rhine area, it is only through the Elbe, which unreliability hardly meets the modern water transport standards. It is even safe to say, that the traditional Elbe connection to Hamburg could be in emergency economically substituted with the detour via the Danube, Rhine and the German canals. The freight cost analyses are surprisingly showing that even doubling of the route length would not exceed the Elbe tariffs, as the more economical exploitation of the Danube admissible drafts brings along much higher efficiency of the transport. By all means, the tariff rates appear far more convenient than those of the railway transport.

It holds true then that the Danube can substitute the function of the Elbe in a critical situation. Moreover, the stage terminal in South Moravia can serve as a terminal for river-sea vessels as well and make direct transport to ports in the Black Sea and the Mediterranean Sea (or even further east).

The first stage will truly begin a new chapter of the water transport development in the Czech Republic.

However, that does not support the opinion, which does not deny the crucial role of the first stage while demanding the waterway realization to be limited only to its first stage.

Why is one stage of the D-O-E water corridor not enough for the Czech Republic? The question could be answered rather unambiguously:

- It is unreal to assume to expect the neighbouring countries of Austria or Slovakia to offer their territory or financial contribution to realization of a waterway, which is a mere dead-end branch for South Moravia and not a complete transit connection.
- The limited project of the first stage only would hardly acquire a large international interest and the related financial contribution.

Přístav osobní lodní dopravy na řece Moravě nad jezem v Hodoníně. Zdrž hodonínského jezu bychom mohli, použijeme-li velmi skromná měřítka, pokládat již dnes za využívanou vodní cestu, postrádající ovšem napojení na souvislou síť.

Landing stage for passenger boats on the Morava above a dam in Hodonín. The pool of the dam could be considered a working waterway of a very modest size, however, with no connection to a continuous system.

- The limit of one terminal port only means to degrade the majority of transport relations to fractional transport, which is less economical. The waterway must be connected to the main resources and destinations of the Czech territory.
- If the realization is limited only to the first stage, the project will have to resign on most its extra-transport benefits in the fields of water management, flood control, conservation etc. The most prominent water management advantages do not concentrate along the state border but rather to the route of the following stages.

Let us set off along the route of the following stage two then. It runs mostly through the territory of the Zlín Region, with a short section still in South Moravia and the north part reaching to the region of Olomouc.

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Zlín Region

...is located in the eastern part of central Moravia. Its area (3,964 km^2) and population (0.590 mill.) both mark it as a smaller region. The Morava is the most important river of the area. The region will host most of the second stage of the D-O-E waterway.

The regional capital – Zlín – *has a population of 81,000, separated from the neighbouring Otrokovice only administratively. If considering both municipalities as a unit, we can speak of a more than hundred thousand agglomeration right on the D-O-E water corridor route. Zlín mostly famous as a city of shoes. At the end of 19th century, Tomáš Baťa established a shoe-making company here, which shortly became a world shoewear empire*

Zlín – centrum.

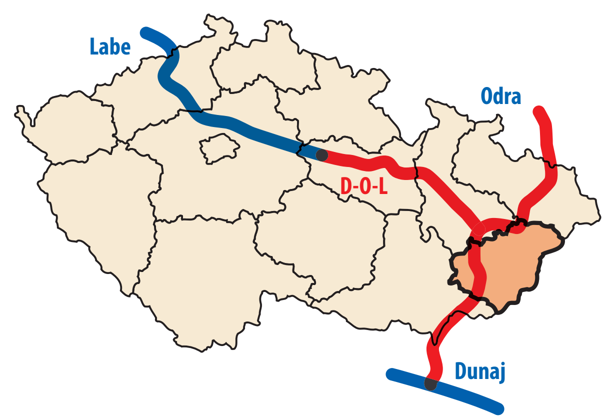
Zlín – the town centre.

Some contemporary bests, which portrait the region:

- Thank to the earlier significant shoemaking industry, Zlín boasts in the larges shoemaking museum of the world. Unfortunately, the fame of that industry has faded both in Zlín and in Otrokovice, therefore new economic projects are ever more topical.
- The town of Kroměříž, also located on the route of the D-O-E water corridor, is packed with historical sights and traditions of culture, music and schooling. Quite righteously, it is called the Athens of Haná. The archbishop castle with historical gardens, listed as a UNESCO World Heritage site, belongs among the real jewels.
- Velehrad, the monastery with the basilica and the stone collection belongs to the noblest ecclesiastical buildings in Moravia. This pilgrimage site is closely connected with the tradition of St. Cyrillus and Methodius.
- The town of Luhačovice, one of the most renowned spa towns in the country, with the tradition dating back to 17th century.
- The White Carpathians PLA, the best-known reserve or the region, has been included in the UNESCO list of biosphere reserves.
- The Wallachian natural museum in Rožnov pod Radhoštěm is the most famous open-air museum of the Wallachian architecture.
- The most tourist attractive places of the Zlín Region include: the Beskydy PLA, namely Mount Radhošť, the alleged site of the god Radegast, with a complex of bordered architecture designed by Dušan Jurkovič – so called Pustevny; the chateau in Lešná, built in 19th century, which architecture combines the half-timbered construction with romantic style elements; the ruins of Brumov from 13th century on a rocky bill of the White Carpathian valley, which used to serve as important land fortification guarding the trade path through the Vlára pass; the castle Nový Světlov, originally gothic, which renaissance reconstruction turned into a fairy tale place surrounded with an English park.
- **Baťa Canal is the most popular waterway of the region, used for both sport and pleasure boating activities. Tomáš Baťa built this multipurpose water project between the towns of Rohatec and Otrokovice in 1930s. The waterway transported lignite for the heating plant in Otrokovice and helped to irrigate the surrounding area.**
- **Bystřička is the oldest dam of the Morava river basin above its confluence with the Dyje, built in 1908–1912. The water project was supposed to retain flood discharges of the Bystřička River; in 1901, according to the proposal of the Austrian Waterways Act, the dam was accounted for as a water source for the summit route of the future Danube–Oder Canal.** However, it is only a smaller, currently not so significant water reservoir. The other reservoirs of the region are of similar size: Karolinka (1977–1985), Horní Bečva (1933–1949), Slušovice (1972–1976), Fryšták (1935–1938), Bojkovice (1963–1966), Luhačovice (1913–1914, 1922–1930), and Koryčany (1953–1958).

The list may significantly increase in future:

- **Due to Baťa Canal as well as other water management facilities in the area, the region features almost ready-made sections of the D-O-E water corridor. It is only necessary to link them, so that they can be fully employed in all their functions, like effective flood control (especially endangered areas include Kroměříž, Otrokovice, Uherské Hradiště, Staré Město and Uherský Ostroh), considerable increase of attractiveness of industrial locations and search for new economic projects. In this respect, the D-O-E water corridor could become a spine of the whole region.**
- **Also further development of tourism, and pleasure boating especially, should account for another indispensable benefit of the D-O-E waterway, as it is to connect the currently isolated Baťa Canal with the continuous European network of waterways, thus including the area to all-European pleasure boat cruising tours.**



Zlín Region offers virtually ready stretches of the waterway

The title of the chapter does not exaggerate. Between the wars, the Morava River was subjected to a number of alternations, although they were not supposed to become a part of the D-O-E waterway, as they were motivated otherwise: flood control, irrigation, “small” navigation within Baťa Canal, waterpower utilization. Nevertheless, it appears that the contemporary concept can use entire stretches and a large number of their facilities.

The pool of the Hodonín dam represents the first ready-made section, which can be included in the waterway practically without further adjustments. However, the water level heave of the Hodonín dam ends at Rohatec. The D-O-E water corridor will have to leave the river there and transfer to a right-bank lateral canal. Such routing has even other reasons: firstly, the Morava upstream from Rohatec has kept its natural character so far, practically untouched by human hand, with wonderful meanders and on-going dynamic riverbank processes. **So-called collapsing banks are a spine of the PLA Strážnické Pomoraví. Any interference with the current character of the landscape – extremely rare in the country – would be an inexcusable mistake, which even an inexperienced and insensitive water corridor designer would hardly choose to commit.**

Secondly, the favourable morphology of the right bank terrain will allow construction of a higher lock at Rohatec, which 18-km pool will be suitable for navigation.

The right-bank D-O-E water corridor first follows the railway quite closely and cuts through large sand quarries, and later enters the existing flood diversion canal of the Morava between Uherský Ostroh and Strážnice. It was built between the wars to protect the townships of Uherský Ostroh and Veselí nad Moravou, had nothing in common with the D-O-E waterway, although it now represents another of its almost ready stretches. Its turn into a waterway will require some changes, though: it will be partially widened and constantly filled with water – not only in flood periods. Its banks should be more naturally landscaped, with shallow lagoons on their sides. Namely, the unsatisfactory tree dressing of the banks in mostly neglected fruit tree alleys should be substituted with trees natural for riverbanks. The discharge capacity of the canal will increase considerably, which should further intensify the flood control of the above-mentioned cities. The canal route will turn back into a river one entering the pool of the existing dam in Nedakonice.

Zdrž hodonínského jezu na řece Moravě vytváří prakticky hotový úsek vodního koridoru D-O-L od Hodonína po Rohatec.

Hodonín pool on the Morava represents a practically ready-made section of the D-O-E water corridor from Hodonín to Rohatec.

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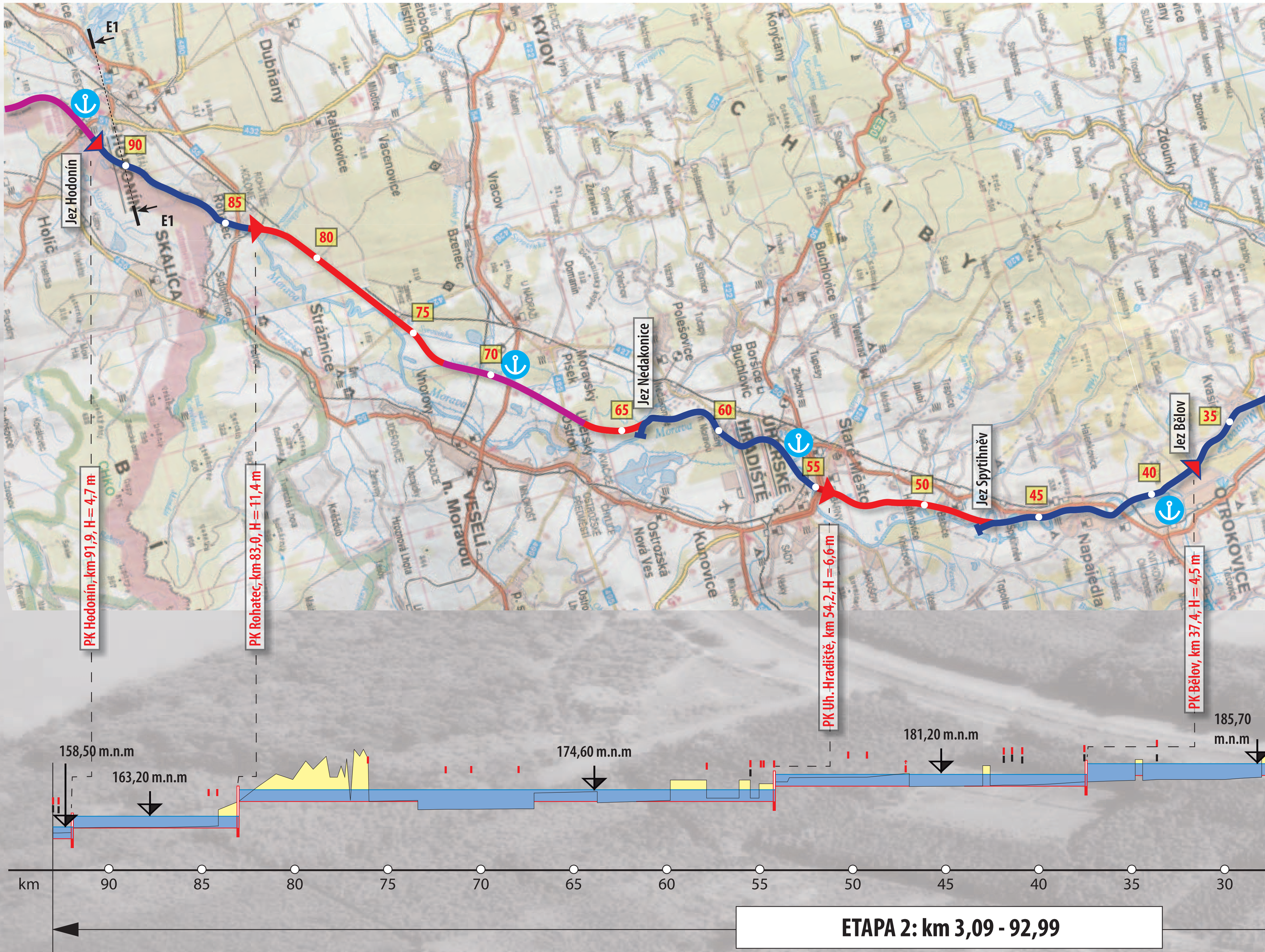
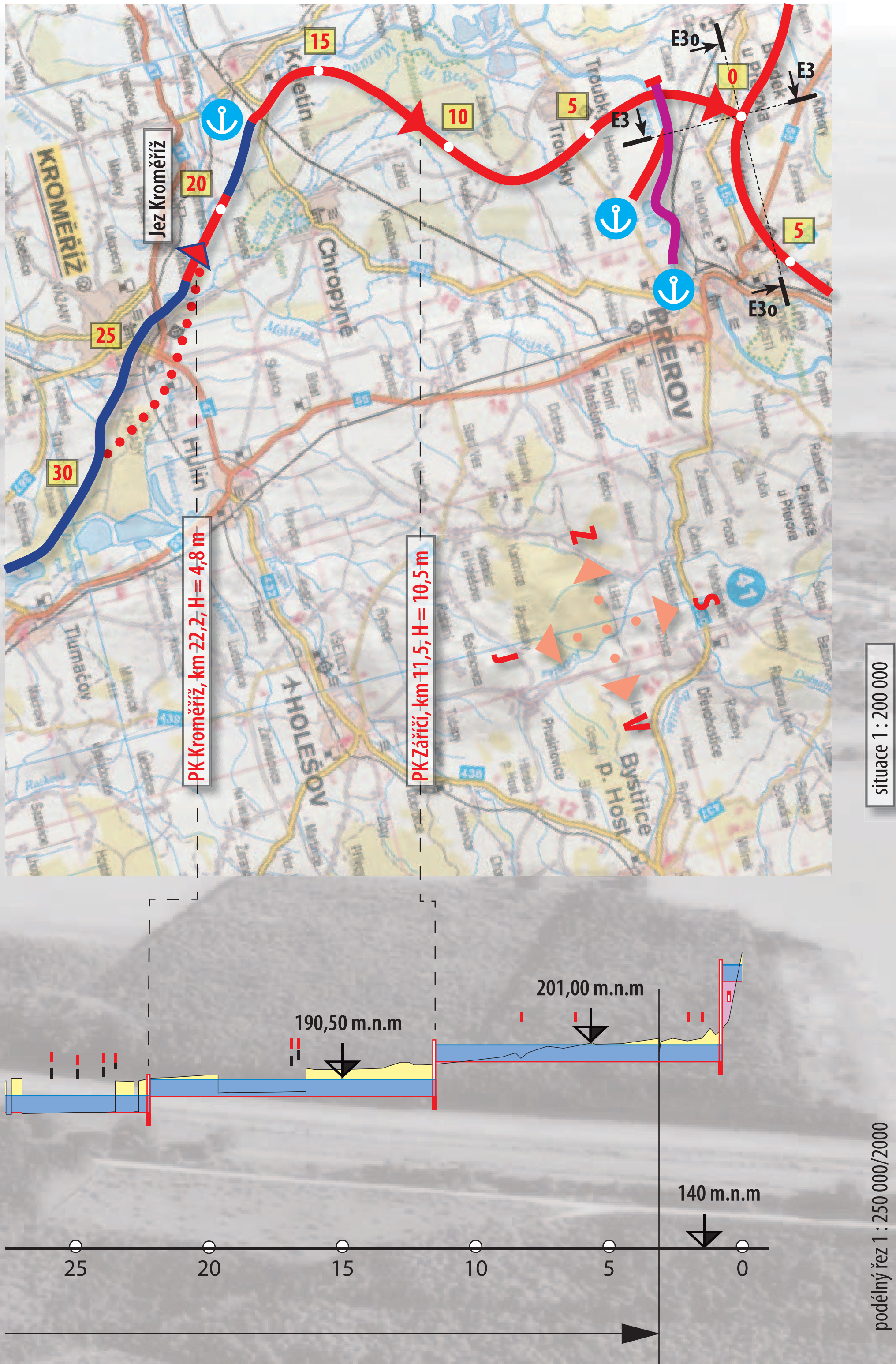


Jez Hodonín
PK Hodonín, km 91,9, H = 4,7 m
PK Rohatec, km 83,0, H = 11,4 m
Jez Nedakonice
PK Uh.-Hradiště, km 54,2, H = 6,6 m
Jez Spytihněv
Jez Bělov
PK Bělov, km 37,4, H = 4,5 m
E1
90
85
80
75
70
65
60
55
50
45
40
35
158,50 m.n.m
163,20 m.n.m
174,60 m.n.m
181,20 m.n.m
185,70 m.n.m
km
90 85 80 75 70 65 60 55 50 45 40 35 30
ETAPA 2: km 3,09 - 92,99



Legenda | Legend

situace | map

	říční úseky (existující jezové zdrže)	river sections (existing pools)
	říční úseky (navrhované zdrže)	river sections (proposed pools)
	průplavní úseky	canal sections
	variantní úseky	variants
	plavební komora	lock
	plavební komora u existujícího jezu v trase	lock at the existing dam
	existující jez (mimo trasu)	existing dam (out of route)
	přístav	river port

podélný profil | longitudinal section

	terén	terrain
	návrhové dno	proposed bottom
	návrhová hladina	proposed water-level
	existující most	existing bridge
	navrhovaný most	proposed bridge
	podjezd (průplavní most)	underpass (canal bridge)
	plavební komora	lock

Trasa a podélný profil 2. etapy vodního koridoru D-O-L po Přerov.

The route and longitudinal section of the D-O-E water corridor up to Přerov in its second stage.

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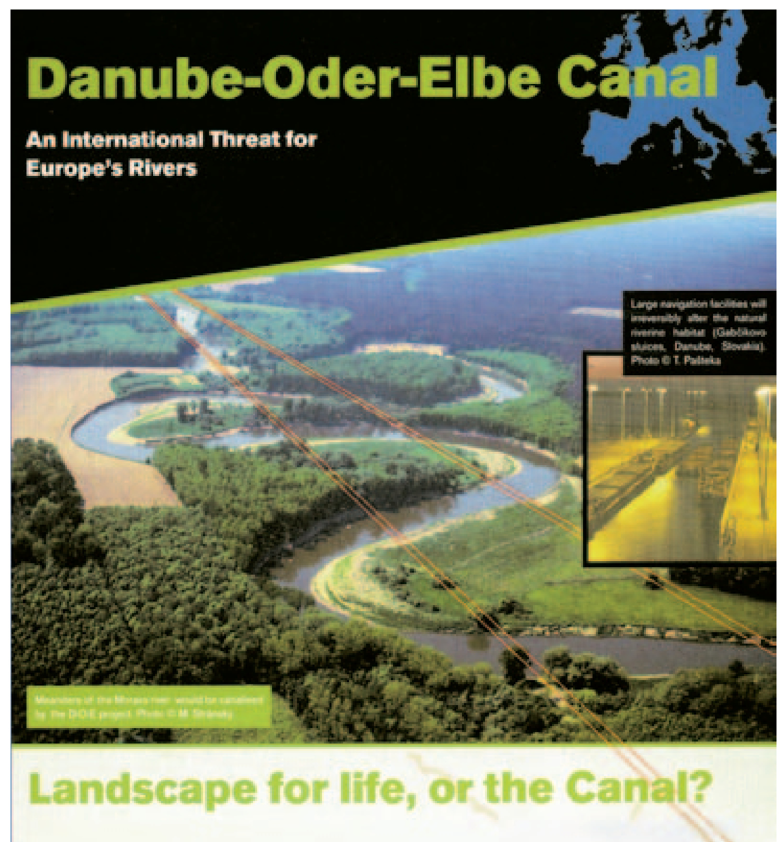
Meandry řeky Moravy ve Strážnickém Pomoraví jsou vzácným fenoménem a vodní koridor D-O-L je samozřejmě důsledně obchází. Jeho trasa, zakreslená (červeně) do fotografie, protne území využívané pískovny mezi řekou a železniční tratí.

The meandering Morava in Strážnické Pomoraví is a unique phenomenon, and the D-O-E water corridor circles carefully around it. Its route – red in the photo – cuts the area of a sand pit between the river and a railway track.

Se skutečným vedením vodní cesty – bohužel – ostře kontrastuje zvláštní představa některých ochranářských iniciativ, znázorněná na titulní straně prospektu, rozšiřovaného (patrně nemalým nákladem) po celé Evropě. Za povšimnutí stojí na obrázku naznačená trasa protínající celé meandry. S takovým nesmyslným vedením se samozřejmě nikdy nepočítalo a rozumný projektant by na něj nemohl ani pomyslet. Jedná se o naivitu vydavatelů prospektu, nebo o jejich zlomyslnost? Překlad anglického textu na titulu je uveden jako citát na protější straně.

Unfortunately the actual route of the waterway collides sharply with the ideas of some conservation initiatives as shown on the title page of a leaflet distributed around Europe (unlikely so at low expenses). It is to be noted that the route in the picture crosses over the whole meanders. Such an absurd solution has never been an option and any reasonable designer would never even think of it. Does it prove the editor's naivity or rather mischief?



Odlehčovací rameno řeky Moravy (na snímku v popředí) obcházející města Uherský Ostroh (uprostřed snímku) a Veselí nad Moravou se pro vedení vodního koridoru D-O-L přímo nabízí. Technicky se změní jen málo. Bude jen mírně rozšířeno a opatřeno vhodnějším vegetačním doprovodem. Bude však trvale naplněno vodou podstatně vyšší kvality, než je ta, která dnes stagnuje na jeho dně. Osa vodního koridoru D-O-L je naznačena červeně.

The Morava floodway (at the front of the photo), circling around the town of Uherský Ostroh (in the middle) and Veselí nad Moravou, is ideal for the D-O-E water corridor route. Technically speaking it will change very little. It will be slightly broadened and dressed in more suitable vegetation. However, it will be permanently filled with water of much higher quality than what presently stands still at its bottom. The axis of the D-O-E water corridor is marked in red.

Danube–Oder–Elbe Canal. An International Threat for Europe's Rivers.

Large navigation facilities will irreversibly alter the natural riverine habitat (Gabčíkovo sluices, Danube, Slovakia).

Meander of the Morava River would be canalised by the D-O-E project. Landscape for life, or the Canal?

Daphne, WWF a BUND, Berlín 2002

The nature abhors dull scientists.

Campbells law

An error is the more dangerous, the more we do not realize it.

J. W. Goethe

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Kapacita řeky Moravy v Uherském Ostrohu je nedostatečná. Hladkému průtoku velkých vod vadí zejména pevný jez (uprostřed snímku). Plavební komorou vlevo od jezu, zřízenou v rámci Baťova průplavu, povede i nadále paralelní vodní cesta pro sportovní plavbu.

Capacity of the Morava in Uherský Ostroh is far from sufficient. First of all a smooth pass of floods collides with a fixed dam (centre of the picture). The lock to the left from the dam, a part of Baťa Canal, will remain a parallel waterway for pleasure navigation.

Ve Veselí nad Moravou se řeka dělí do dvou relativně úzkých ramen, k nimž přibyl na sklonku třicátých let ještě Baťův průplav (v popředí). Průtočná kapacita nestačí ke zvládnutí povodní a v roce 1997 nezachránil město před rozsáhlými škodami ani vybudovaný odlehčovací kanál. Definitivně pomůže až zvýšení jeho kapacity v rámci výstavby vodního koridoru D-O-L. Baťův průplav bude v tomto úseku zachován jako atraktivní paralelní cesta pro sportovní plavbu.

In Veselí nad Moravou the river divides into two relatively narrow branches. In 1930s t the third water route was built – Baťa Canal (front). As their capacity is no match for a flood flow, in 1997 the town was not spared even with the help of a new flood diversion canal. Only its increased capacity through the construction of the D-O-E water corridor will bring a final solution. The section of Baťa Canal will be preserved as an attractive parallel route for pleasure navigation.

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Území mezi Veselím nad Moravou a Vnorovy, kde probíhají paralelně tři „vodní linie": řeka Morava (v popředí), Baťův průplav (uprostřed) a odlehčovací rameno Moravy (na snímku je ukryto za souvislou lesní plochou). Tímto ramenem bude probíhat i vodní koridor D-O-L, jehož trasa se však právě v těchto místech odkloní k západu a přimkne se u stanice Bzenec-přívoz k železniční trati. Je na snímku naznačena červeně.

The area between Veselí nad Moravou and Vnorovy, where three "water lines" run alongside: the Morava River (front), Baťa Canal (centre), and a Morava flood diversion canal (in the picture hidden behind the forest line). This branch will merge with the D-O-E water corridor, which around here turns westward and joins railway tracks at the station Bzenec-přívoz. In the photo, it is marked red.

Jez Nedakonice na řece Moravě vytváří dlouhou zdrž, která je vhodná pro plavbu až k Uherskému Hradišti. Vlevo od jezu je malá plavební komora, zřízená v rámci Baťova průplavu. Trasa vodního koridoru D-O-L odbočuje z jezové zdrže těsně podél pravého břehu a protíná pozemky obhospodařované převážně jako pole.

The dam Nedakonice on the Morava creates a long pool fit for navigation up to Uherské Hradiště. There is a small lock to the left of the dam, a part of Baťa Canal. The D-O-E water corridor branches off the dam pool tightly along the right bank and crosses an area used mostly for farming.

Jez Kunovský les na řece Moravě může být zrušen, neboť jeho funkci převezme jez v Nedakonicích. Svoji funkci ztratí i plavební komora, vybudovaná v rámci Baťova průplavu, ta však může být zachována jako technická památka a stát se např. ochranným přístavem pro malé sportovní lodi.

The dam Kunovský les on the Morava can be abolished as its function will pass on the dam in Nedakonice. Also a lock of Baťa Canal will lose its purpose, however it may be preserved as a technical monument and become a shelter of small pleasure boats.

Řeka Morava odděluje Uherské Hradiště (vpravo) od Starého Města (vlevo). Snímek zachycuje i Baťův průplav, odbočující z ohybu řeky uprostřed snímku, kterým bude po jeho podstatném rozšíření vedena i trasa vodního koridoru D-O-L.

The Morava River separates Uherské Hradiště (right) and Staré Město (left). Then the picture shows Baťa Canal as it diverts from the river bend in the centre of the photo. Its significantly widened route will become a part of the D-O-E water corridor.

Zdrž jezu Spytihněv je lemována odstavenými rameny a štěrkovnami. K tomu, aby se stala mezinárodní vodní cestou třídy Vb v rámci vodního koridoru D-O-L, chybí snad jen vytyčení plavební dráhy.

A pool of the dam Spytihněv is lined with dead-end branches and gravel pits. Add only buoys marking the channel and it will pass for an international waterway of Vb class on the D-O-E water corridor.

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Řeka Morava u Napajedel je stále ještě ve vzdutí jezu Spytihněv a poskytuje dostatečnou hloubku i šířku. Složitější problém představuje jen korekce oblouku vlevo a úprava silničního mostu (uprostřed). Snímek zachycuje i průmyslový komplex (chemické závody) na pravém břehu (v popředí).

Still heaved after the dam Spytihněv, the Morava at Napajedla offers a sufficient depth and width. Correction of the left bend and adjustments of the road bridge (centre) present a more challenging task. The photo shows a chemical plant on the right bank (front).

Segmentový jez v Bělově, navazující na konec zdrže Spytihněv, byl sice vybudován kvůli stabilizaci podzemních vod v době, kdy se o splavnění Moravy či o zásluhách Tomáše Bati téměř nesmělo hovořit. Přece však perfektně zapadá do podélného profilu splavnění. Při pravém břehu (na obrázku v popředí) je vhodné místo pro dostavbu plavební komory.

A dam with radial gates in Bělov, adjacent to the Spytihněv pool, was built to stabilize groundwater levels at the time when any talk of the Morava navigability, or Tomáš Baťa's credits was hushed. Still, it fits perfectly the longitudinal profile of navigability. A lock can be conveniently added to the right bank (front).

Splavná zdrž Spytihněvského jezu dosahuje až k ústí Dřevnice. Po proudu od čistírny odpadních vod v Otrokovicích nabízí přímý úsek řeky zřízení výkonného překladiště v blízkosti průmyslových závodů (pneumatikárna Barum-Continental, letecké závody s letištěm aj.).

The navibable pool of the Spytihněv dam reaches all the way to the mouth of the Dřevnice. Downstream from the sewage plant in Otrokovice a straight river stretch offers an opportunity to build a berth adjacent to the industrial zone (the tyre factory Barum-Continental, an aircraft plant with an airport etc.).

Architektonické ztvárnění pilířů bělovského jezu je velkými plochami upraveno tak, aby připomínalo režné cihlové zdivo, tj. „baťovskou" architekturu Zlína.

Large surface of the Bělov dam pillars, finished to resemble fair-face brickwork, evokes the architecture of Baťa's Zlín.

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Zdrž jezu Bělov mezi Otrokovicemi (nahoře) a Kvasicemi (dole). Zákruty řeky Moravy zapadají do rázu krajiny, současně však odpovídají požadavkům plavby v rámci vodního koridoru D-O-L.

The pool of Bělov dam between Otrokovice (above) and Kvasice (below). Turns of the Morava fit the countryside character as well as the navigation standards of the D-O-E water corridor.

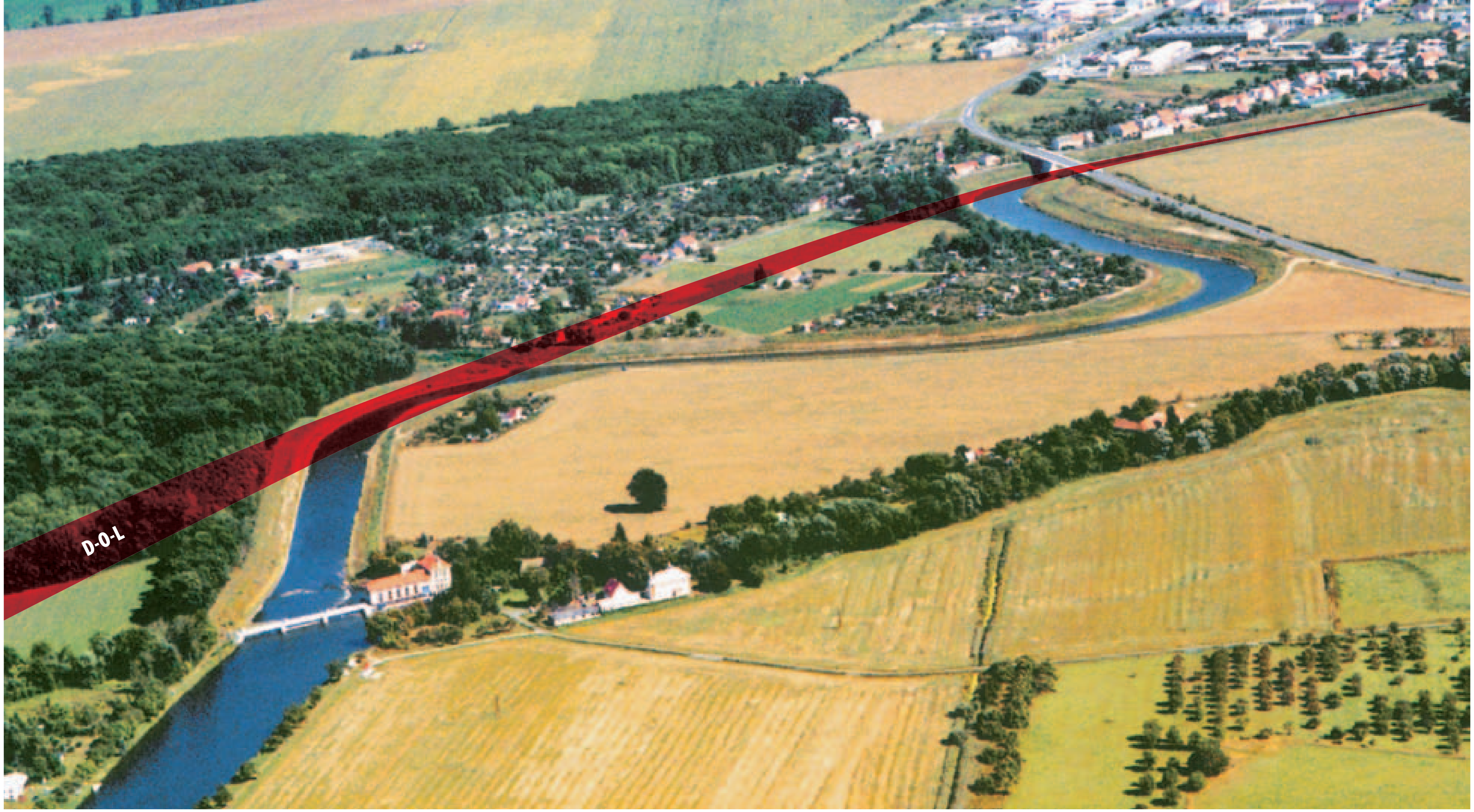
Zákrut řeky Moravy u Kvasic je už přece jen příliš ostrý a bude vyžadovat menší korekci. Jinak vodní koridor D-O-L je veden řekou Moravou.

A meander of the Morava at Kvasice is after all too sharp and will need a slight correction. Otherwise the D-O-E water corridor runs through the Morava River.

The Nedakonice dam pool represents another ready-made stretch all the way up to Staré Město at Uherské Hradiště. The Nedakonice pool will call only for minor alignment improvements at Kostolany nad Moravou. A newly arisen island in the river should host artificial biotopes and the movable weir in Kunovský Les would be dismantled as the Nedakonice dam at full heave would make it redundant.

The following section Staré Město–Spytihněv again runs in a right-bank lateral canal with one lock. It follows quite exactly the route of the present Baťa Canal. Transferring of part of high discharges to the D-O-E water corridor will reduce the flood danger in the area from Napajedla to Uherské Hradiště.

Elevation of the Spytihněv pool is not to change as it guarantees sufficient navigation depths all the way to the following dam at Bělov. Thus, the Spytihněv dam is yet another basically ready section, which needs only slight alignment improvements at Napajedla and Otrokovice.



Pod jezem v Kroměříži, který je nejvyšší ze všech jezů na dotčeném úseku Moravy (v popředí), by bylo nutno počítat s větší korekcí v trase, jež směřuje do osy nedávno zřízeného mostu dálnice D 1 (v pozadí), který je již přizpůsoben požadavkům vodní dopravy. Složitější problémy s trasováním nastávají až dále po proudu, v centru města.

Below the dam in Kroměříž, which is the highest of all dams on the mentioned section of the Morava (front), a larger correction of the route has to be taken into account. It aims directly to the axis of a recently raised bridge of the motorway D 1 (behind), which is already adjusted for requirements of navigation. More complicated problems of routing are to be met in the centre of the town.

The Bělov dam lock will enable reaching of the Bělov pool, which water level will have to elevate a little. The dam was adjusted to the future elevation already when under construction. Its initial section is satisfactory in terms of depth as well as the routing direction of the waterway. The only correction will be needed at Kvasice. The real problems await at the end of the elevated part in the area of Kroměříž. The official documents of regional planning registered a route preferring to detour via the left bank to a straight stroke through the town. The final routing will have to be optimalized yet.

The waterway crossing through Kroměříž has two major problems. First of all, it does not allow routing with radii 800 – 1,000 ms. If the waterway was to avoid the valued Podzámecká Garden, the project had to settle for R = 600 ms only in two cases. Neither that treats the problem as the navigation channel in such bends would have to be widened to 40 + 28,3 = 68,3 ms, which cannot possibly fit the narrow space of Kroměříž. The option of the compromise, settling on the realistic width of 50 ms, would limit passing of convoys in both directions in the bends, i.e. declare them a navigation narrow. The necessary elevation of a road bridge in the town centre is not an easy task either. The solution may appear in a form of yet another compromise: a slight increase in the vertical alignment by 1–2 ms, so that the bridge offered enough clearance at average discharges, and a movable bridge construction (swing or lifting bridge) in the navigation opening. Such bridges are quite common e.g. in the Netherlands, Belgium, USA, Canada or France, distinctively contributing to the landscape colouring. Although a central Moravian citizen will hardly welcome the red light not only at crossroads or railway crossings but also at a movable bridge. Luckily, such situation would be extremely rare in case of the bridge in Kroměříž. Only at the higher discharges, when the water level should reach extremely high and an extremely large vessel should need to pass (a vessel carrying three tiers of containers, for instance).

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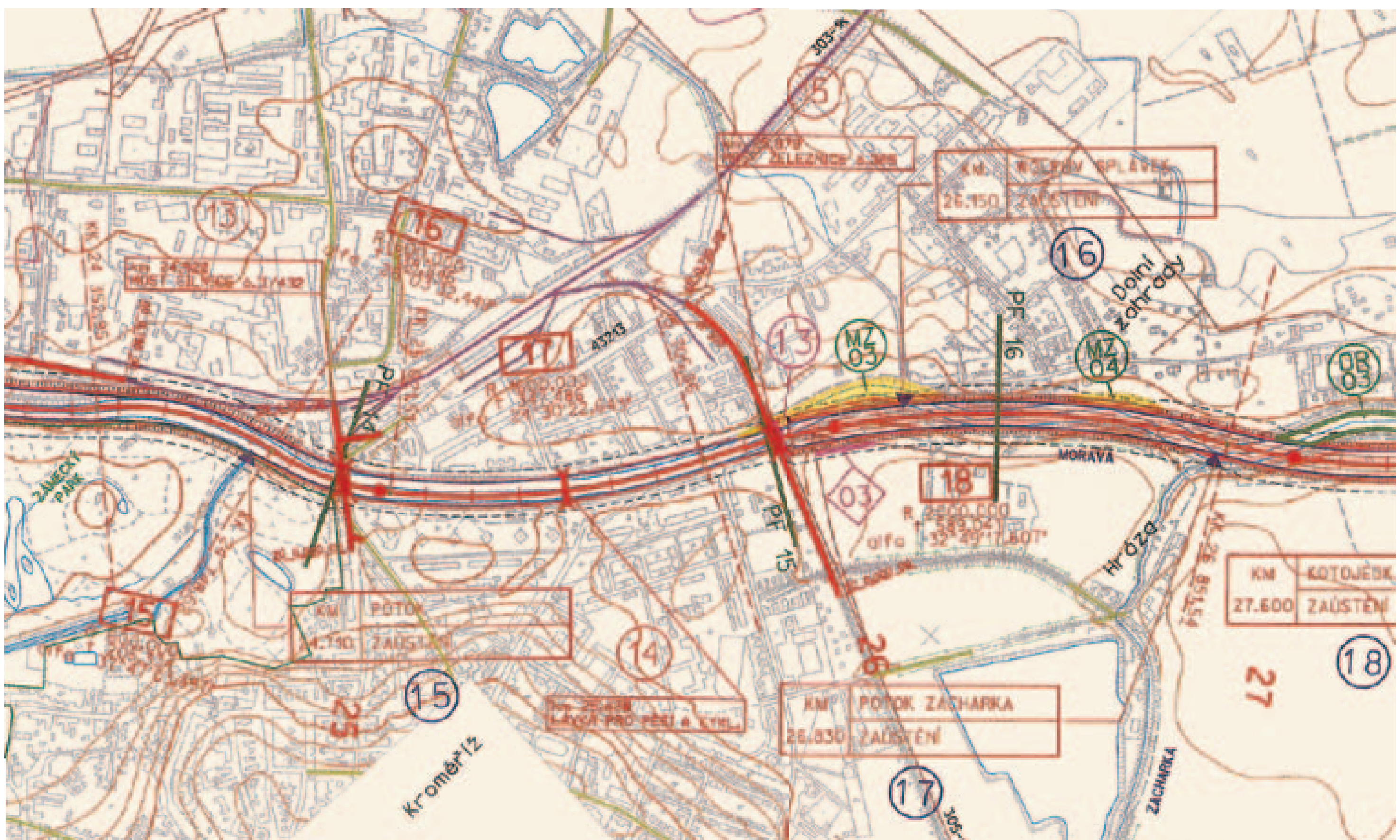
Kroměříž – „hanácké Atény" z ptačí perspektivy. Za zámkem (v popředí) se rozkládá rozsáhlá Podzámecká zahrada, lemovaná řekou Moravou. Řešení vodního koridoru D-O-L v tomto úseku by si vyžádalo značných kompromisů, aby nebyla tato zahrada ani v nejmenším narušena. Variantní řešení obchází levobřeží část města (v pozadí).

Kroměříž – a bird's eye view of "the Athens of Haná". Behind the castle (front) there is the large Podzámecká Garden lined with the Morava River. The D-O-E water corridor routing solution required serious compromises here as not to affect the garden in any way. The route circles around the left-bank part of the town (behind).



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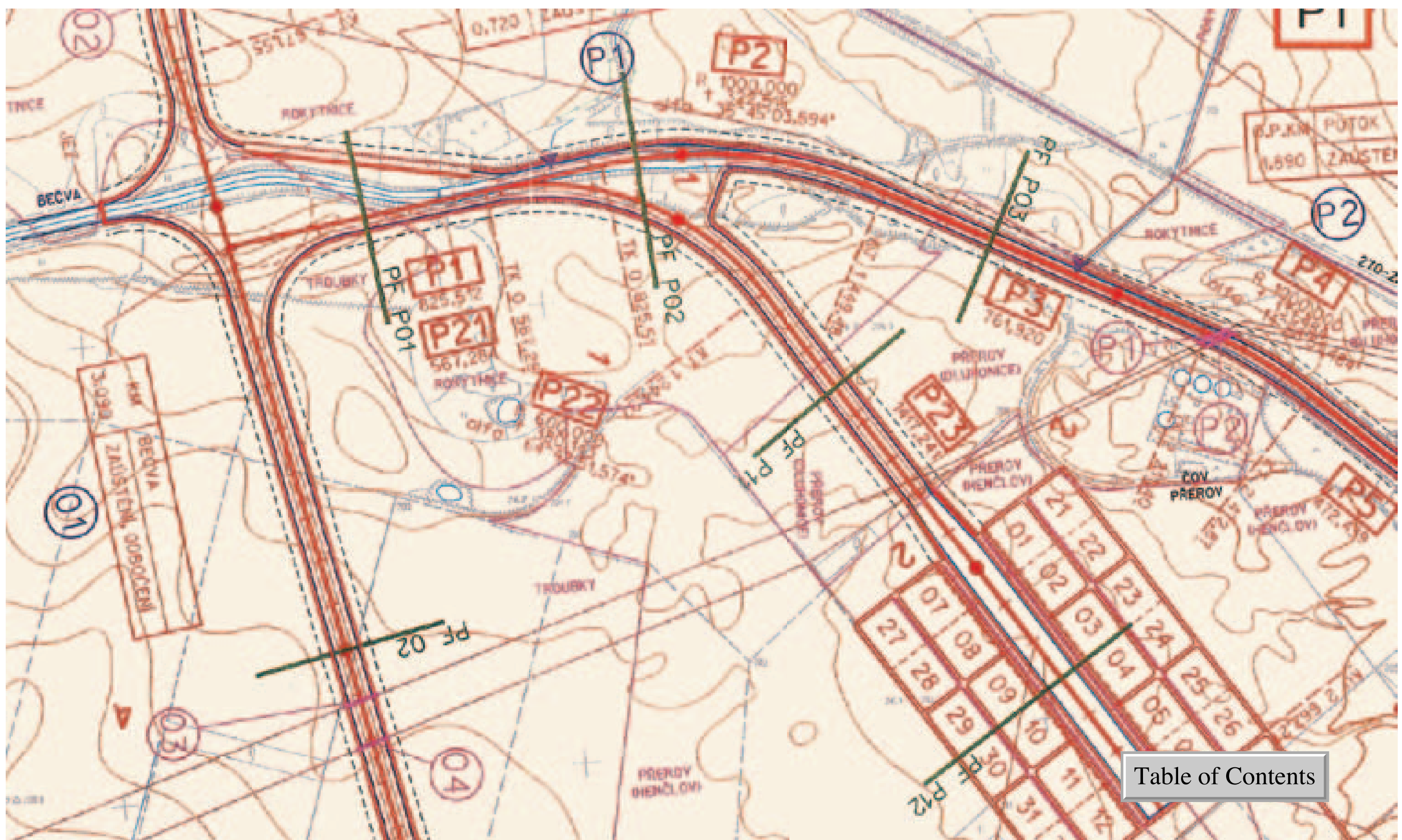
Koncovým bodem druhé etapy vodního koridoru D-O-L je obratiště při úrovňovém křížení s Bečvou, odkud vychází odbočka do přístavu Přerov u Henčlova. Přístav je navrhován jako multimodální logistické centrum s vlastní průmyslovou zónou, navazující na železniční uzel i budoucí dálnici. Další odbočka může být vedena korytem Bečvy až do blízkosti existujících závodů chemického a strojírenského průmyslu v Přerově.

A turning place at a level crossing with the Bečva is the end-point of the second stage of the D-O-E water corridor. A detour to the port of Přerov near Henčlov branches there. The port is designed as a multimodal logistic centre with an industrial zone of its own, connected to a railway junction and a future motorway. Another extension can run through the Bečva riverbed up to the already existing plants of chemical and engineering industry in Přerov.



Mapka obratiště a přerovského přístavu (podle dokumentace zpracované pro územní hájení projektu).

A layout of a turning place and the port of Přerov (acc. to documentation of the territorial protection of the project.

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Řeka Morava ve zdrži jezu Kroměříž vykazuje několik nepříznivých oblouků, které bude nutno obejít levobřežním průplavem. Uprostřed snímku je vidět ústí říčky Hané do Moravy.

In Kroměříž pool the Morava features several unfavourable bends, which are to be side-tracked with a left-bank canal. In the middle, a junction of the Haná and the Morava.

Zdrž kroměřížského jezu končí u Kojetína, kde trasa vodního koridoru D-O-L podchází železniční most dráhy Přerov–Brno (uprostřed) a poté ještě silniční most (vlevo). Pak již definitivně opouští řeku Moravu a odbočuje – jako umělý průplav – okolo Záříčí k Troubkám.

The Kroměříž dam pool stretches to Kojetín, where the D-O-E water corridor route passes under a railway bridge of the line Přerov – Brno (centre). Then it leaves the Morava riverbed and branches-off as an artificial canal around Záříčí towards Troubky.

To let the D-O-E water corridor route detour Kroměříž treats both the problems at once, while it intensifies the town flood control. The deviation has been considered earlier already, but only for high water reasons, without any navigation use. However, this option is rather costly as it requires a new highway bridge on the D1 highway, which is currently being built, and elevation of its vertical alignment. The through-town alternative has no such problems as the motorway bridge over the Morava already meets the navigation needs.

On thenorthwest fringe of Kroměříž , there is a high movable weir on the Morava. The waterway will reach the level of its pool via a lock built either near the dam or on the by-pass, to enter the last nearly ready-made stretch of the D-O-E water corridor in the area of the Morava River. The pool of the Kroměříž dam spans almost to Kojetín, where the route has to leave the Morava entirely and run in a left-bank lateral canal with a lock at Záříčí connected to the pool of the reconstructed dam Troubky on the Bečva.

At floods, this section of the water corridor – already on the territory of the Olomouc region – will relieve both the Morava and Bečva rivers at their confluence and could become the first part of a flood control system protecting Přerov and its surroundings including Troubky, which was so heavily hit at the 1997 flood. Apart from that, it ought to provide an access to the port of Přerov as another stage terminal after the one in the Břeclav–Hodonín area.

Along with the port of Přerov the route of the second stage should feature berth on the right-bank canal in the area of Veselí nad Moravou–Uherský Ostroh na Moravě in Staré Město, in Otrokovice and in the section Kroměříž –Kojetín. The berth in Otrokovice should be larger both in size and in significance, as it will be connected with an extensive industrial zone. Finally, the navigation may lead through a short stretch of the Bečva adjusted for one-vessel traffic to reach the already existing chemical and machinery plants in Přerov.

It is now necessary to mention the relation between the D-O-E water corridor and Baťa Canal. Coexistence of the waterways should have three forms. In the short stretch between Staré Město and Spytihněv Baťa Canal will be substituted by the right-bank canal; the whole fall will be passed in one lock of medium rise. It is likely that a special small lock for pleasure boating will have to be added. Both "small" and "large" navigation would operate in the pools of the Spytihněv and Nedakonice dams, while the small lock in Nedakonice would be kept in order to allow transfer of pleasure boats to the parallel Baťa Canal from Nedakonice to Rohatec, where this canal comes to its end in about 1 km from the Hodonín pool on the Morava. The implementation of the prepared connection to this pool via the Radějovka River and the small lock at Rohatec with a tiny rise would turn the parallel little waterway into a continuously passable route. **Such arrangements would allow round pleasure boating trips through Moravské Slovácko along both the "small" and "major" waterways, which could considerably contribute to the tourist attractiveness of this part of Moravia.**

Průmyslové závody na západním okraji Přerova se rozkládají na obou březích Bečvy. Korytem této řeky by mohla být vedena plavební odbočka, která by je napojila na vodní koridor D-O-L.

Industrial plants in the west suburbs of Přerov lie on both the Bečva riverbanks. Its riverbed could run a branch canal extension connected to the D-O-E water corridor.

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Olomouc Region

Its area (5,139 kms²) as well as its population (0.642 mill.) classifies it as a middle-sized region. Character of the landscape rather varies as it includes both the plentiful flatland of Haná and the highest mountains of Moravia – the Jeseníky (Ash Mountains). The Morava and the Bečva are the most important rivers of the region. The prevailing part of the third stage of the D-O-E water corridor should be routed through the region.

The regional capital – Olomouc – *has been a centre of Central Moravia with rich culture tradition since the medieval times. Currently it has a population of 103,000 of the fifth largest city in the country. It is located straight on the D-O-E water corridor route. Other important centres nearby include: Hranice, Přerov, Litovel, Lipník nad Bečvou, Šternberk, Uničov and Zábřeh*

Olomouc. Kašna se sochou Ariona – v pozadí Sloup Nejsvětější Trojice zapsaný v seznamu UNESCO.

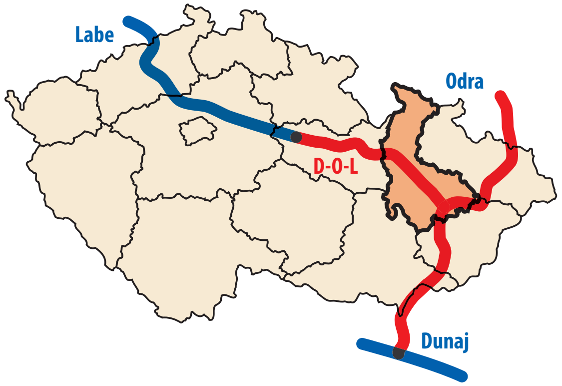
Olomouc. The fountain with the statue of Arion, the Unesco listed Holy Trinity plague column at the back.

Some contemporary bests, which portrait the region:

- Olomouc is a site to the second oldest university of the country.
- Hradisko - the oldest Moravian monastery was founded in 11th century on the outskirts of Olomouc.
- The most visited and renowned places of the Olomouc region include:
- The High Ash Mountains, the snowiest mountain region in CR.
- The castle Helfštýn, built in 14th century, a site of annual festival of blacksmith artists Hefaiston.
- The chateau of Velké Losiny, built in Renaissance, connected with the witch-hunting trials of 17th century.
- Velké Losiny pride also in a handmade paper mill and a museum of paper.
- The castle Bouzov from 13th century is a former retreat of Hussite leaders.
- The late baroque chateau of Náměšť na Hané is surrounded by a French park and 200 years old lime trees.
- The most recognized spas of the region include: Teplice nad Bečvou, Jeseník, Slatinice, Velké Losiny, Bludov, Skalka and Lipová–Lázně, which was known as early as in Celtic times.
- Svatý Kopeček (Holy Hill) at Olomouc, with the baroque church of the Visitation of Virgin Mary, is the most sought-after pilgrimage destination of the area.
- The Hranice Abyss, near the town of Hranice, is the deepest abyss in CR (currently confirmed depth 274.5 ms) was first marked in the worldwide known map of J. A. Komenský in 1627.
- PLA Litovelské Pomoraví is located on the Morava riverbanks and belongs among the largest riparian woodlands in Moravia.
- The most significant dams of the Olomouc region include: Nemilka (1967–1970), Plumlov (1922–1933), Opatovice (1969–1972), and Dlouhé Stráně (1978–1996). Although small in volume, the pumped storage hydropower station Dlouhé Stráně ranks among the most remarkable facilities of its type both for its size and engineering and fully respects the surroundings of the PLA Jeseníky.
- **The Moravian Gate of the Olomouc Region is the lowest spot in the watershed between the Danube and the rivers running towards the Baltic and North Seas. It represents an extremely unique "natural treasure" of the whole Czech Republic.**

The list may grow significantly larger in future

- **The completed third stage of the D-O-E water corridor on the Olomouc Region territory will bring to life one of the most important junctions of European waterways, which will connect three seas and could be righteously called the port in the heart of Europe.**
- **The region will benefit from the water-management effects of the D-O-E water corridor, which will be most apparent in Haná, as well as from its flood control function; the proposed dry polders will bring a positive impact even to the regions of Zlín and South Moravia. Development of long-distance cruises will boost visitor rates of many sights on the route of the water corridor (Olomouc, Bouzov, Hranice, Teplice nad Bečvou etc.).**



Olomouc Region – junction of European waterways

The territory of the Olomouc Region will bear the constituent part of the third stage of the D-O-E water corridor, including the exit branch to the Danube and Oder watershed. The nodal point from which in future waterways should run in three different directions – to the Danube, Oder and Elbe – has also been designed in this area. However, in relation to the D-O-E water corridor, the region is a kind of a crossroads even today – a crossroads of opinions, which are often not much obliging.

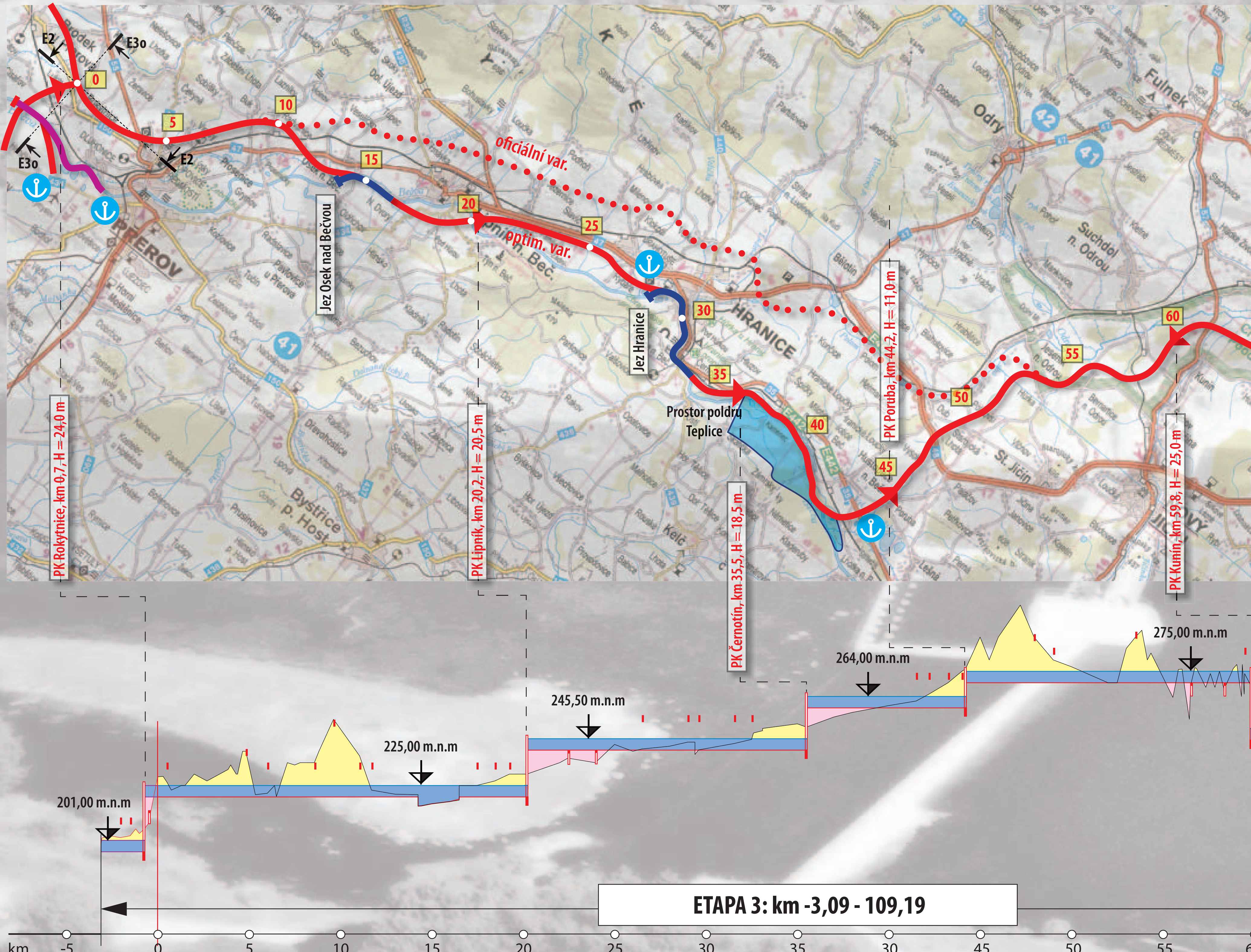
Why is that so? The protest events, which largely are held in Olomouc, are perhaps fed with the distrustful atmosphere, which governs the Faculty of Science of Palacký University. The reserved attitude of economic circles of the region may originate in sceptical views of the prompt realization of the D-O-E water corridor. According to them, the gradual development of the project will reach the Central Moravian region only in a far future, i.e. too late to aid in dealing with the pressing regional problems like flood control. The denominator of the pessimism is similar to the other regions; in the region of Olomouc it is only more pronounced. One of the important factors is lack of information on the project routing, on impacts of its realization and its regional functions. Let us move on, then, and continue describing the D-O-E water corridor route from where we have left it in the previous chapter – on the Bečva river in Troubky.

The canal only crosses the Bečva on the same level and does not lead through its riverbed, with an optional exception of the branch for the Přerov plants. Beyond the river, the route should underpass the main railway track and behind it – at Rokytnice – it should enter the first of the high lock series with saving basins heading for the actual fork of the Oder and Elbe branch. The length of the Rokytnice pool – from the next lock on the Oder branch to the next lock on the Elbe one – is exceptionally convenient due to the terrain circumstances of Haná – more than 50 kms. The pool can easily compare to the pools of North German or Dutch canals. Let us first follow the route to the Oder. The officially protected route should circle around Přerov and follow the northern side of the main railway track around Lipník all the way to Hranice. Then, close to the cement mill, it crosses to the southern side, where it cuts through the European watershed at the village of Kunčice with either a deep cut or a canal tunnel. The solution will be decided according to ecological and economic aspects. The D-O-E water corridor then enters the river basin of the Luha, the Oder tributary. It follows its valley, still south from the railway tracks, all the way to Jeseník nad Odrou. The next section of the third stage, i.e. the descending part of the water corridor, is already on the Moravian Silesian territory, which is treated in the following chapter.

It is worth noticing, that the route ascends from the long Haná pool, which altitude equals the Elbe altitude in the flatland below Hradec Králové, to the "rooftop of Europe" only through two high locks: in Buk near Prosenice and in Trnávka near Lipník nad Bečvou.

It is now essential to emphasize the crucial importance of the lowest spot in the centre of Europe for the routing of the D-O-E water corridor. It is as valuable as the narrowest part of the American continent for the Panamanian economy. We are talking the Moravian Gate. There is hardly anything else of similar significance that the country has to offer to Europe.

For the section Buk–Jeseník nad Odrou, there was an alternative solution considered. Although not a long time ago it was excluded from the official documents, the newest research has proved it much more convenient from both the economic and flood control point of view. The alternative route crosses the main track as well as the first class road 47 only at Prosenice, runs between the road and the Bečva (eventually, in a short stretch above the Osek dam, straight through the Bečva riverbed to Hranice). Above the dam in Hranice, it passes to the Hranice pool. Its construction was designed to allow slightly higher elevation depending on the need of the waterway. This pool takes the D-O-E water corridor route through the so-called Teplice narrow and runs on along the wide Bečva valley to the village of Hustopeče nad Bečvou, where it turns sharply to north and crosses the watershed between the villages of Poruba and Palačov. Both alternative routes join again at Jeseník nad Odrou. The alternative option has been investigated several times throughout the history. Last time it attracted engineers in 1960s, when a large reservoir on the Bečva at Teplice was being seriously considered and even prepared. At first sight, it was tempting to lead the navigation through the wide lake and save several kilometres of the artificial canal routing. Only at first sight, though, as merely the entrance to the dam reservoir would need to be fitted with an oversized lock of up to a 30-m fall, which due to the number of locked vessels would certainly become a capacity bottleneck. Next, it would be necessary to respect the actual purpose of the reservoir. It called for a significant water level fluctuation, which would influence even the length of the elevated water surface. Below the minimal reservoir water level, the through navigation channel would thus have to be deepened. The Teplice reservoir would thus represent more of an obstacle than a navigation advantage. Superficial knowledge of this episode provokes numerous misunderstandings; e.g. that for the D-O-E water corridor the dam is essential, if not as part of the route, then at least as a reservoir of water for the lock operations. It is yet another mistake, which certainly does not contribute to the fair evaluation of the project.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oficiální var.
optim. var.
Jez Osek nad Bečvou
Jez Hranice
Prostor poldru Teplice
PK Rokytnice, km 0,7, H = 24,0 m
PK Lipník, km 20,2, H = 20,5 m
PK Černotín, km 35,5, H = 18,5 m
PK Poruba, km 44,2, H = 11,0 m
PK Kunín, km 59,8, H = 25,0 m
PŘEROV
HRANICE
Odry
Fulnek
Suchdol n. Odrou
St. Jičín
Bystřice p. Host.
201,00 m.n.m
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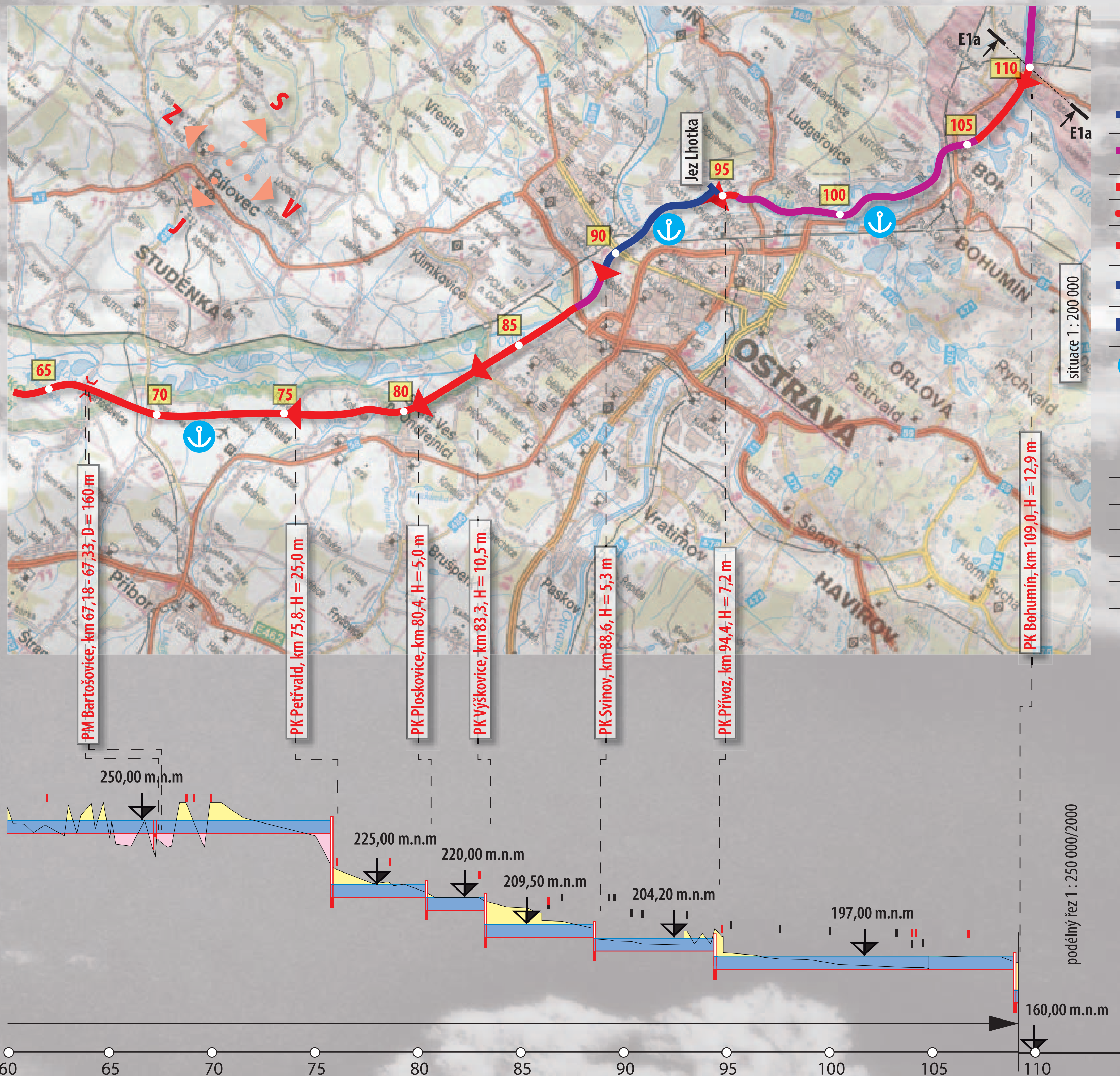

Legenda | Legend

situace | map

	říční úseky (existující jezové zdrže)	river sections (existing pools)
	říční úseky (navrhované zdrže)	river sections (proposed pools)
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podélný profil | longitudinal section

	terén	terrain
	návrhové dno	proposed bottom
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	podjezd (průplavní most)	underpass (canal bridge)
	plavební komora	lock

Trasa a podélný profil 3. etapy vodního koridoru D-O-L po Bohumín.

The route and longitudinal section of the D-O-E water corridor up to Bohumín in 3rd stage.

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Problémem oficiální varianty vodního koridoru D-O-L, vedené v úseku od plavební komory Buk po Hranice paralelně s hlavní tratí Přerov–Bohumín (severně od ní), jsou hluboká příčná údolí. Hlavní trať se s nimi vyrovnávala dlouhými viadukty, zděnými z kamene, které dodnes pokládáme za významná díla železničního stavitelství. Příkladem je viadukt u Hranic, překračující údolí Veličky.
Vodní koridor D-O-L by měl přecházet toto údolí za tratí vysokým náspem. Hladina by se nacházela až 10 m nad terénem. V některých údolích by byly nutné náspy až 20 m vysoké. To je příčinou vysokých investičních nákladů v porovnání s alternativní trasou, která k terénu těsně přimyká.

Deep transverse valleys are a problem of the official version of the D-O-E water corridor, which in the section from the lock Buk to Hranice runs along the north side of the main railway route Přerov–Bohumín. The railway found its solution in long stonewall viaducts, remarkable monuments of railway construction engineering. One of them, the viaduct at Hranice, crosses the Velička valley. The route would traverse the valley behind the track in a high embankment, the water level thus reaching 10 ms above terraine. As some valleys would need embankment of 20 ms, the investment costs rate much higher than in the alternative routing, which clings closer to the terrain.

It is not only that the dam lake at Teplice would be in a way; the contemporary concept of providing water for a waterway would make it absolutely redundant. Owing to the water management role of the D-O-E water corridor, the project of this dam, once considered an essential water-managing reservoir of the Morava river basin, could be definitely abandoned. **The D-O-E water corridor could provide the Morava with more water and at lower cost that the Teplice dam.**

The enthusiasm of routing the waterway through the Teplice narrow and the reservoir of Teplice nad Bečvou has thus gradually disappeared. Other aversive aspects of the alternative route have only contributed to that. It is almost 7 kms longer that the currently official route, plus it requires three locks instead of only two: at Lipník nad Bečvou, at Černotín and at Poruba. In addition, the Teplice narrow does not allow the required radii of bends, therefore, similarly to Kroměříž, extremely small radii would have to be applied (650 or even 600 ms) as well as (perhaps even) some short sections of one-way traffic and regulated traffic of longer convoys. **The final decision about the case should be very careful. If the large reservoir at Teplice is not an option any more, the dry polder of the area remains the more topical. The concerned cross-section allows retaining and transformation of flood waves, which threaten the whole Bečva basin, as much as the basin of the Morava below the Bečva mouth. The body of the waterway, led south from the main railway line from Černotín to Hustopeče, could optimally outline the polder and rid of the costly re-loadings of the line as well as the parallel road.** The combination of a polder (e.g. of the volume of 50–100 mill. m^3) and the D-O-E water corridor would be highly convenient rather than problematic, like in a case of a reservoir with a significantly higher water level. Moreover, a part of the flood discharges could be simply transferred from the Hranice pool to the waterway, which would lower flood threat in the section from Hranice all the way to Kroměříž. If you consider the 25 % lower costs of the alternative corridor routing and cutback on construction costs of the actual polder, this solution currently appears much more promising than the official routing, and thus should be documented as fast as possible, for the realization of the polder has grown rather urgent already. **If realization of the dry polder is not carefully coordinated with the D-O-E water corridor, serious economic may occur.** Therefore, with the respect to higher chances of the alternative solution the attached situation and longitudinal cross-section document it in detail, while the official route is treated only in general.

Let us now return above the lock in Rokytnice and follow the route towards the Elbe. The D-O-E water corridor should head for Velký Týnec, circle Olomouc from the east and run through intensively farmed, practically forestless flatland around the villages of Štěpánov, Moravská Huzová and Pňovice towards Střelice, where the long Haná pool finally comes to the end. The first high lock with saving basins will have to be erected there to start the ascent to the Elbe watershed. **Owing to the navigation linkage of the port of Olomouc in order to manage economically the overplus from excavations as well as for protection of the city against floods, the relatively easy section of the Elbe branch up to Pňovice should be considered an integral part of the third stage of the corridor realization.**

Above the lock of Střelice there are two alternative routing options. The first one – officially protected – heads for the town of Loštice, where it enters the Třebůvka River valley; the other one leads around Králová, through the saddle of Úsov to the wide valley of the Morava at Dubicko, crosses the river, and along the main line runs to Zábřeh na Moravě, where it enters the Moravská Sázava River valley. According to engineering of each solution, they could be nicknamed the lift and the lock alternatives, respectively.

The officially protected lift alternative will have to cut through the PLA Litovelské Pomoraví and interfere with the Morava River in terms of a level crossing, which will call for a dam construction. Quite naturally it has stirred severe protests of conservationists. They argue eloquently that granting an exception from the law, which literally bans routing of navigation canals through protected areas, would be far from easy. Most probably, such statutory exception will not be needed, as nowadays the lock alternative appears much more convenient from both the technical and economic respects. It results from comparison of the following course of the route, which runs mostly through the Pardubice Region. We shall thus postpone the actual comparison of pro and con to the relevant chapter.

Let us recognize the lock alternative as more convenient for the route Střelice–Králová–Dubicko–Zábřeh na Moravě, and focus mainly on that option.

To surpass the altitude differences of the described section of the lock route another high lock – along with the one in Střelice – was proposed at Králová. Similarly to the lift route, the lock alternative has to cross to the right Morava bank, i.e. to cross its valley alluvium as well as its bed. However, the situation is quite different from the previous routing: firstly, the crossing does not happen in the PLA area, secondly, the river would be crossed by a canal bridge, and its natural character would not be disturbed at all. The most important part of the lock route comes at the crossing of the valley alluvium. Without any extra costs needed, the body of the D-O-E water corridor would create a transversal dyke of a polder, plus its longitudinal lining on the west side, which would prevent inundation to reach the main railway corridor. A perfect functioning of the polder could be guaranteed by a functional facility, which might be a part of the canal bridge. **The protection volume of the polder (which may be called polder Dubicko) could reach about 50–70 mill. m^3. The effect on reduction of flood culminations would be as crucial as in the case of the polder in Teplice nad Bečvou. Moreover, it would significantly contribute to protection of Olomouc. The opportunity to establish the Dubicko polder is an indisputable advantage of the lock route.**

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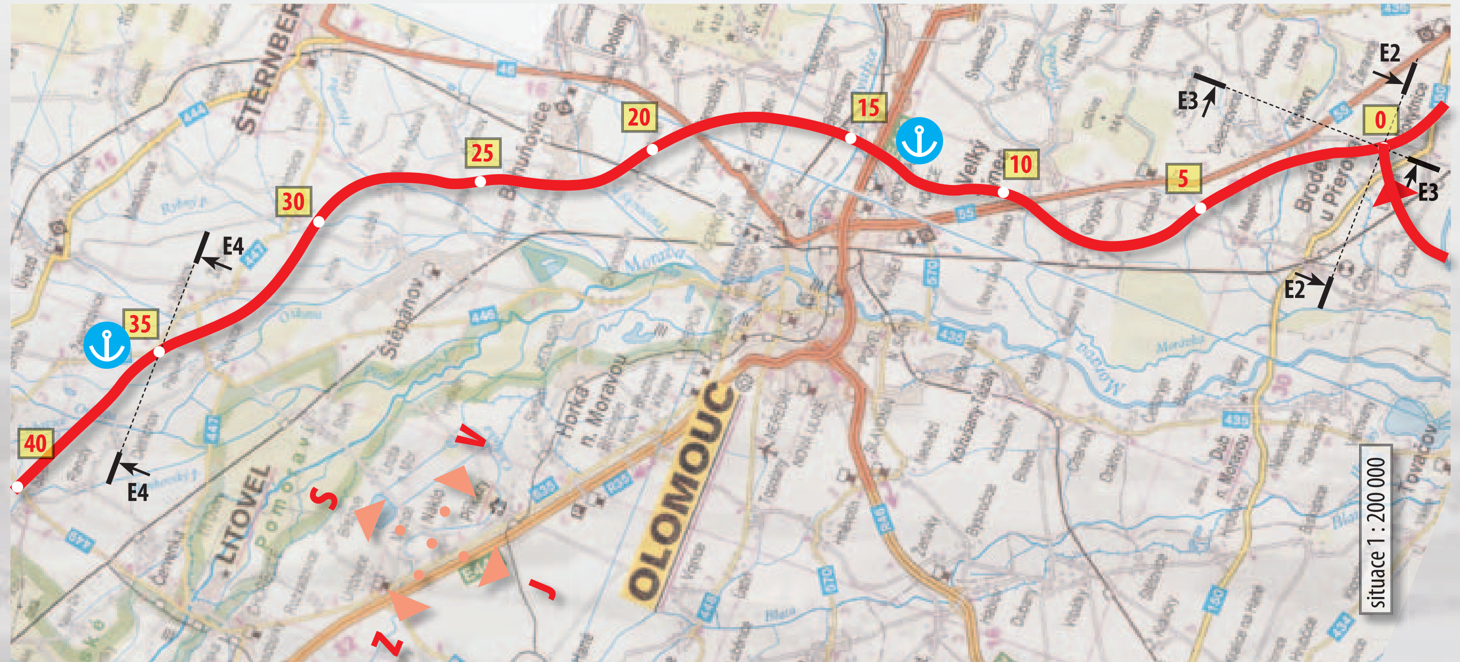

Legenda | Legend

situace | map

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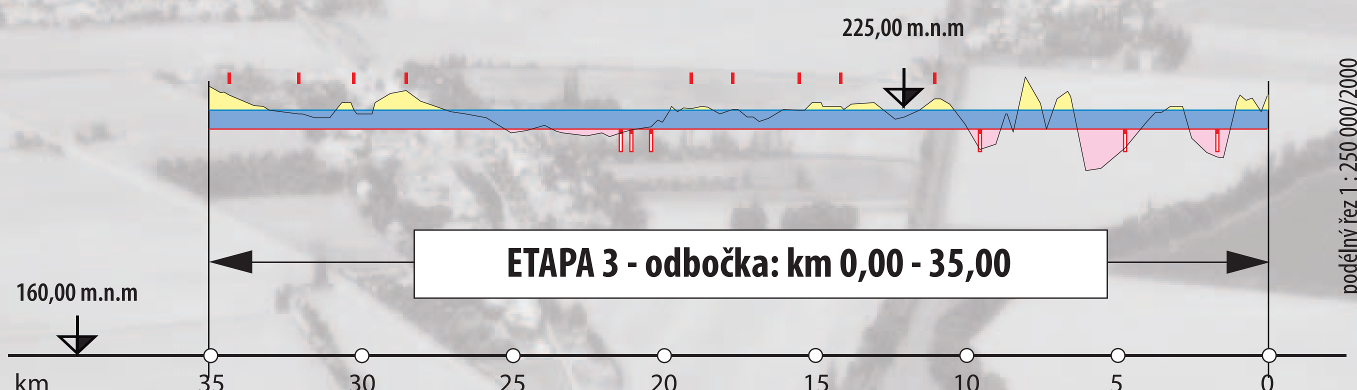

Trasa a podélný profil 3. etapy vodního koridoru D-O-L (odbočky Přerov–Přňovice).

Routing and longitudinal section of the D-O-E water corridor (the extension Přerov – Přňovice) in 3rd stage.

Nedávno vybudovaný segmentový jez na Bečvě v Hranicích byl navržen již s ohledem na požadavky vodní cesty. Projektant počítal s mírným zvýšením vzdutí.

A recently built dam with radial gates on the Bečva in Hranice was designed to accommodate the waterway standards.

Jez v Oseku na Bečvě má pevnou část a dvě pole s klapkami. Jez usnadňuje vedení trasy vodního koridoru D-O-L v krátkém úseku řekou Bečvou.

The dam allows the route of the D-O-E water corridor to use a short stretch of the Bečva riverbed.

Zdrž jezu Hranice, v pozadí silueta města. Touto zdrží může být vedena trasa vodního koridoru D-O-L přes město.

A pool of the dam Hranice; behind, an outline of the town.

Celkový pohled na jez v Oseku na Bečvě.

A general view of the dam on the Bečva in Osek.

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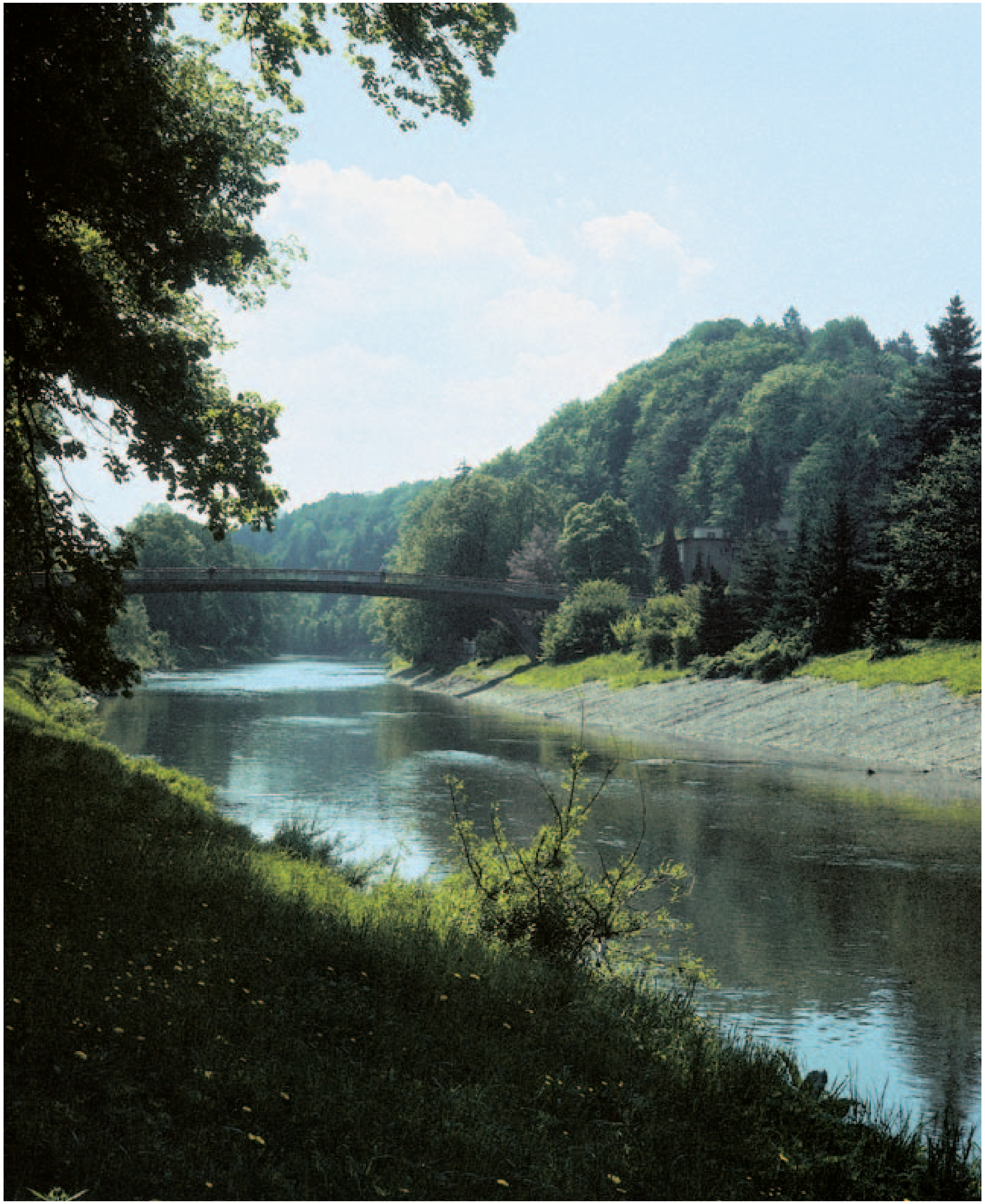

Bečva v tzv. teplické soutěsce u Lázní Teplic. Koryto řeky poskytuje dostatečnou šířku pro převedení koridoru D-O-L, byť místy za cenu poněkud ostrých oblouků.

The Bečva in a narrow near Lázně Teplice. The riverbed is wide enough to accommodate the D-O-E water corridor route, although with quite sharp bends in some places.

Lázeňské budovy na břehu Bečvy. Po výstavbě koridoru by byla hladina v řece asi o 1 metr výše než na obrázku, a to i za nízkých průtoků. Vzhledu pobřežní promenády by to zřejmě prospělo.

Spa buildings on the Bečva bank. Construction of the corridor would elevate the water level approximately 1 m higher even at low discharge. The image of the promenade would certainly benefit from that.

Silnice I/47 protíná rozvodí v blízkosti oficiální trasy vodního koridoru D-O-L, a to na kótě cca 330 m n. m. Tento významný bod na její trase vyznačuje symbolická plastika.

Road I/47 cuts the watershed near the official route of the D-O-E water corridor at cca 330 ms ASL. The place is marked with a symbolic sculpture.

Optimální trasa je vedena nejnižším místem Moravské brány, kde rozvodí sestupuje až téměř na kótu 300 m n. m. Silnici mezi Starojickou Lhotou a Dubem protíná v jejím nejnižším místě.

The optimum route leads through the lowest point of the Moravian Gate, where the watershed descens to 300 ms ASL. It cuts the road from Starojická Lhota to Dub at its lowest point.

Pohled k Hranicím od místa, kde trasa podle oficiálního řešení (obcházející velkým obloukem město) protíná rozvodí mezi Dunajem a Odrou. Uprostřed snímku areál hranické cementárny. Šipkou je naznačeno místo, kde by byl jižní portál cca 1,3 km dlouhého průplavního tunelu, který se zřejmě jeví vhodněji než hluboký zářez (terén na rozvodí je na kótě cca 315 m n. m.).

A view from the point where the official solution, circling Hranice wide, crosses the watershed of the Danube and Oder towards the town. The Hranice cement mill is in the centre of the picture. The arrow marks the southern portal of a 1.3 kms long canal tunnel. Such solution appears more suitable than a deep cut (the terrain of the watershed lies at 315 ms ASL).

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Typický úsek dlouhé „hanácké" zdrže vodního koridoru D-O-L, obcházejícího táhlým obloukem obec Štěpánov (v popředí vlevo) a Moravskou Huzovou. Trasa protíná zemědělské plochy v táhlých obloucích o poloměrech 2500 až 5000 m a hladina v ní je zhruba na úrovni terénu s tolerancí ± 2 m. Při vhodném vegetačním doprovodu by vodní cesta vytvořila nový zelený koridor v zemědělsky využívané krajině. Středem snímku prochází poněkud stroze upravený tok Oskavy.

A typical stretch of the long Haná pool of the D-O-E water corridor passing with a protracted circle the village of Štěpánov (front left) and Moravská Huzová. The route crosses the farmland in bends of the radii 2.5 to 5.0 kms. The water corridor runs at the same level with terrain with the tolerance of ± 2 ms. In a proper vegetation finish the waterway would create a new green coridor in the agriculturally exploited countryside.

Pohled na údolní nivu řeky Moravy pod Zábřehem s naznačenou trasou vodního koridoru D-O-L, který nivu mezi obcemi Dubicko (vpravo) a Bohuslavice (vlevo) šikmo kříží a přimyká se v pozadí k železniční trati Česká Třebová–Přerov, takže vytváří boční (a částečně i čelní) hráz poldru Dubicko.

Alluvium of the Morava below Zábřeh with a marked route of the D-O-E water corridor as it crosses the alluvium between the villages of Dubicko (right) and Bohuslavice (left) to join the railway route Česká Třebová – Přerov (at the back), thus creating a side (and partially also front) dam of the polder Dubicko.

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Prostor chráněné krajinné oblasti Litovelské Pomoraví proťat železničním koridorem byl nedávno dosti necitlivě narušen i trasou rychlostní komunikace R 35. Tím pochopitelnější jsou snahy o jeho ochranu před dalšími liniovými stavbami. Na snímku je mimoúrovňová křižovatka na trase R 35 u obce Mladeč (uprostřed). Trasa vodního koridoru D-O-L prochází podél horního okraje snímku, daleko za hranicí lesa.

The area of Litovelské Pomoraví PLA has been cut through with a railway corridor, and recetly also by the speedway R 35. Efforts to protect it from any further linear constructions are quite understandable. The picture shows a multilevel junction on R 35 at the village of Mladeč (centre). The D-O-E water corridor route runs along the top of the photo, far beyond the forest line.

If even after transformation of the flood wave in the polder the flood control of the regional capital or other municipalities along the Morava was not sufficient, the flood could be also led through the canal – from Dubicko all the way to Kojetín.

The above described sections of the waterway could have one rather important port in Olomouc, located in the developing industrial zone of the city, and in Hranice, right next to the Hranice cement mill (according to the official solution). Berths could be established at Pňovice, i.e. in the focus point of Litovel, Šternberk and Uničov, and at Zábřeh na Moravě. Alternatively, a port could be established in Valašské Meziříčí near the existing chemical concern. To conclude this chapter, it is safe to say that construction of the D-O-E water corridor in the Olomouc Region could commence immediately. There is no doubt that flood control in the region is a priority task, which must not be postponed.

Thus, we propose:

- Realization of the polder in Teplice nad Bečvou according to the optimal concept, i.e. with the concurrent construction of a part of the D-O-E water corridor (within the first stage of its realization).
- Realization of the Dubicko polder, with a dyke running along the route of the D-O-E water corridor and adjusted the way, which would allow a construction of a complete cross-section of the waterway in the future (also within the first realization stage).
- Construction of the part of the Haná pool, which circles around Olomouc and Litovel, i.e. at least the section from Pňovice to Holice, as a flood diversion canal of the Morava River sections crossing the centres of these towns. Part of the flood discharge would enter the canal from a short feeder in the route Litovel–Pňovice and return to the Morava via an exit branch below Olomouc. The flood diversion canal of the future water corridor could be a dry, grassed bed with presently only a smaller profile.

Construction of the D-O-E water corridor in the Olomouc Region indeed could begin immediately with no worries about any preliminary investments. Clear specification of needs and options as well as purposeful coordination of all operations are all that it requires in order not to waste funds on one-purpose projects, which are eventually more expensive than one complex solution.

Meandry Moravy u Nových Zámků v CHKO Litovelské Pomoraví si jistě zaslouží nejpřísnější ochranu jako cenný segment krajiny. Není ostatně žádný důvod do této oblasti zasahovat a charakter řeky i její nivy měnit. Vodní koridor D-O-L je veden ve vzdálenosti 4–6 km od řeky, zcela mimo oblast CHKO.

As a valuable landscape segment, the Morava meanders of Litovelské Pomoraví PLA at Nové Zámky deserve the highest protection. There is absolutely no need to disturb the area and change the character of the river and its alluvium. The D-O-E water corridor runs 4–6 kms away from the PLA.

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Moravian Silesian Region

Its area of 5,554 km² and population of 1.278 mill. makes it the largest region of the Czech Republic. The Oder is the most important river of the area. On its territory, the third stage of the D-O-E water corridor ends and the stage 1a begins.

The regional capital Ostrava *lies directly on the D-O-E water corridor route. With 319,000 inhabitants, it is the third largest city of CR. With the surrounding municipalities, which are administratively separated from Ostrava, but form a compact agglomeration with the city, the Moravian Silesian capital would rank as the second largest of the country. Symbolically, the importance of the city has been affirmed by its well-known municipal hall; its 85-m high glassed-in tower makes the building the highest city hall in CR. There are other important centres near the water corridor: Nový Jičín, Kopřivnice, Příbor and Bohumín.*

Praděd – nejvyšší hora Moravskoslezského kraje.

Praděd – the highest mountain of the Moravian-Silesian Region.

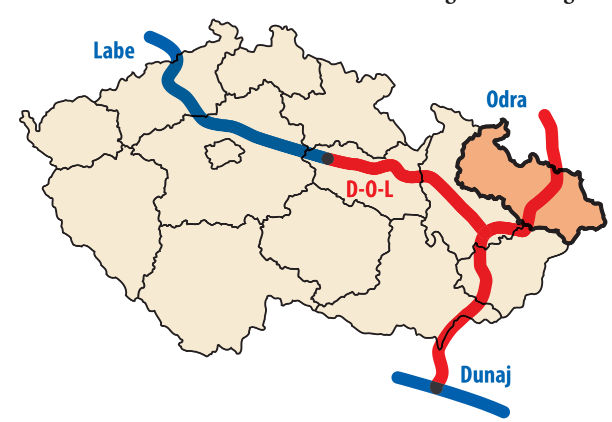
Some contemporary bests, which portrait the region:

The region of Ostrava is the largest centre of coal mining and smelting industry in the Czech Republic. Although the activities do not represent an economic priority any more as they used to in the past, the Ostrava (or rather Karviná) mines and metallurgical works play still an important role in the Czech economy. They are also closely connected with the character of the region.

- Apart other attractions, the Beskids have preserved remains of original forests, smaller peat moors, mountain beechwoods and meadows. Lysá (1,323 ms ASL), the highest mountain of the Beskids belongs to the most tourist-visited areas.
- The High Ash Mountains (Hrubý Jeseník) is dominated by Praděd Mountain (1,491 ms ASL), the highest peak of Moravia. The summit TV tower invites to a view terrace at the highest altitude in the whole CR.
- The spa Lázně Klimkovice rank among the most modern spas of the country.
- The neo-renaissance Silesian Museum in Opava is the oldest museum in the Czech Republic.
- The most significant tourist sights include: the Technical Museum Tatra in Kopřivnice, the Wagon Museum in Studénka, and the Mining Museum in Ostrava-Petřkovice, established in the historical facility of the mine Anselm.
- The fast development of industry and housing in the region after WWII provoked construction of a large number of water reservoirs: Větřkovice (1974–1976), Pocheň (1973–1975), Slezská Harta (1987–1997) – the youngest and largest reservoir of the region, Kružberk (1949–1955), Lobník (1949–1955), Šance (1964–1970), Baška (1958–1963), Olešná (1960–1970), Žermanice (1951–1958) and Těrlicko (1958–1963).
- The water of the water-supply reservoir Morávka (1960–1964) belongs to the best quality surface water resources in the Czech Republic. It is located in the Beskids on the Upper Morávka River.

The list may grow significantly larger in future:

- **The port of Ostrava on the D-O-E water corridor route should tranship far the largest volume than any other port in the country.**
- **Connection of the region to the waterway network will become the most significant development instrument in seeking new economic activities at the expected decline of the traditional ones. The D-O-E water corridor should be viewed as the region's ticket from the tradition to the future.**
- **The water corridor will provide a reliable flood control for all important locations of the region, namely for the major part of Ostrava and Bohumín.**
- **In addition, the recreation and tourist navigation of the corridor route will increase the interest in the culture sights of the region.**



Tradition and future

In the region of Moravian Silesia, namely of Ostrava, the project of the D-O-E water corridor has been always followed extremely closely perhaps for two reasons. First of all, the Ostrava region has been far the largest centre of coal mining and steel industry in the former Czechoslovakia. The "building enthusiasm" of the years of socialism even marked it as a "steel heart of the republic". Extensive transportation demands connected with the mining and metallurgic industries inspired decades of strong efforts to link the region with a waterway network. The main argument of such efforts built on the fact that the Ostrava region is the last area of heavy industry in Europe which lacks connection to the inland navigation. The nearby ending point of the navigable Oder in Kožle was another obvious reason for the attention. The favourable viewing of the D-O-E project had also a certain real outcome, like the Koblov dam, finished in 1937, or the groundbreaking of the Oder–Danube Canal, which took place about 50 kms from Ostrava two years later.

Today, such attitudes could be traced in thorough respecting of the D-O-E water corridor route in the region when other projects are realized, and it is also rather unambiguously defined. Apart from that, it is indisputable that the third stage of the water corridor should be realized not only on the Olomouc Region territory, but drawn as a compact unit all the way to the Ostrava central port.

Let us take up where we have finished with description of the proposed route – in Jeseník nad Odrou, at a terrain point, which offers a convenient descent through a high lock from the summit pool to the level of the Oder valley alluvium. After the PLA Poodří was after-declared, the descent to the alluvium at Jeseník appears rather conflicting, as the route would disturb a short stretch of the meandering stream of this still very small river. Therefore, it was necessary to move the lock of descending branch to the village of Kunín. From this point on the route runs roughly along the edge of the Oder valley past Bartošovice and Albrechtičky to Petřvald, where the second and last high lock is to be established. Beyond the lock, the canal route heads on along the brim of the Oder alluvium to the south fringe of Ostrava, to enter the Oder riverbed. As it has already been reconstructed in terms of direction and even height due to the mining damage, only a certain deepening and partial widening could turn it into a part of the water corridor.

Even after having moved the first descending lock from its original location at Jeseník nad Odrou to Kunín, the route will not avoid the PLA Poodří entirely and cut through some of its border parts. It is thus a question if it should not be entirely modified and led outside this area. Theoretically, it is plausible if it circles the airport of Mošnov from the eastern side. It has to be mentioned, that only in 1930s the proposed route was cutting straight through the airport area (at that time, no plans to create an airport were known) – which routing was naturally optimal. In 1950s it had to yield to military interests, which were hard to by-pass. Return to the original route is now practically impossible. The route circling around the airport from the east would have only a theoretical impact. Such change would not only imply higher investment costs but also take away from the protected area, which attractiveness is based on the artificial water formations. The complex of the Jistebnice lakes laces the western side of the Oder alluvium. A sensitively designed water corridor could very well run along the eastern part of it.

Despite the large level differences which are to be surpassed by the locks at Kunín and Petřvald, there will be no high banks or deep cuts on the route, as both the locks are situated at convenient terrain points. A rather higher dykes and a "elevated" canal bed would be created only between Výškovice and Proskovice, in case the fall of the Výškovice lock (as suggested in some alternative designs) would be elevated by 5 ms and thus the Výškovice pool and the lock of Proskovice would be omitted. On the other hand, the water level elevation could be employed in a town acquapark with an artificial slalom track of the highest parameters, and in other facilities.

Pohled od jistebnických rybníků na údolní nivu Odry a na letiště Mošnov. Trasa koridoru D-O-L prochází zemědělsky využívanými plochami těsně podél letiště mimo údolní nivu a také mimo CHKO Poodří.

A view from the lakes of Jistebnice to the alluvium of the Oder and the airport Mošnov. The route of the D–O–E water corridor leads through farmed areas near the airport, outside the alluvium and Poodří PLA.

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Mezi Košatkou a Proskovicemi ústí do Odry řeky Lubina (vlevo) a Ondřejnice (vpravo). V tomto úseku protíná koridor D-O-L výběžek CHKO. Trasa koridoru prochází převážně zemědělskými plochami (v popředí) a mohla by CHKO obohatit na jihovýchodním okraji stejně, jako ji ohraničuje jiné technické dílo do chráněné oblasti zahrnuté, tj. jistebnické rybníky na severozápadní straně (v pozadí).

Between Košatka and Proskovice the rivers Lubina (left) and Ondřejovice (right) empty to the Oder. The section of the D–O–E water corridor crosses here a spur of the PLA. The route runs mainly through farmland (front). It would vary the southwest brim of the PLA; another technical project – the Jistebnice lakes outline its inner northwest border (at the back).

Pohled na ústí Ondřejnice od západu dokumentuje, jak se trasa koridoru důsledně vyhýbá meandrující Odře, která si v údolní nivě vytváří své koryto podle vlastních zákonitostí – viz „zaškrcený“ meandr v popředí.

The mouth of the Ondřejovice from the west. This photo illustrates how the corridor route carefully steers away from the Oder meanders: the river threads its way through the alluvium by its own ruling – note the hourglass meander to the fore.

V meandrech u Proskovic – na prahu ostravské abglomerace – je řeka stále ještě svobodná...

In the meanders near Proskovice the river is still free as it enters the urban area of Ostrava…

...od železničního mostu Polanecké spojky však již byla spoutána regulačními pracemi, které měly za cíl uspořádání odtokových poměrů v poddolovaném a důlními odvaly zdevastovaném území. To současně umožnilo trasování koridoru jejím korytem.

… while from the railway bridge of Polanecká spojka it is bound in regulating arrangements. They were to deal with discharge situation of the devastated undermined area of spoil banks; they have also allowed the corridor routing through the riverbed.

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Stavba mostu dálnice D1 přes Odru u Mariánských hor respektuje budoucí plavební využívání zdrže jezu ve Lhotce (v pozadí). Snímek zároveň umožňuje srovnání náročnosti dopravních cest a odpovídá na otázku, proč náklady na výstavbu 1 km koridoru nejsou o mnoho vyšší (a velmi často nižší) než náklady na 1 km dálnice.

The motorway D1 bridge across the Oder at Mariánské hory takes into account future navigation of the dam pool in Lhotka (behind). This photo also enables to compare the construction demands of the traffic routes and explained why the construction costs of 1 km of the corridor do not exceed (and often even rate lower) the costs of 1 km of a motorway.

Utilization of the regulated Oder in the Ostrava area for navigation should be achieved mainly through deepening of the riverbed, not by elevation above the current water level. It will considerably increase the discharge capacity as well as the flood control of the adjacent parts of the city. The fixed dam in Svinov would remain basically unchanged. Also the movable one in Lhotka would remain fully in operation, nor would change the water level of its pool. On the other hand, left-bank bypass north of Bohumín. Originally, a piercing with a dam should have been built at Kopytov to cut through (and thus basically ruin) the frontier meanders of the Oder above the mouth of the Olše. It was supposed to regulate draining of the subsidence areas, which had appeared due to extensive coal mining of the part of the pan. After all, the mine subsidences, sometimes even tens of metres deep, were the main reason on all regulations of the Oder and other rivers in the Ostrava-Karviná region. Had the regulations been carried out in 1960s, there would have been lakes in the area, drainable only by pumping. Prognoses of further mining and the related terrain subsidence were truly alarming only 20 years ago. They suggested that if the barrier of frontier meanders had not been removed, a large part of the city would have literally drowned. After the mining had eased up to cease eventually completely in the Ostrava part of the pan, the pessimistic forecasts lost their ground. The frontier meanders are, on the other hand, an increasingly valued natural phenomenon with no parallel on the whole stretch of the Oder from Ostrava to the sea. A compromise solution is the one discussed now – it preserves meanders, but compensates their insufficient discharge capacity by a bypass with a lock. The Kopytov dam and lock should be moved to its route, which would make the Oder navigable all the way to the state border – and complete the third stage and helped to protect Bohumín and the northern part of Ostrava against floods at the same time..

On one hand, the abolition of mining in the Ostrava part of the pan contributes to the technical solution of the D-O-E water corridor, which can use the current adjustments and does not have to ponder on the complicated prognoses of the future terrain changes. On the other hand, such course of development prevents numerous mining and coal processing plants to be serviced directly via water transport. Also the significant metallurgical plants gradually lose the potential contact with the waterway. The Vítkovice metalworks are the closest to the Oder. Even earlier, the plant had an opportunity to transport the ore directly to the ore-yard by water transport via a short branch along the river Ostravice. However, the traditional metallurgical operation in Vítkovice has been abolished and the manufacturing has moved to Nová Huť, which is much farther from the waterway.

It seems that decades of postponing of the D-O-E project realization have left the Ostrava Region rather sceptical, and the planned waterway has disappeared form the priority agenda of the local politics. Concurrently, "the steel heart of the republic" has devalued in terms of the wider Czech or European economy. Ostrava will have to seek

Mezi Přívozem a Hrušovem ústí do Odry zprava Ostravice. Odra (v pozadí) přestává být od tohoto místa „malou říčkou", jakou je nad Ostravou, a vedení trasy vodního koridoru D-O-L jejím korytem se přímo nabízí.

Between Přívoz and Hrušov the Ostravice empties to the Oder from the right. From now on the Oder (at the back) outgrows the size of a "small river" it used to be above Ostrava; the corridor could route directly through its riverbed.

Prostor vytěžených štěrkoven u Vrbice na pravém břehu Odry (na snímku vlevo) nabízí vhodné místo pro rozvoj centrálního ostravského přístavu. Je však zájem i o rekreační využívání alespoň části těchto rozsáhlých vodních ploch pro rekreaci. Vhodnější by tedy asi bylo soustředění rekreace na druhý – levý břeh, kde jsou v prostoru Antošovic rovněž velké štěrkovny.

The area of quarried gravel pits at Vrbice on the right Oder bank (left in the photo) can accommodate a development of a central port of Ostrava. Recreation purposes are also an interesting option, desired at least in parts of the vast water area. Such activities would be advisable to concentrate to the other – left bank, with yet more large gravel pits in Antošovice.

Detailní pohled na vrbická (vlevo) i antošovická (vpravo) jezera. Upravená Odra mezi nimi vytváří zelený pás. Trasa vodního koridoru D-O-L prochází v těchto místech přímo řekou.

A detailed view of Vrbice (left) and Antošovice (right) lakes. The regulated Oder creates a green corridor in between.

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Hraniční meandry Odry u Bohumína trasa vodního koridoru D-O-L důsledně obchází. A to částečně i jezerem bohumínské štěrkovny (vlevo vzadu) a okolo čistírny odpadních vod (vlevo v popředí). V blízkosti čistírny odbočuje ze silnice přístupová cesta k malému překladišti, které bylo využíváno v rámci zkušebních plaveb na Odře.

The D–O–E corridor route carefully circles around frontier meanders of the Oder near Bohumín – side by side with Route No. 78 in Poland which leads on the left bank at the village of Chalupki (in the background on the right). Near the sewage treatment plant (in the front plan on the left) an access road turns from the road to a small berth, used for trial navigation purposes on the Oder.

new supporting economic programmes. It is not that rare. The very same situation has occurred in the Ruhr area, or in the mining and metallurgic centres of North France and in South Belgium. However, if you look for analogies, the waterway connection of these areas represented one of the magnets, which attracted new economic activities once the heavy industry had retreated. The D-O-E water corridor could very well help the Ostrava region in the same way.

The D-O-E capacity water corridor will advantage the location of the region on the north-south transit axis and encourage development of transport and logistic services. For machine works manufacturing complete industrial plants or oversized and extremely heavy products, the waterway could mean indisputable advantage if not a new development impulse.

Exploitation of the potential economic impact of the D-O-E water corridor naturally implies a sufficient ground reserves for development of ports, berths and other consecutive activities along the route. So far, there is proposed the central Ostrava port near Vrbice between Ostrava and Bohumín, where it could make use of the areas flooded after sand gravel quarrying. In Ostrava-Mariánské hory, there is another suitable area with a convenient direct contact with a large chemical plant. Not to forget, there is the planned international economic zone Lutyně–Věřnovice–Gorzyczki at the meeting of the Olše with the Oder. On the other hand, between Ostrava and Jeseník nad Odrou, the D-O-E water corridor should retain as natural character as possible, with no berths on the banks, with an exception of the airport of Mošnov, where an industrial zone connected with the large airport is designed.

Řeka Odra si v oblasti hraničních meandrů nedávno vytvořila novou cestu a původní koryto opustila. Takové projevy říční dynamiky jsou již dnes na větších evropských tocích vzácné a ochránci přírody si jich cení. Méně je oceňují v daném případě orgány dbající o správné vytyčení a stabilitu státní hranice či odborníci, kteří vyhodnocují každoroční nenávratný odnos úrodné půdy vrtošivými řekami. Řešitelé koncepce vodního koridoru D-O-L nefavorizují ani jednu ze stran sporu. Navrhovaná trasa se prostě hraničním meandrům na Odře – a nejen jim – důsledně vyhýbá.

Not a long time ago the Oder abolished its former riverbed and broke its new way through the area of frontier meanders. Such river-dynamic features are rare in Europe and they are highly valued by conservationists. Less enthusiasm the phenomenon stirs among authorities supervising demarcation and stability of borders, or among specialists analyzing the annual soil erosion caused by the wilful river. The D-O-E water corridor designers do not favour either of the side. The proposed route simply stays clear of the border meanders (or other places).

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Soutok Odry s Olší (v popředí) a pohled na polský úsek Odry v prostoru poldru Buków. Oba mosty na snímku již plně vyhovují požadavkům plavby, stejně tak jako parametry řeky.

Meeting of the Oder with the Olše (front) and the Polish Oder in the area of the polder Buków. Both the bridges already comply with the needs of navigation.

Through Poland to the navigable Oder

The section between the ending point of the navigable Oder at Koźle and the border of the Czech Republic spans to mere 50 kms and features a highly convenient conditions for the construction of the D-O-E water corridor – even more favourable than the first stage between the Danube and South Moravia. Moreover, its construction already began in 1939. According to the contemporary concept, the connection should not have joined the Oder directly but only through then recently finished Gliwice Canal. Until the outbreak of WWII, the 6-km stretch of the canal from the pool Nowa Wieś to Kędzierzyn was almost completed. It was finished after the war and today it represents a navigation detour called Kędzierzyn Canal. It runs to the factory port of a large chemical plant (nitrogen factory) and it serves the water transport in the same way as the even shorter section near Vienna connecting the Danube and the port of Lobau. It actually means that 2 % of the entire water corridor between the Danube and the Oder are already used for water transport; unfortunately, it is hardly a statement to boast about.

The technical simplicity of the section between the state border to the navigable Oder was also a reason why it used to be considered a natural first stage of the canal construction. However, the current situation on the Oder waterway proves this postulate largely questionable. It would be a mistake, though, to exclude the possibility, that this stage would become a stage 1a. And not only for the low engineering demands of its route. Most of the alternations would have to be done for other, mainly flood control, reasons. Their realization is time pressing and often is already under its way. The area between the state border and the town of Racibórz is a key to flood control of towns on the Polish Oder. The Oder river basin has a form of a fan on the Czech territory. In a short stretch in the Ostrava region, four rivers meet – the Oder, the Opava, the Ostravice and the Olše. From a small river, the Oder turns into a rather large and especially wilful stream. Concurrent flood waves from all four rivers could significantly endanger the Polish territory, as was last experienced in July 1997. For decades, a large reservoir had been considered above Racibórz, which would effectively decrease culmination of high water, and at the same time worked as a water reserve for navigation on the regulated Oder. For decades, there had been negotiations between the Czech and Polish sides about the concept of the reservoir and the maximum allowable water level. In the end, they decided for stage realization. Its first stage – which has been already finished – is the polder above the village of Buków, which represents the higher (smaller) part of the reservoir. The larger (lower) part, to be finished in the near future, will probably at the beginning also remain only a "dry" polder and only later it will be adjusted in order to hold a certain water supply.

Východní obvodová hráz poldru Buków. V prostoru poldru (vlevo) se soustřeďuje těžba štěrkopísku. Osou poldru může být vedena trasa vodního koridoru D-O-L.

The lateral dam of the polder Buków. Gravel quarrying concentrates to the polder area (left). The D-O-E water corridor route can run in the axis of the polder.

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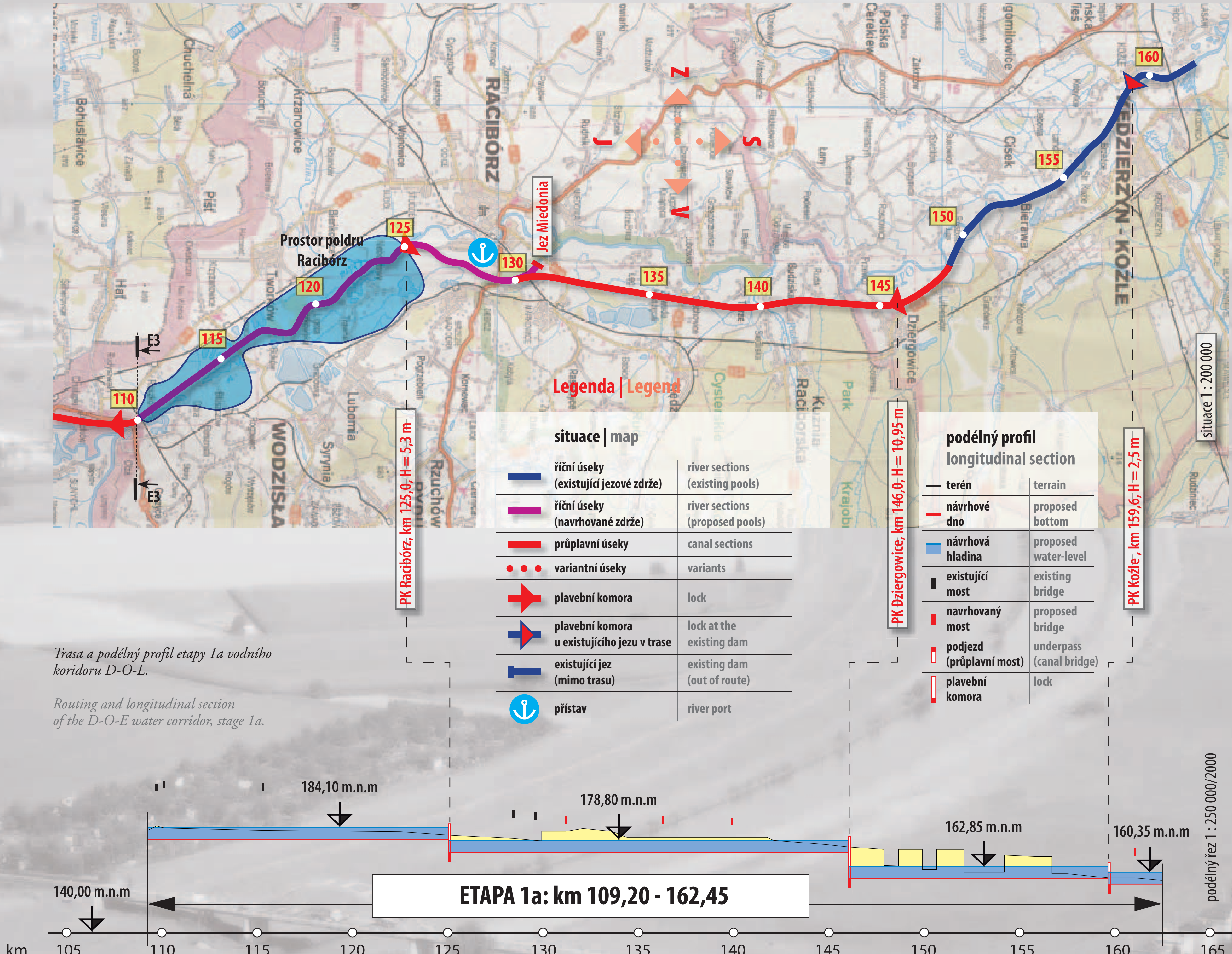

Trasa a podélný profil etapy 1a vodního koridoru D-O-L.

Routing and longitudinal section of the D-O-E water corridor, stage 1a.

Odlehčovací rameno Odry obcházející město Racibórz. Jeho směrové vedení bylo přizpůsobeno požadavkům plavby, kterým v podstatě vyhovují i veškeré mosty.

A flood diversion canal of the Oder circling around Racibórz. Its routing took into account needs of navigation, which basically all the bridges respect.

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Koncový přístav Kędzierzynského průplavu navazuje bezprostředně na území chemického kombinátu. *The terminal port of the Kędzierzyn canal adheres to the area of a chemical plant.*

At a glance, it may seem that realization of the Racibórz–Buków polder could not contribute to the waterway construction much. Quite to the contrary, though. The word “dry“ was quoted on purpose. On the flatland above the town of Racibórz, only a very shallow reservoir could be established, with only a limited volume. In order to increase it, the future polder bottom area has been subjected to extensive gravel sand quarrying, which reaches considerable depths. The bottom of the polder will thus keep water with sufficient navigation depth even at the minimal water level. A purposeful directing of the quarrying could provide a sufficient navigation channel from the state border to Racibórz. The waterway could just “happen” here basically for free.

In the section from the future dyke dam above Racibórz, there is a flood diversion canal, which was built between the wars with the respect to its future integration to the waterway to protect the town. It represents another nearly ready-made stretch of the D-O-E water corridor. From the point where the canal meets the Oder again it is mere 25 kms to reach the navigable part of the Oder. There are basically two alternative solutions. The first could connect with the Kędzierzyn Canal and run along the contour line without any locks. It is actually the route, which was proposed to be built in 1939. The other option (currently favoured by the Polish side) should head as a navigation diversion canal to the pool of the existing dam Koźle, which is again a nearly ready stretch of the waterway. This alternative would call for a lock of a medium fall. At the dam Koźle, again, a new large lock would have to be established, as the existing one, of too small dimensions, is rather a historical sight currently.

Whatever was said about the southern part of the D-O-E water corridor, it is fully true about its northern run. The Polish side will be only interested in connecting the Ostrava region to the Oder waterway if the entire connection of the Danube and Oder is in the game. The hesitant attitude on the Polish side at the negotiations about the prior realization of the stage 1a, i.e. connection of Ostrava to the navigable Oder, only confirmed that. The negotiations have not led to a meaningful result yet although (especially if all the necessary facilities were incorporated in the concept of the Racibórz reservoir), the negotiations did not come to any satisfactory conclusion.

After decades of wasted post-war years, it looks that the better times are about to dawn. In 1998, at the presidential visit of Václav Havel to Warsaw, the cooperation on connection of CR to the navigable Oder was agreed. The Polish president Aleksander Kwasniewski actually expressed his hope to see the Czech vessels with goods navigate to the Polish ports. Subsequently, in 1999, the Czech Ministry of Transport signed a memorandum with the Polish Ministry of Environment, which established a Czech-Polish expert committee preparing documentation of making the Oder navigable between Koźle and Ostrava, with a special respect to realization of the Racibórz reservoir. The mutual Oder committee (OKO) worked relatively intensively until 2003 and drew a quality study for both the Czech and the Polish part of the project. However, other activities ceased later on and the work of the committee was renewed only in 2010 after the appendix of the memorandum was signed. The appendix enhanced the task of the Czech-Polish Workgroup by negotiating issues of the D–O–E water corridor – therefore the committee is called DOE now. The Slovak Republic joined the committee as an observer in 2011.

Modernizovaný jez v Koźle vytváří poslední z řady zdrží vodního koridoru D-O-L. Historická plavební komora vedle jezu má ovšem rozměry jen 41,9 x 5,34 m, se kterými se dnes mohou spokojit jen sportovní plavidla či malé osobní lodi.

A modernized weir in Koźle creates the last of the D-O-E water corridor pools. The historical lock next to the dam has dimensions of only 41.9 x 5.34 ms, which presently accommodates only pleasure boats and small passenger vessels.

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Pardubice Region

The region is located practically in the centre of the country; its area stretches to 4,519 kms². Although its population (0.510 mill.) classifies it as one of the smaller regions, its strategic location and convenient link to transport infrastructure marks it as a perspective one. Almost the entire route of the fourth stage of the D-O-E water corridor runs through its territory.

***The regional capital Pardubice** has a population of 91,000; it is an industrial and trade centre of the eastern Elbe basin area. It lies directly on the D-O-E water corridor route. On the route or nearby, there are also other towns: Česká Třebová, Ústí nad Orlicí, Choceň and Vysoké Mýto.*

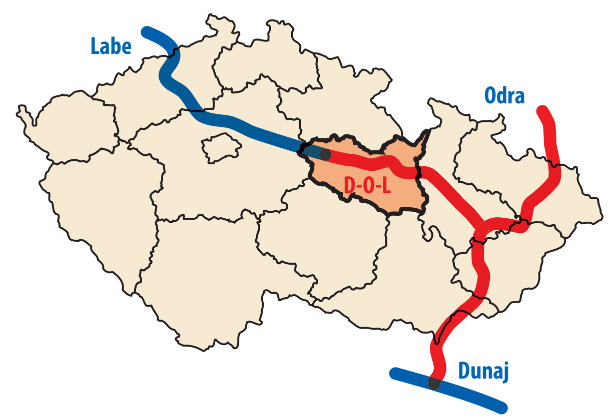
Labe pod Kunětickou horou. *The Elbe River near Kunětická hora.*

Some contemporary bests which portrait the region:

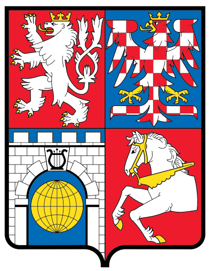
- Agriculture plays traditionally and important role in the regional economy. Invention of a cast-steel plough significantly stimulated technological progress of farming in much wider that just regional terms; it was invented by cousins Veverkas from Rybitví near Pardubice in 1824–1827.
- Fishpond cultivation has also a long tradition; developed especially in the times of Vilém of Pernštejn, in 16th century the largest pond constructions of Polabí (Elbe Lowland) flooded hundreds of hectares of land (the artificial lakes Čeperka, Oplatil, Bohdanečský etc.). Fishpond construction brought along some remarkable water management constructions. At the turn of the 15th and 16th centuries, the renowned Opatovicce Canal was built to feed the ponds with water. It has been preserved until today.
- Horse breeding is also of a very long tradition in the region. The most recognized regional breeding farm is definitely in Kladruby nad Labem. In Slatiňany, there is a hippological museum, which is unique in Europe. It holds over 2,100 exhibits of the horse breeding history.
- Some significant personalities of technology, transport and industry development were born in the region, e.g. Jan Kašpar, a pioneer of flying, Josef Ressel, the screw-propeller inventor.
- One of the largest centres of chemical industry has developed in Pardubice, therefore, both agriculture and industry are well balanced in the region.
- Pardubice holds some important sports events, which go far beyond the border of the region or the country: Golden Helmet Motorcycle Speedway Race was first organized in 1929, and it has been worldwide known ever since. The oldest steeplechase race on the Continent has been held since 1874; it is the second hardest horserace event of the world.
- **The region has got a geographical speciality, which is connected with the main European watershed. It is Králický Sněžník, located in the northeast spur of the Pardubice Region and it is its highest mountain peak (1,424 ms ASL). It is sometimes called "the roof of Europe", as at the summit, the main European watershed is joined even by the watershed divide between the Elbe and the Oder. Water from its slopes is run down in brooks, rivulets and rivers in three directions: to the Black, North and Baltic Seas.**
- **At the same time, still on the territory of the region, the main European watershed descends to low altitudes: the gaps near Česká Třebová are the lowest spots on the watershed divide between the Danube and the Elbe. Although they are not as convenient, they form a kind of analogy to the Moravian Gate.**
- Building of reservoirs continued the tradition of old water management construction engineering from the times of Vilém of Pernštejn; the most popular reservoirs of the region include: Pastviny and Nekoř (1933–1938), Hamry (1907–1912), Křižanovice and Práčov (1948–1953). The dam Pařížov, built in 1909–1913 in the beautiful valley of the Doubravka River, is one of the most beautiful dam constructions in the Czech Republic. There is also the reservoir Seč, built on the Chrudimka River in the very centre of the PLA Železné Hory, and the reservoir Hvězda, which is actually a reconstructed artificial lake, built in 1378 by Albrecht of Šternberk, which makes it the oldest in the region.

Budoucnost však může níže uvedený počet nej rozšířit:

The routing solution of the D-O-E water corridor in the Pardubice Region is serious challenge for bold designer engineers mainly for two reasons. Firstly, the gaps at Česká Třebová are still higher than the Moravian Gate; to lead the water corridor across will call for some more complicated facilities. Secondly, the area offers an opportunity to combine the water and the high-speed railway corridors. If such combination succeeds, it could be a "project of the century" with the top shelf technological, economic and environment-improving parameters. That would remarkably increase the tourist attractiveness of the region.



The waterway corridor in Pardubice Region – a serious designing challenge



At its lowest part, the watershed ridge between the Danube and the Elbe is about 120 ms higher than the area of the Moravian Gate. Also the morphology of the terrain, which divides the watershed to the Haná side and the Elbe flatland on the other side, is far from favourable for the D-O-E water corridor routing. Searching for optimal solution has never been an easy task. It gave birth to a large number of alternative solutions; neither of them has been so far chosen as the final one, although it is safe to say that from the large choice there are basically two, vastly different alternatives remaining. As another consequence of the section demandingness, it has always been considered as the fourth stage to be built, the last one, realized rather in farther future.

When describing the technical possibilities for surpassing the altitude differences on the waterway, it was said that the concerned section of the Elbe branch is pretty much the only one suitable for effective application of boatlifts, i.e. boatlifts of extreme falls. The two options considered have already been marked as the lift and lock alternatives. The official solution has so far favoured the lift one, although modified. Nevertheless, we present it as an alternative and in the graphic insert we prefer a more exact documentation of the modernized lock route for its indisputable, while still underestimated advantages.

The lift route heads for the watershed through the Třebůvka River valley, which it enters at Loštice. Let us remind you of the above-mentioned conclusion, that the access to the valley leads only through the PLA Litovelské Pomoraví, which handicaps, if not disqualifies, the alternative rather heavily. Neither the entrance to the valley is easy – according to the last solution, it would require a shorter navigation tunnel. On the other hand, pass through the valley around Bouzov and Vranová Lhota would be technically rather simple all the way to Pěčíkov. Pěčíkov offers an exceptional advantage as an approximately 100-m lift could be established there, allowing ascend to the 390 ms ASL, to the altitude of the summit pool, through a single boatlift. Why should such extreme concentration of fall be seen as an advantage?

First of all, the only boatlift would substitute for four high locks, which is very interesting in the least. However, that was not the chief reason of searching for a convenient place for such a high lift. 1960s saw the main and prevailing purpose of a waterway in transferring water and in the energetic effect of repumping. A long summit pool, bordered with the highest possible lifts or inclines on both the ascending and descending branches then seemed an optimal solution from the energetic point of view. It was actually a highly efficient pumped storage hydropower station. They had even managed to find the “mirror image” of Pěčíkov at Zálší near Choceň, where another 100-m incline could be established, allowing descend directly to the level of the Elbe flatland. The only remaining problem was to find a convenient route of the summit pool, which would connect, optimally on the contour level both the locations – Pěčíkov and Zálší. The route was then to run from Pěčíkov via Staré Město north from Moravská Třebová to the watershed at Třebovice and then past Česká Třebová to the Řetůvka River valley to Zálší. Running the D-O-E water corridor route in this line is far from easy. In the very beginning, it was clear that it would call for navigation tunnels (especially at Třebovice, where a deep cut is out of question for the inconvenient geological reasons) or canal bridges across the deeper valleys, which the route cannot avoid. All the same, in 1960s the lift route seemed to be the correct and sharp solution for the easiest possible pass across the watershed. Moreover, when compared to the earlier routing through the Moravská Sázava and Tichá Orlice valleys, it featured remarkable advantages. Along with a considerable lower number of locks or lifts, it prevented any collision with the main railway (corridor) lines running through the valleys.

In the following years, as the lift route was being more specified, its advantages seemed to give way to ever longer stretches of problematic sections. The change of limits, which outlined the large transport of water management project in their relation to environment, also played its role. Step by step it led to efforts to reduce the environmental conflicts, or rather to their entire elimination. That was only possible with gradual increase of extremely costly solutions, especially prolonging of the navigation tunnels. Today, it seems hardly advantageous to tackle the pass across the watershed with two extremely high lifts. The idea of two high falls on each end with an efficient pumped storage hydropower station connected to the summit pool has lost its topicality to remain a criterion of convenience for the solution.

One of our most significant hydro-engineers, Ing. Libor Záruba-Pfefferman, who holds credits for domestic world-class water projects, used to say that waste bin is the most valued device of every designer. He was right. Even after hundreds hours of work, when the designers reach the best possible solution, they should still be able to discard it as soon as a suspicion arises that there may be a different, more convenient way how to achieve the assigned goal. Even if it involves new and cleverer interpretations of principles, which has seemed to be outdone.

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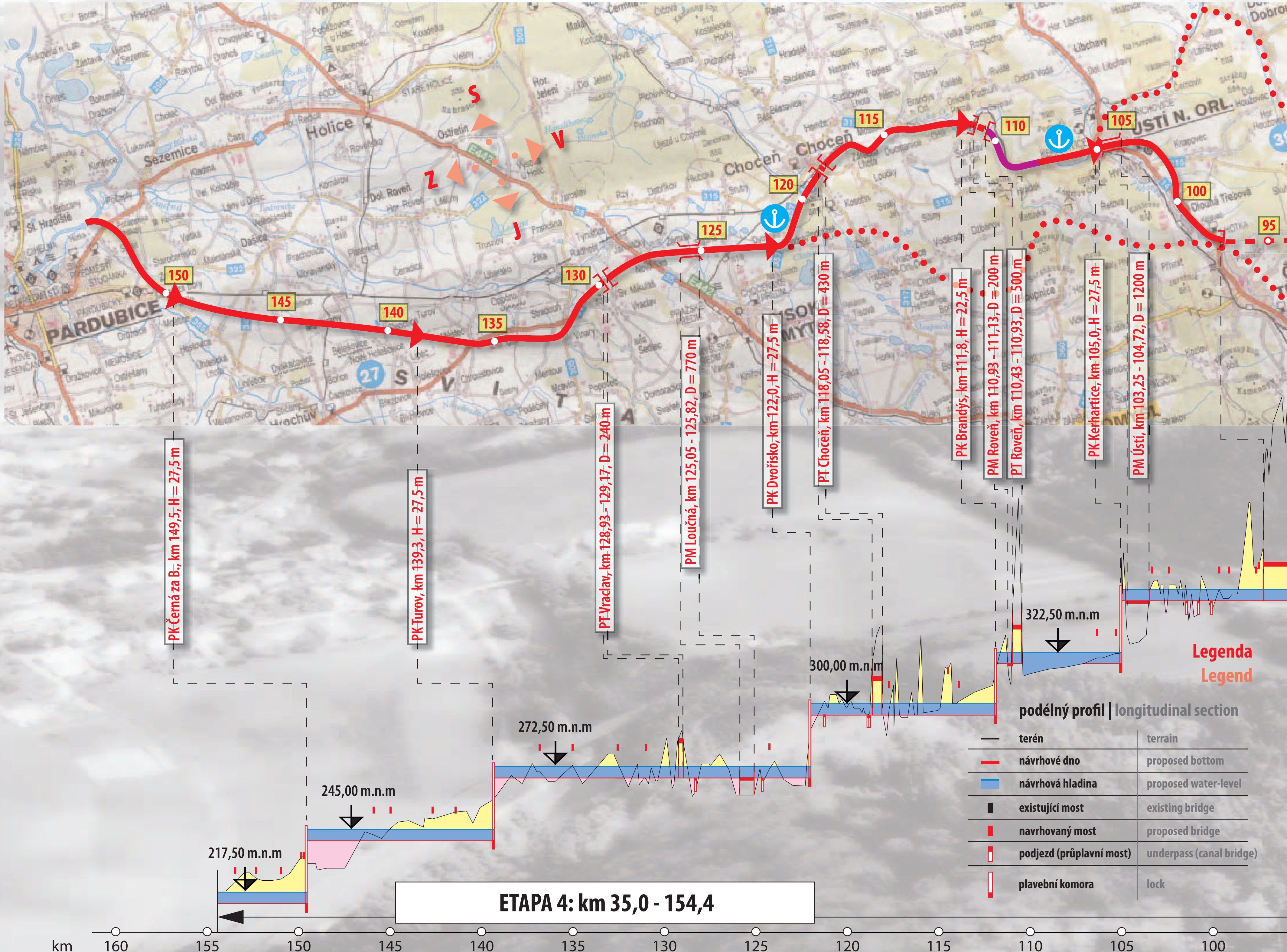
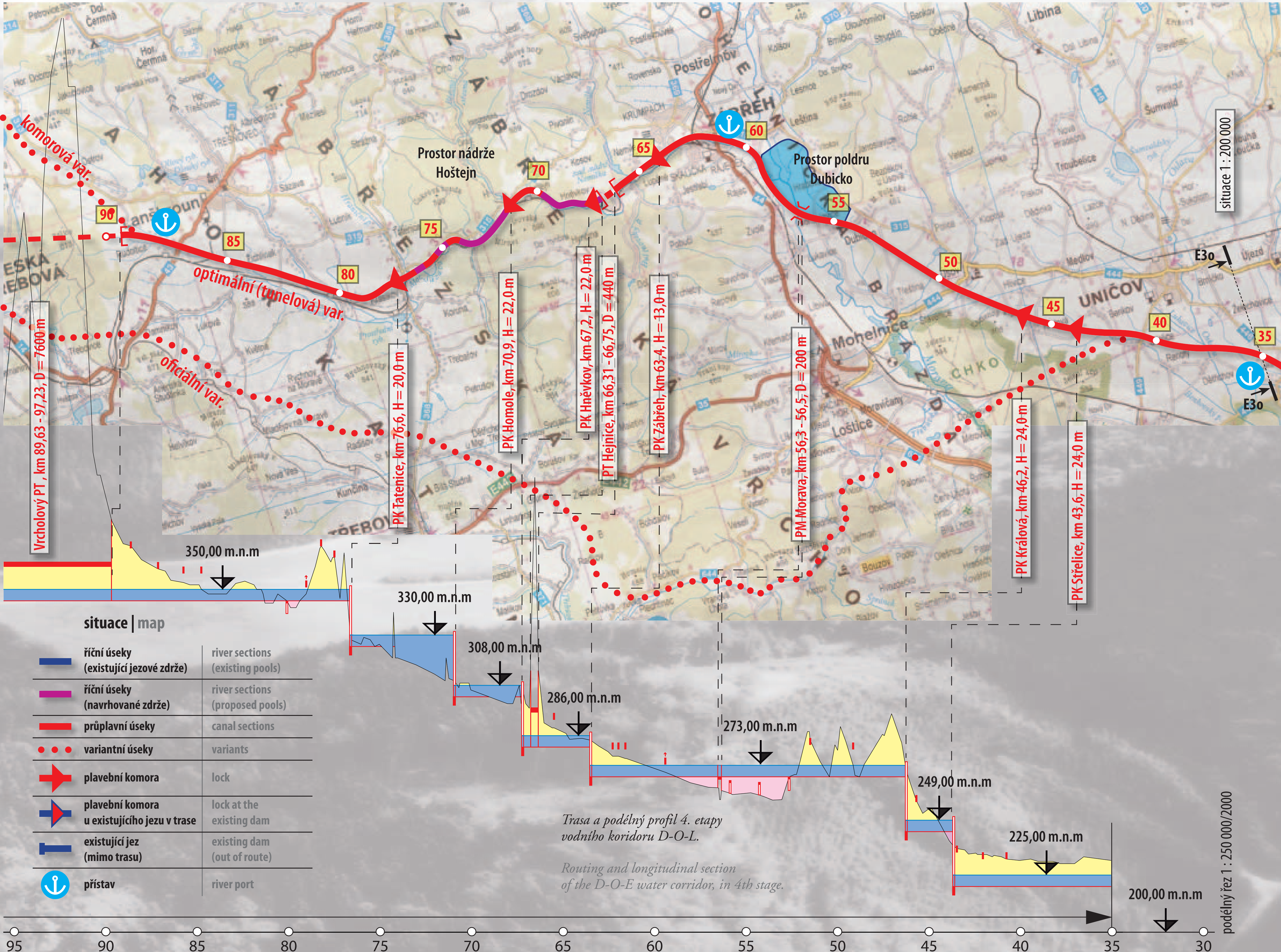

PK Černá za B., km 149,5, H = 27,5 m
PK Turov, km 139,3, H = 27,5 m
PT Vraclav, km 128,93 - 129,17, D = 240 m
PM Loučná, km 125,05 - 125,82, D = 770 m
PK Dvořisko, km 122,0, H = 27,5 m
PT Choceň, km 118,05 - 118,58, D = 430 m
PK Brandýs, km 111,8, H = 22,5 m
PM Roveň, km 110,93 - 111,13, D = 200 m
PT Roveň, km 110,43 - 110,93, D = 500 m
PK Kerhartice, km 105,0, H = 27,5 m
PM Ústí, km 103,25 - 104,72, D = 1200 m
217,50 m.n.m
245,00 m.n.m
272,50 m.n.m
300,00 m.n.m
322,50 m.n.m
ETAPA 4: km 35,0 - 154,4
km 160 155 150 145 140 135 130 125 120 115 110 105 100
Legenda
Legend
podélný profil | longitudinal section
terén | terrain
návrhové dno | proposed bottom
návrhová hladina | proposed water-level
existující most | existing bridge
navrhovaný most | proposed bridge
podjezd (průplavní most) | underpass (canal bridge)
plavební komora | lock



Trasa a podélný profil 4. etapy vodního koridoru D-O-L.

Routing and longitudinal section of the D-O-E water corridor, in 4th stage.

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Dunajsko-labské rozvodí v prostoru České Třebové probíhá po výrazné terénní hraně, svažující se strmě k povodí Dunaje (k Moravě) a povlovně do Čech. Z geologického hlediska se jedná o cuestu, tj. terénní útvar s jedním povlovným svahem daným sklonem vrstevních ploch. Hlavní trať (v pravé části obrázku) šplhá až k úpatí strmého svahu (přičemž se obě koleje proplétají, jak je na pohledu jasně vidět), v posledním úseku se však její stavitelé rozhodli pro tunel. Podobným – avšak podstatně delším – tunelem je možno převést přes tuto bariéru na kótě 350 m n. m. i vodní koridor D-O-L. Východní portál by byl na okraji lesního masivu, kterým je pokryt strmý svah.

The Danube – Elbe watershed near Česká Třebová runs along a sinewy terrain crest, diving the catchment area of the Danube and gradually sloping down to Bohemia. It is a terrain unit with a gentle slope defined by an incline of superimposed layers (so-called cuesta). The main railway route (in the right corner) climbs to the base of the steep slope, while its tracks interlace, as clearly shown in the photo. In the follow-up section, however, the designers decided for a tunnel. The water corridor D-O-E can surpass the barrier in a similar – although significantly longer – tunnel at 350 ms ASL. Its eastern portal would enter at the forest line of the steep slope.

In case of the D-O-E water corridor section in the Danube-Elbe watershed area, it means a return to the "old" lock alternative, or rather its new reinterpretation. The chapter on the Olomouc Region has already established its major advantages: it entirely avoids the PLA Litovelské Pomoraví and allows easy realization of the Dubicko polder. On the other hand, the lock route has to break through the narrow valleys of the Moravská Sázava and Tichá Orlice and intrude itself into the slim space, which has been left behind the railway corridor. It runs along here the left there the right side of the valleys and at times creates a truly impassable barrier.

However, concurrence of the D-O-E water and railway corridors could be treated even differently, if you get back to the above-mentioned cooperation of different types of transport in multimodal corridors, which could very conveniently appear in line with the D-O-E waterway.

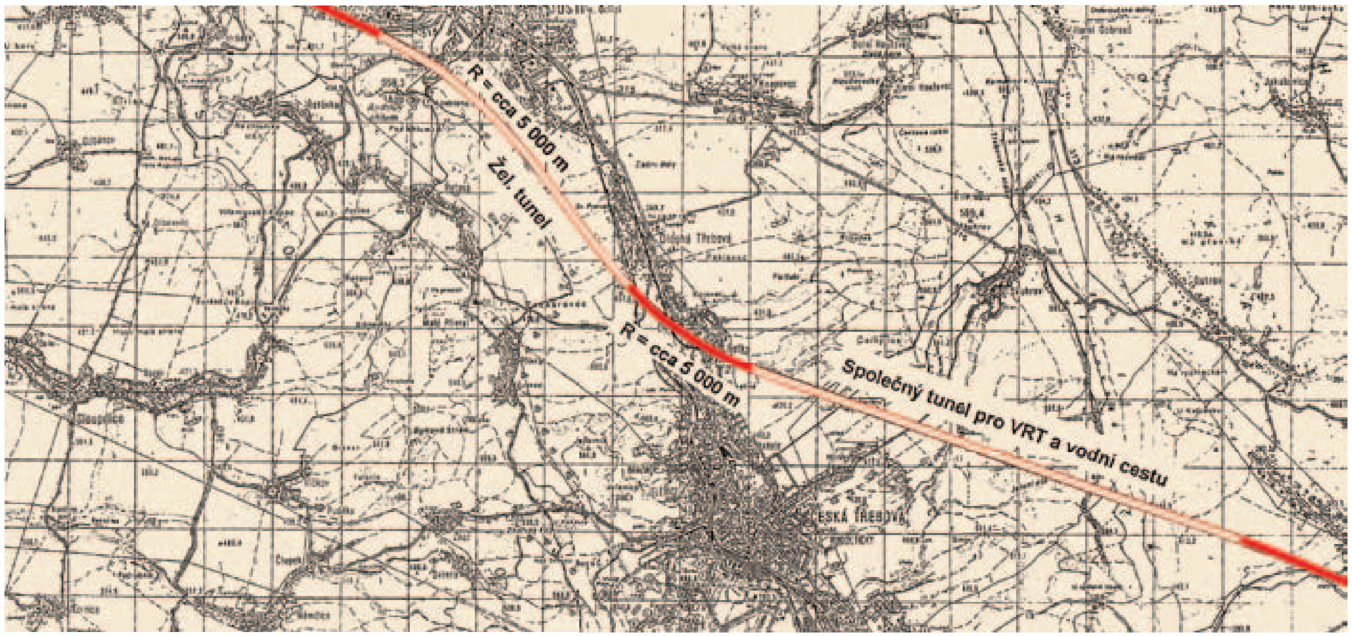
Gradual conversion of the traditional transit corridors into high-speed railway lines could create one element of such project. The process is relatively easy to carry out almost everywhere, with the exception of the above-mentioned valleys, as no sub-corrections would lead to the basic parameters, i.e. the line speed of conventional fast trains about 200 kms/h, and about 300 kms/h with high-speed units. Such speed requires a track route with minimal radii of bends 5,000 or even 7,000 ms. To squeeze such radii into the valleys of the Moravská Sázava and the Tichá Orlice is absolutely implausible. To achieve the high-speed parameters from Zábřeh na Moravě all the way to Choceň would only be possible if the corridor avoided the valleys entirely and a new railway route was constructed.

The radical route transfers will naturally meet objections to their extremely high costingness. However, it is imperative to compare total costs spent on the prospective transport infrastructure as such. One of the scenarios which does not respect mutual coordination of both projects will be characterized by a sum of costs spent on hundreds of kilometres of entirely new high-speed railway tracks and on the more demanding routing of the D-O-E water corridor across the Danube–Elbe watershed, which call for a number of partial route transfers and compromises. The other alternative will require investment costs on the gradual conversion of the existing transit corridors, including the costly tunnel transfers in the above-stated short section, which is going to be considerably balanced by savings at realization of the D-O-E water corridor in the "freed" valleys. One glance only proves the second scenario to be worth minimally some decent attention.

If you have agreed on such argument, it is rather simple to imagine the easy routing of the D-O-E water corridor through the water valleys of the Moravská Sázava and Tichá Orlice. It would be characterized by a meandering route requiring minimal excavation work. In places it would spread into shallow "lakes" employable in recreation, which would thrive in the peaceful environment with no loud railway. Routing through the Moravská Sázava valley would offer another special advantage: The water corridor could be easily connected with the large reservoir at Hoštejn on the Březná River, which due to

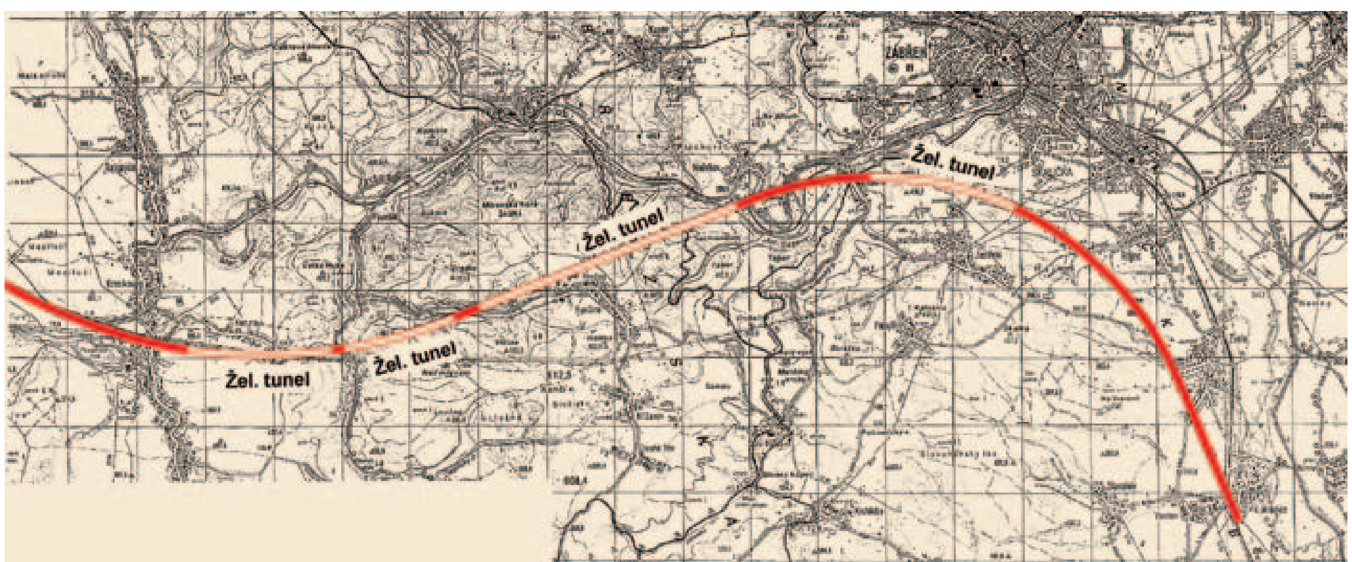
Názorná ukázka možné modernizace traťového úseku Choceň–Ústí nad Orlicí, při které by byly respektovány parametry platné pro vysokorychlostní trať, tj. zejména poloměry oblouků větší než 5000 až 7000 metrů. Z této podmínky vyplývá, že by trať musela zcela opustit stísněné a křivolaké údolí Tiché Orlice. Tím by se podstatně zjednodušilo vedení vodního koridoru D-O-L.

An example of possible modernization of the railway stretch Choceň – Ústí nad Orlicí, which takes into account parameters of a high-speed track, i. e. radii of bends larger than 5,000 to 7,000 ms. Such condition implies that the track would have to leave entirely the narrow and twisty valley of the Tichá Orlice. The D-O-E water corridor routing would thus become much easier.



Další příklad možného vedení vysokorychlostní železnice mimo uzel Česká Třebová. Vyžádal by si výstavbu dvou dlouhých tunelů. Jedním z nich by však bylo pravděpodobně možné převést vodní koridor D-O-L. Je to jen fantazie?

Other example of an appropriate high-speed railway routing is near the Česká Třebová junction. It would call for two long tunnels, one of which could probably accommodate even the D-O-E water corridor. Is that just fantasy?



Zcela obdobná jako v údolí Tiché Orlice je situace v údolí Moravské Sázavy. I tam by vedla radikální modernizace železniční trati k úplnému „uvolnění“ tohoto údolí.

A situation in the valley of the Moravská Sázava is quite similar to the one of the Tichá Orlice valley: a radical modernization of the railway track would ”clear” the valley entirely.

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the morphology, would only call for a not very expensive dam. Its flooded area would interfere with the traffic network or housing development only minorly. We dare to mention that only rather sheepishly as we can already hear the protesting voices that the waterway is of no need for such reservoir, and thus is the only cause for the flooded valley of the Březná. However, it is far from true. Considering, even just hypothetically, that in some 100 years, the pessimistic forecasts of greenhouse effect come true, as well as those of disaster collapse of Central European water balance, it will be necessary to lean the balance far more on the Danube, to transfer much larger volumes of water – but only in shorter periods which would correspond with the high discharges of this large stream. Most probably, it would be necessary to accumulate part of the water. Suitable reservoirs would have to be found (with the largest possible volume and smallest possible flooded area); they could be established even in places with no natural outlet, limited only by easy transfer of the pumped water. The reservoir on the Březná meets all such standards, as it is directly on the waterway route. There is another reservoir possibility on the Oder near Spálov, although it is quite distant from the route. However, it could concern more than just Danube water. The chapter on water management balance has already mentioned the re-distributional function of the water corridor, which should guarantee that virtually every drop is captured not to leave the country without being utilized – or even causing flood damage on its way. To achieve such goal, the river basin of the Morava above the Bečva mouth would have to be fitted with a reservoir of hundreds of millions

Prvé kilometry trasy údolím Moravské Sázavy nad Zábřehem jsou poměrně jednoduché a nečinily problémy ani budovatelům železnice, podél níž by mohl být trasován paralelně vodní koridor D-O-L až po obec Lupěné (vlevo v pozadí).

The first kilometres of the Moravská Sázava valley above Zábřeh are relatively simple, as they were for designers of the railway route, along which the corridor could run up to the village of Lupěné (rear left).

Zaklesnutý meandr Moravské Sázavy u Hněvkova (na snímku vlevo). Hlavní železniční trať obcházela jeho jádro za cenu oblouků s nevyhovujícími poloměry (foto 2004).

A locked meander of the Moravská Sázava at Hněvkov (left). The main railway route circles its core at the expense of unfavourable radii of bends (photo 2004).

V rámci modernizace druhého železničního koridoru byly nevyhovující oblouky eliminovány tunelem, který protíná meandr, resp. vrch Hejnice. Krátkým tunelem pod tímto vrchem může být vedena i trasa vodního koridoru D-O-L, která v tomto úseku prochází paralelně s železniční tratí (foto 2007).

Modernization of the second railway corridor eliminated the inconvenient bends with a tunnel, which cuts the meander or rather the hill Hejnice. A short tunnel through this hill could accommodate even the route of the D-O-E water corridor, in this section running alongside the railway track (photo 2007).

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Pohled na údolí Moravské Sázavy pod Hoštejnem. Trasa hlavní trati přimykající se jednou k pravému a záhy k levému svahu údolí samozřejmě průchod vodního koridoru D-O-L, jehož vedení údolím by bylo jinak velmi snadné, komplikuje. Přesto nabízí trať z hlediska přípustných rychlostí jen omezené parametry.

The Moravská Sázava under Hoštějn. The main railway route, clinging alternatively to the right and then left slopes of the valley, complicates the otherwise easy routing of the water corridor through the valley. However, the track offers only limited parameters of allowable speed.

Průchod městem Ústí nad Orlicí patří k největším problémům komorové trasy, která musí v tomto místě přejít z pravého svahu údolí Třebovky na levý svah. Nejvýhodněji se zatím jeví přechod 1,2 km dlouhým akvaduktem nad rozsáhlým areálem textilní továrny a nad železniční tratí.

A pass through the town of Ústí nad Orlicí represents a major problem of the lock-fitted route, as it is to move from the right slope of the Třebovka valley to the left. A 1.2 km long aqueduct above the large area of a textile factory, and railway tracks appears the most convenient so far.

Zaklesnutý meandr Tiché Orlice u Sudislavi proti proudu od Brandýsa nad Orlicí. Snímek dokumentuje nevýhodné poloměry hlavní železniční trati. Souběžná trasa vodního koridoru D-O-L by protnula jádro meandru průplavním tunelem.

A locked meander of the Tichá Orlice at Sudislav upstream from Brandýs nad Orlicí. The photo shows inconvenient radii of the main railway route. A parallel waterway would cut the meander core with a canal tunnel.

cubic metres. Such facility is impossible to be established in the Haná flatland, but only on the very upper stretches of the Morava and its feeders, in the mountain valleys. The hydrological conditions of the area are so inconvenient, though, that the condition of maximum capture of surplus discharges would not be met even with ten such reservoirs. On the other hand, the only reservoir at Hoštejn could – owing to the direct link to the D-O-E water corridor – satisfactorily manage the entire drainage of the Morava below the mouth of the Moravská Sázava, plus of the Tichá and Divoká Orlice on the Czech side of the watershed. It could easily become a crucial reservoir for the problematic water management of the river basins of the Morava above the Dyje and the Elbe above the meeting with the Vltava. It is again necessary to mention that the waterway truly does not need such reservoirs, the water management, on the other hand, will be in an urgent need of them in the time of our great grandchildren's adulthood. We do not say more than that there are such options, which should be viewed as a benefit of the D-O-E water corridor, not as its negative feature. By no means it is trying to say that the D-O-E water corridor routing solution could not do without larger reservoirs or costly transfers of concurrent railway tracks.

The last studies of the lock route suggested some further simplification of its solution. It is quite clear that locks are operationally speaking more convenient than boatlifts, as they allow one-time locking of even longer convoys. However, it is not to be omitted that this feature could turn less advantageous when there are too many successive locks on a relatively long route given by the pass over the watershed. Although the watershed in Dobrouč gap is quite morphologically and geologically convenient, it requires a rather significant deflection to the north. The entire section between Střelice and Dvořisko u Chocně would thus call for 13 locks, while the lift alternative only for 4 locks and 2 high rise lifts. The engineers tried to shorten the lock route as well as reduce the number of its locks. It was rather tempting to lower the summit pool, resign on the lowest spot of the continental watershed and build a navigation tunnel. However unconvential the proposal is, it does not steer that far away from common practice to be found too odd. We have already mentioned the longest navigation tunnel of the world, which was built in France at the beginning of 20th century. It is 7.12 kms long and its profile is larger than the one required for the D-O-E water corridor purposes. It was built by conventional tunnelling methods, which have been long outdone by the modern methods especially due to constructions of motorway tunnels. The efforts to find a tunnel route with the summit pool at the considerably lower altitude was thus by no means inept – the lift route had to count with tunnels anyway. Eventually, between Rudoltice and Dlouhá Třebová, there was designated an area, where the watershed could be surpassed in a tunnel of 7.6 kms, while the current altitude of the summit pool was lowered by 40 ms, the route length was reduced, and the number of locks got smaller by 4. However, the gained savings, especially on the four locks, would be exceeded by the extra costs on the long tunnel.

The approximate comparison of the main features of individual alternatives of the section Střelice–Dvořisko u Chocně are best shown in a simple table.

Characteristic value	Variant		
	Lift option	Lock option (without a long tunnel)	Lift opton (with a long tunnel)
Length of the route in the respective section (kms)	80	86	78
Number of lifts	2	0	0
Number of locks	4	13	9
Number of locks and lifts (altogether)	6	13	9
Total length of canal tunnels (kms)	8,00	3,20	8,97

Construction of 7.6-km tunnel between Rudoltice and Dlouhá Třebová brings about the question of transport capacity of the waterway. The tunnel would naturally be one-vessel only in order to keep its costs bearable. It seems that the problem has a solution; moreover the tunnel has one rather important feature: very conveniently, it could accommodate even the high-speed track, which would thus avoid not only the junction of Česká Třebová but also the unfavourable bends to the east and west of the tunnel. Thus, it would deal with the last obstacles in the way of "new generation expresses" on this spinal line connection.

Nevertheless, it should be admitted that the final choice of the optimal routing of the D-O-E water corridor in the area of the Danube–Elbe watershed is not an easy one. Wide and largely unconventional solutions are in the game and the final word has not been uttered yet. Let us lighten the topic with the following description, which leaves behind the demanding terrain and moves to the area of Dvořisko u Chocně. All the proposed alternative routes again meet up there and the next part of the route leads through a rather simple terrain to the south from the main railway line all the way to the eastern outskirts of Pardubice, where it crosses the track and finally joins the Elbe. That is also, where our tour comes to the end.

At conclusion of the chapter, there is one note only to be added. Although it could seem that the attention to the fourth stage of the D-O-E water corridor realization in the complex of concurrent types of transport would be directly proportional to the complexity of the problematic, it is rather the other way round. There have occured partial adjustments of railway corridor routes while the designers are not aware of the fact that there is a certain interest in realization of a waterway in the area. The attention of respective authorities to the solution of the project in this demanding section equals zero. Thus, conflicts are rather being produced than efficiently resolved.

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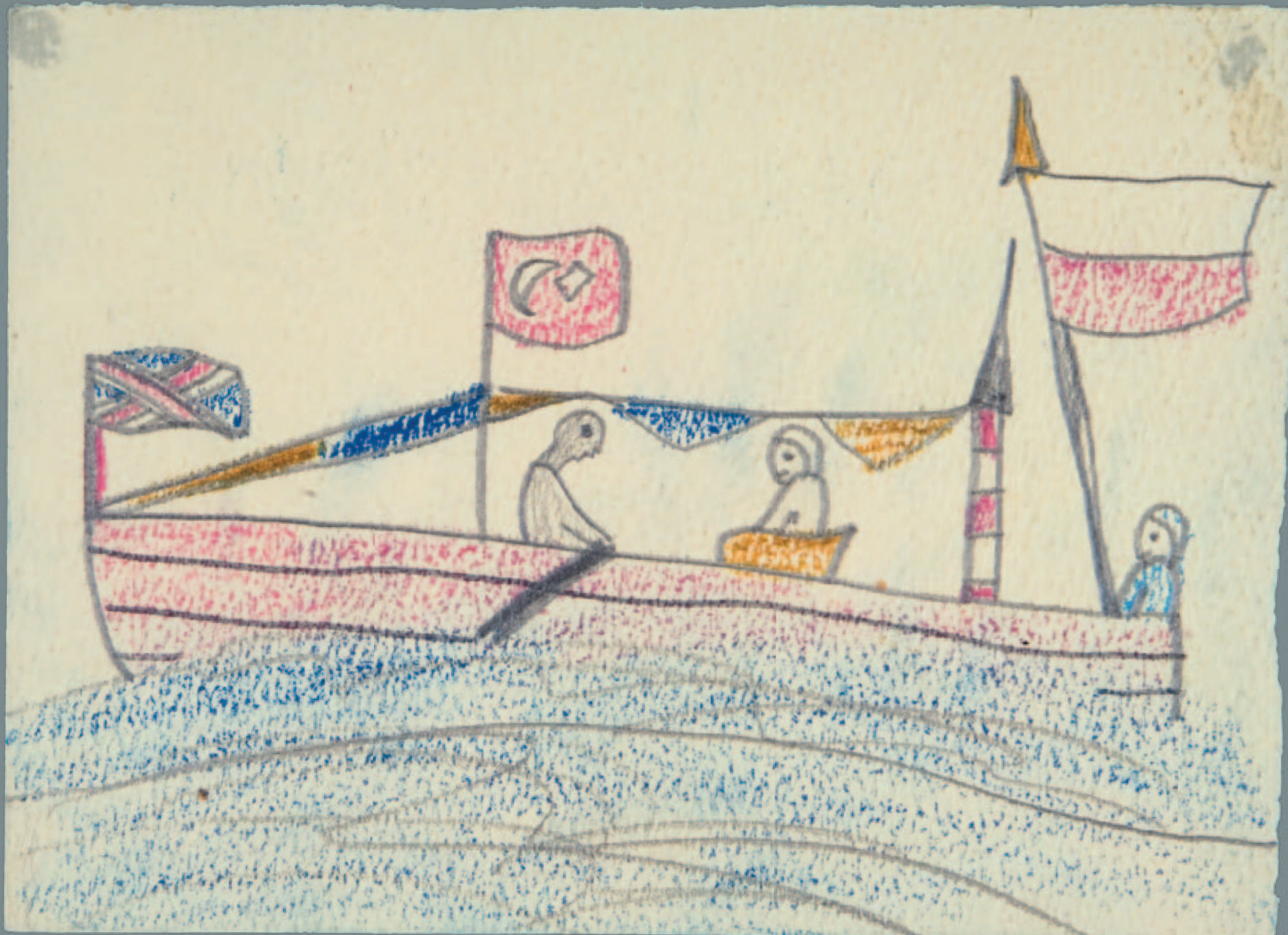

Kamil Lhoták

There were people who tried to convince me that there is not enough money to build a solid road across the country, to build a system of water-ways, to build a nation-wide railroad structure, that there is not money for anything…, simply that we are a small nation that must improvise, crouch down, etc. However, this had been before we managed to earn so many billions for armament, only for a fragment of which we might have constructed everything.

Let's build a state
for 40,000,000 people
J. A. Baťa, 1937

Ekonomika je nesmlouvavým soudcem

The uncompromising voice of economy

VII

Uskutečnění jakéhokoliv projektu, i když se může zdát na první pohled lákavý, se neobejde bez odpovědi na lapidární otázku: vyplatí se náklady vložené do jeho realizace a provozu? Projde sítem ekonomických kritérií, které není právě propustné či řídké? Odpověď musí být věrohodná a jednoznačná. Nepomůže žádná rétorika: takovou odpověď je třeba doložit objektivními fakty a spolehlivými – tedy spíše opatrnými – prognózami. Pokusme se ji nalézt.

Realization of any project, however attractive at first sight, needs to answer a simple question first: will the investment and operation costs pay off? Will the project pass a close screening of economic criteria? The response needed is to be a credible and explicit one. No rhetoric will help: such answer must be supported by unbiased data and trustworthy – i.e. rather cautious – prognoses. Let us try to find it.

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Methodology of Economic Assessment

Economists use various methods in order to express economic benefits or, in contrast, inadvisability of any business or project. However, their principle is always the same and is actually (but only seemingly) quite simple. It means comparison of all costs on one pan of scales with all revenues on the other pan. The problem however is that individual items are not usually spent – or "collected" – at the same moment of time. One hundred CZK you borrow today don't equal the hundred crown banknote your debtor pays you twenty years from now. It is necessary to take into account that money (or capital if you prefer) has one special quality: over a period of time – if it is reasonably spent, used for profitable business or only deposited with a reliable bank – money can multiply and change its value. With investments in traffic infrastructure (thus also in case of the D-O-E water corridor), this phenomenon – or time factor – manifests particularly strongly, as these are projects with long life. Traffic infrastructure constructions can be completed in several years, but they are subsequently used for tens or hundred years. Even if built in stages, i.e. over a longer time span, the time factor effect does not diminish with them – by contrast it may become even more important.

Actually, the time factor can be expressed by interest bearing (or discount) of all cost and revenue items as at one instant of time. However, a question of interest rate arises then.

If we apply, for a comparison of revenues and costs over a period tens of years, a low interest rate, e.g. only 3 %, we will be too benevolent to expensive projects, while if we apply, in contrast, a high interest rate, e.g. exceeding 10 %, we will be unjustly strict. A suitable starting point can be by the method of internal revenue rate also known under the abbreviation IRR. When applying IRR one follows from an assumption that the costs and revenues are balanced in the course of a period observed; and an interest rate at which the balance is achieved is searched for. With a bit of simplification it is possible to say that the IRR value represents an interest rate at which an investor of a project – in our event the developer of the D-O-E water corridor – can borrow the money from the bank and not to lose money, i.e. maintain the balance between the costs and revenues in the course of the technical life of the project, or rather in the course of a shorter but adequate period of time during which it is possible to predict reliably the effectiveness of the project. IRR values represent a comparable criterion between various projects. Projects with higher IRR value must be preferred over projects having a lower value. The margin at which it is still possible to speak about an efficient project is given by the condition of the economy in general, by strategic importance of the project, the level of risks associated with its implementation and also with the weight of non-economic effects that are more of a whole-society importance, difficult to be expressed in economic terms. As infrastructure investments are concerned, the value of IRR = 6 % may be deemed to be a bearable one, while at the value of 10 % the projects are profitable ones. The value of more than ten per cent indicates that the project is extraordinary economically advantageous.

The methodology of IRR specification therefore answers the question of project effectiveness relatively clearly, i.e. by providing the only value enabling both comparison with competition projects applying for sources and "absolute" assessment. Moreover, it enables a simple "sensitivity" analysis that is necessary due to the fact that not all input values of the calculation can be exactly defined. This concerns, in particular, inputs deduced from forecasts that are often based on a multiple potential "scenarios".

Hereunto, it was necessary to illustrate the theoretical and methodological processes while assessing economic effectiveness, in order to get to concrete calculations.

Zemní práce na zářezu dálnice D 5. Používaná technologie se stejně dobře hodí na výstavbu vodního koridoru D-O-E.

Earthmoving works at the cut of motorway D 5. The technology in use would suit construction works of the water corridor D–O–E very well.

The First Balance Pan – Costs

Certainly, the largest item is the one-time investment costs for construction of the D-O-E water corridor. Their as far as possible exact determination is not very difficult, because the scope of individual construction works (i.e. excavation and earthmoving works, construction of banks, concrete and steel constructions, vegetation modifications, etc.) can be determined from the existing documentation quite exactly. It is possible also to specify quite exactly the unit price of the relevant construction works, since engineering of the construction is not actually different from the engineering applied at the current intensive building of motorways – thus it is possible to count on same and equally efficient machinery for excavation and earthmoving works, surface modification of ground bodies, founding of structures, etc. Building companies have therefore enough experience and also clear idea with what prices they can enter the competition. Comparison with the construction of motorways is possible also from another two points of view. In particular, it is obvious that specific costs of construction of 1km of a route are very similar. Another analogy is offered by the distribution of the construction among integrated and technically and operationally self-sufficient stages. We do not perceive the construction of motorways and speed highways, that at its target condition will be many times longer than the D-O-E water corridor, in any event as a single investment act, but instead as a set of gradually implemented partial stages, each of which is important and functional by itself. Similarly, also the D-O-E corridor is actually a target program consisting of stages which, once being completed, will immediately start bringing benefits – not only in the area of traffic, water management and anti-flood protection, but also in other fields. The essential assumption is of course a well designed sequence of the stages. The construction must proceed from the Danube to the north, as Danube is a part of a perfect network of waterways of EU and simultaneously a source of water on which water-management function of the canal can build. Some correction of a basic time schedule of the construction can be raised by anti-flood protection interests (region of Olomouc, and the Polish section of the waterway). For the time being it is possible to expect that there will be a total of 5 main stages (1, 2, 3, 4 and 1a) in a time sequence corresponding to their numbering. The exception is stage 1a, the inclusion of which can be affected by the development on the Polish Oder and also by the process of implementation of the polder or reservoir of Racibórz and thus it is “free”. It is possible to assume that the part necessary for the protection against floods will be implemented first; the rest will be implemented only after the stage 3.

In the past many qualified estimates of total investment costs have been processed. With a view to the economic development and inflation impacts the former estimates are not true any more and their transformation to the current price level might be inaccurate. That is why we concentrate on an up-to-date calculation based a relatively accurate specification of the scope of the individual construction works and engineering supplies in compliance with the technical solution and the prices of the year 2004. The results – expressed due to practical reasons not in CZK but in EURO – are available, well-arranged, in the table below.

Within the first stage, the costs of construction of the polders Teplice nad Bečvou and Dubicko are included. Although they are situated by the route of the third stage or even the fourth stage, their construction is – with a view to the protection against floods – so urgent that their

Stage	Section	Length (km)	Investment costs (mill. €)					Specific investment costs (mill. €/km)	
			Total	Out of which polders	Out of which r eservo-irs	Out of which for high speed tracks	Comparable	Total	Comparable
1	Danube – Hodonín, polders included	97,50	892,2	148,2	-	-	744,0	9,15	7,63
2	Hodonín – Přerov (port)	89,90	763,3	-	-	-	763,3	8,49	8,49
3	Přerov – Ostrava (incl. branch to Pňovice)	147,29	1 992,3	-	-	-	1 992,3	13,53	13,53
1a	Ostrava (central port)– Koźle	53,25	400,9	-	-	-	400,9	7,53	7,53
	Connection D-O in total	**387,94**	**4 048,7**	**148,2**	**-**	**-**	**3 900,5**	**10,44**	**10,05**
4	Pňovice-Pardubice (min)	119,40	4 106,9	-	176,0	-	3 930,9	34,40	32,92
4	Pňovice–Pardubice (max)	119,40	4 831,9	-	176,0	1 356,3	3 299,5	40,47	27,63
	D-O-E water corridor in total (min)	**507,34**	**8 155,6**	**148,2**	**176,0**	**-**	**7 831,4**	**16,08**	**15,44**
	D-O-E water corridor in total (max)	**507,34**	**8 880,6**	**148,2**	**176,0**	**1 356,3**	**7 200,1**	**17,50**	**14,19**

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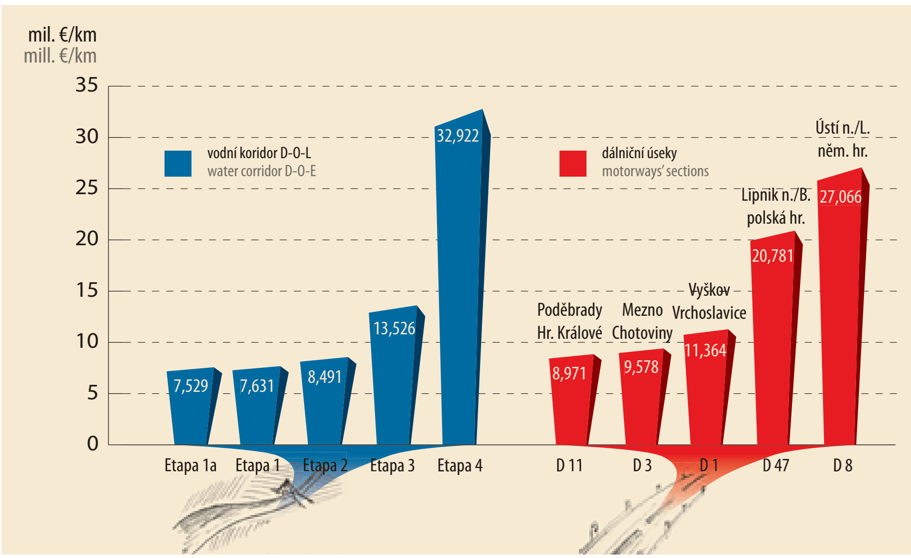
realisation should run parallel to the first stage. In the determination of specific costs, i.e. costs per 1 km of the water corridor, the polders were however deducted so that the comparison of this indicator was not distorted. For the same reason the costs of shifting of railroad tracks are also deducted from the "comparable" costs of the 4th stage and from the total costs.

It follows from the table that specific investment costs of individual stages differ considerably. They seem to be most favourable at the stages 1a, 2 and 1, which is quite obvious due to a big share of partially constructed or prepared sections. At these stages the specific indicators are lower than at the motorways constructed in a medium-demanding terrain morphology. It is best illustrated by a comparison with recently constructed or completed sections of the motorway network in the Czech Republic.



Srovnání měrných nákladů na jednotlivé etapy vodního koridoru D-O-E a na dálniční úseky vybudované v ČR v posledních letech.

Comparison of specific costs of individual stages of the water corridor D-O-E and those of recently built motorway sections.

Also the specific costs of the third stage are acceptable. However, the fourth stage, i.e. the section of the Elbe branch from Přovice to Pardubice, would be very expensive. Its costs are stated at the minimum and maximum level. The minimum level is based on the assumption that radical shifting of railway routes will not be implemented in the valleys of the Moravian Sázava and Tichá Orlice, but that there will be only necessary modifications of these railroads in the places where they collide with the route of the D-O-E water corridor. In contrast, the more expensive variant assumes a radical redevelopment observing the parameters for high-speed tracks. From the point of view of economic assessment it is possible to depart from the minimum estimate. If we departed from the maximum amount it would be also necessary to reflect in the calculation the effects in the area of construction of network of high-speed tracks. The latter effects would be apparently so important that the resulting indicator of the economic effectiveness would be more favourable than in the minimum estimate. However, there is not enough supporting information for responsible stipulation of such an effect.

In order to verify the accuracy of the ascertained specific costs of construction, it is possible to mention also the ratio between these indicators verified in connection with the comparison of the investment demands for the canal Main–Danube with other infrastructure purposes in Germany.

At the price level of the 1990s, the analysis reached the following specific costs:

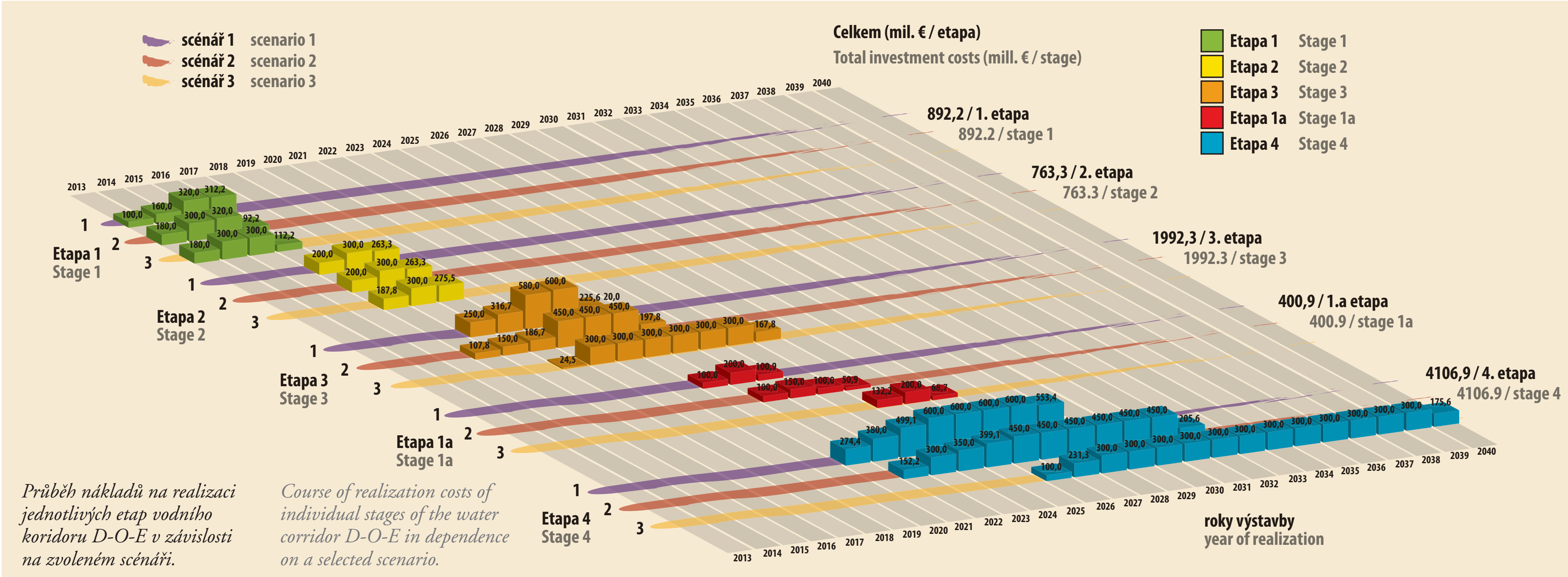
Main–Danube canal between Bamberg and Kelheim	27.5 mill.DM/km
Standard construction of motorways in a comparable period of time	15.0 mill. DM/km
Motorway in demanding conditions (by-pass highway north of Munich)	50.0 mill. DM/km
High speed track - Hannover–Würzburg	35.0 mill.DM/km

Mutual proportions are surprisingly identical – in particular if we consider the fact that the specific costs of the construction of high-speed railway tracks are estimated to be 10 to 13.3 mill. EUR/km in the Czech Republic. As far as the canal section between Bamberg and Kelheim is concerned, more complicated conditions than e.g. in the third stage of the D-O-E water corridor were concerned here (higher differences in elevation per 1km).

If we talk about the total investment costs, we cannot pass away the popular phrase tagging the D-O-E water corridor as a "mega project". We do not intend to examine whether such attribute has arisen on the basis of the ignorance, naïve ideas, lack of "comparative" basis, or from an intention to discredit the project. However, let's not make precipitated judgements. If we assume that such an unfavourable designation is justified, how would we call the program of motorway construction, construction of the network of sewage plants, program of revitalisation of river network or other projects the investment of costs of which are not lower and, usually when the project is completed, they are multiple of the D-O-E investment?

How would we confront the finding that in neighbouring post-war Germany, during the 1950s, almost 1,000 km of new modern waterways were constructed, although only 5% of the costs required for the development of the total traffic infrastructure (i.e. namely of motorways and railroads) were spent in average on them?

The target amount is however not decisive in assessing the investment demands of long-term programs. Higher relevance has the annual volumes of investment funds that would be necessary to be spent on the implementation. These are inversely proportional to the time when the target condition is supposed to be reached. Let's therefore consider three possible action scenarios, based on fast, medium and slow speed of realisation. Under the "fast" scenario 1, we can count on the annual volume of investment funds up to the amount of about 600 mill. €, in the medium scenario with the volume up to 450 mill. € and in the "slow" – i.e. the third scenario – with the volume up to about 300 mill. €. Let us assume that the first year of implementation would be, for example, the year 2013 (for another starting year the conclusions would be similar) and let us follow a potential development over the period of 28 years until 2040. The following conclusions arise from data table assembly:



Průběh nákladů na realizaci jednotlivých etap vodního koridoru D-O-E v závislosti na zvoleném scénáři.

Course of realization costs of individual stages of the water corridor D-O-E in dependence on a selected scenario.

The first scenario enables completion of the continuous connection from the Danube to Ostrava by 2022, i.e. within 10 years from the commencement of the construction, to the connection to Oder one year later and to the completion of the compete D-O-E water corridor in 2028, i.e. within 16 years. For comparison it is possible to say that according to the chapter "The D-O-E Waterway and Greater Germany" in the German-Czech-Slovak Protocol dated November 19, 1938 it was stipulated that the period for the construction of the connection of the Danube-Oder shall not exceed 6 years, while the program of Water-Road Act of 1901 – which however included, apart from the connection of D-O-E also other projects the costs of which were supposed to be double – was to be implemented in the course of 20 years. Thus, one cannot say that the assumptions under the "fast" variant would be too ambitious.

In the second scenario, the Danube-Ostrava would be connected also in 2022, however, the connection with the Oder would be assured as late as at the end of 2025, i.e. after 13 years. In the monitored period also the work on the fourth stage would be widely developed, but its completion would be possible as late as in 2032, i.e. after 20 years.

In the third scenario, within 13 years, i.e. until 2025, when going from the Danube it would be possible to reach at least the region of Ostrava, and the connection to the Oder in another two years. It would be possible to start with the fourth stage as late as in 2026 and its completion would be postponed by approx. 2040. The total period of the implementation would be 28 years.

Another cost category is operational costs that, in contrast to the one-time investments, encumber the investor or operator of the waterway constantly. They are related to the services, maintenance and repairs of the completed work. At the stage of preliminary calculations they are often defined by an annual rate in the amount of 1.3–1.5 % depending on the investment costs, but for the purpose of more specific analyses they must be established based on a more accurate analysis, in particular in the events when the construction is concentrated on the adaptation of more or less modified and thus already today maintained river sections, the hitherto operational costs of which would not change, or where railway or other road shifts (relays) play an important role, which railways and roads must be maintained anyway. Also in the sections where most investment costs are related to excavation and earthmoving works it is necessary to proceed individually. With the implementation process of individual stages, the operational costs will grow until the overall completion of the water corridor is achieved – subsequently they will not change.

The following survey of the total costs follows from the most recent detailed analysis of the operational costs at the price level of 2004:

After completion of stage 1	8.5 mill. €/year
After completion of stage 2	15.6 mill. €/year
After completion of stage 3	30.6 mill. €/year
After completion of stage 1a	32.7 mill. €/year
After completion of stage 4	50.0 mill. €/year

The stated costs do not include the costs of pumping water that will be compensated – or more than compensated – by the sales of the power production.

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The Other Balance Pan – Revenues

The D-O-E water corridor has many functions and in connection to that it offers a number of effects in various spheres of economy.

In first place it is necessary to mention the revenues to arise in the area of transport, by transfer of a part of traffic from the roads and railroads to water transport. It is true that under specific circumstances – e.g. upon a catastrophic development of water management balance – the centre of importance of the water corridor might be transferred also somewhere else – but let's stay on the firm ground of the present situation.

The basic input value for the specification of the transportation effects is certainly the volume and nature of the expected transport flows. In this respect the forecast is not simple.

Thanks to its key position, the D-O-E water corridor represents an absolutely new element of the European transportation infrastructure, that will change its basic configuration and quality, and can give origin to a fundamental redirection of the flows of goods and can even generate also an absolutely new transportations not expected today.

We can mention a number of distinctive examples of how deceptive the forecasts not taking into consideration this feature can be. Let us mention short-sighted objections against the construction of the rail-roads from Vienna to Brno quoted on page 214 according to the famous Baťa's book and let us compare it with the today's reality.

Despite the doubts concerning the trustworthiness of the forecasts, in the event of plans of system and long-term significance we do not have any choice than to depart from the fact that we do not have crystal ball to examine future transportation. It is therefore necessary to proceed very cautiously. It is worth to get acquainted with the already completed forecasts first. However, we cannot overemphasise these forecasts as they are, generally, outdated; they can however be at least interesting for the sake of comparison. First it is necessary to mention, in particular, the national economic study by Ing. Vladimír Lorenz from 1928. The author of the study tried to specify the transportation on the connection of D-O-E at the level of 1940 based on a very profound and sophisticated analysis of the economic development in Central Europe. He reached an aggregate transportation in the volume of 18.823 mill. t/year. Solid fuels were supposed to have by far the highest share in that volume, over 70%. According to the ideas of the time, the water way was therefore a kind of a "coal canal".

The most comprehensive analysis of the current or close future planned transports that might be transferred to the D-O-E water corridor, was performed by the international group of rapporteurs under the auspice of the European Economic Commission which completed its work in the 1980 by a document we have already quoted in the chapter „Europe is getting interested". The study reached the conclusion that the total transport flows going through the water way might even exceed 70 mill. t/year by 2000. Also the transport intensity on individual branches was adequately high according to the prognosis. The analysis was based on the projected economic development of all countries of the Danube, Oder and Elbe, from which also the expected change of goods among them followed. However, in all these countries (except for Austria and Federal Republic of Germany) the "planned" economy had existed at the time of the study; its principles and priorities of which ceased to be valid after the transition to the market economy in the 1990s. In connection with this, also the stated optimistic forecast lost its trustworthiness.

It is definitely possible to assume that the old Lorenzo's ideas were outreached a long time ago, so they maybe represent the low level of potential figures. Vice versa, the figures ascertained by the group of rapporteurs are undoubtedly the upper level.

An up-to-date forecast that would reflect, in particular, the upheaval in the area of politics and economy in Europe that occurred at the turn of the century was missing for a long time. Only recently an absolutely a new and sophisticated study established on the following assumptions has been processed:

The D-O-E water corridor will connect the area located to the north and northwest of the main European watershed with the area located to the south and southeast of this division line.

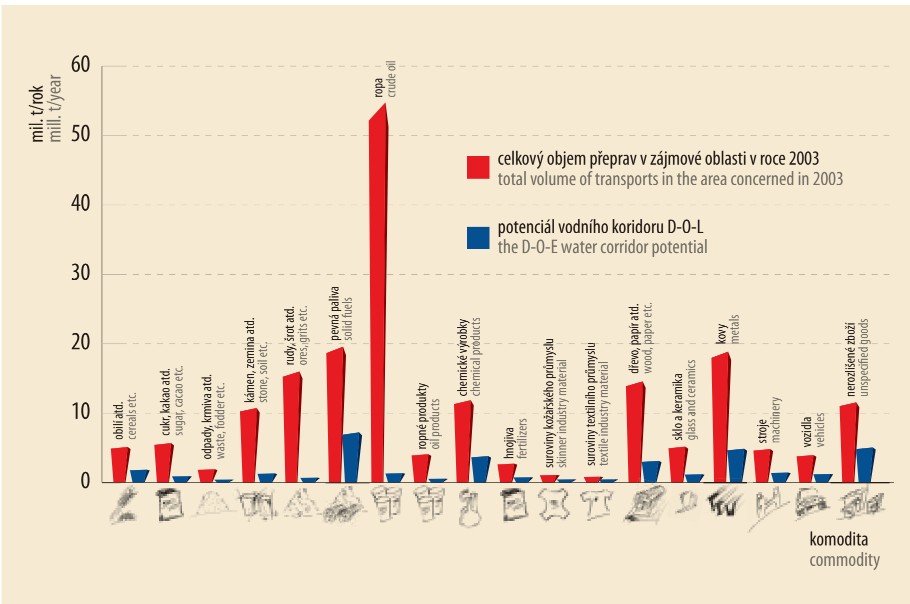
Into the first area it is possible to include sources and destinations of transportation in the North and Eastern parts of Germany, Poland and in a part of the Czech Republic, as well as the main seaports at the North Sea (Rotterdam, Bremen, Hamburg) or the Baltic Sea (Stettin). Into the second area it is possible to include the other (Southern) part of the Czech Republic, and in particular the Danubian countries (Austria, Slovakia, Hungary, Croatia, Serbia, Bosnia and Herzegovina, Rumania, Bulgaria and Moldavia) and also countries reachable by coastal navigation (or even by river-sea vessels without trans-loading) on the Black Sea or eastern part of the Mediterranean sea or on the Caspian sea (accessible through an inland route along the Don and Volga). The following countries belong among them: e.g. Ukraine, southern part of Russia, Kazakhstan, and some other countries of Commonwealth of Independent States, Iran, but also Turkey, Lebanon, Israel, etc.

At present, mutual exchange between both areas is assured by various means of transport while, undoubtedly, road transportation prevails and in some cases also coastal navigation (e.g. in the relations between the Northern Europe and Mediterranean area). Next come apparently railroads and in special events also pipelines, while inland water transport ranks as the last one. These means of transport have at their disposal hundreds of roads and motorways, a route on the sea along the coast, tens of railroad tracks, a number of oil pipelines and other pipelines, and also the only waterway running in the canal Mohan–Danube and Danube. Such a large number of "competitive" routes in which transportations are performed is a fact that has to be taken as a basis. Deriving future transportation flows on the D-O-E water corridor e.g. from the load on one parallel railroad track would be absolutely mistaken from the methodology point of view.

Thus, the basic value of the forecast may be represented by the current total volume of mutual exchange of goods between both areas. It can be determined on the basis of detail statistics of OECD (Organisation for Economic Cooperation and Development), which track the total movement of goods very closely and divide the goods according to commodities. Further it is possible to apply also data on import and export belonging into the mentioned other area through the specified main seaports. In 2003, the relevant total volume (excluding commodities unsuitable for water transport such as perishable goods, natural gas, etc.) reached a notable amount, i.e. 194 mill. tons.

From the stated volume it is possible to deduce transportation potential of the D-O-E water corridor, i.e. the volume of goods that would have used this waterway if it had been available in 2003 and if the water transport on it would have reached a "stable" performance after certain roll-out period.

In order to deduce this potential it is possible to use the elimination method that first reduces individual items from the "geographical" point of view, i.e. it assigns only a specific share to the water transport depending on the transportation distance. At the immediate neighbouring

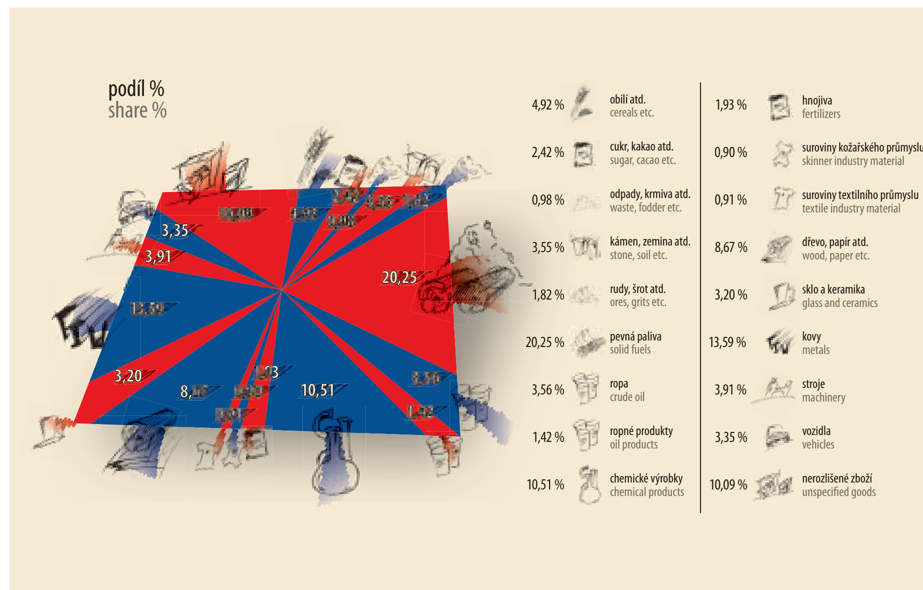


Srovnání celkového objemu přeprav v zájmové oblasti a přepravního potenciálu vodního koridoru D-O-E.

Comparison of the total volume of transport in the area concerned and the transportation potential of the water corridor D-O-E.

countries it is assigned only 0–10 % (at short distances the water transport has only a small chance, and in particular if it is not direct), at more distant countries it is higher and at very distant it is as much as 100 %. Another reduction respects the "commodity" point of view, i.e. it expresses a limited possibility to apply inland navigation on the transportation market depending on the relevant commodity. In the events when shift to water transport is absolutely improbable due to specific reasons, the relevant commodity item is absolutely excluded, and at very restricted possibilities (e.g. while transporting crude oil at which it will be applied only where oil pipelines do not dominate) only 10% is assigned to water transport, etc. At suitable commodities the water transport is assigned adequately more, however no more than 80 %. Based on the methodology already described, the transportation potential of the D-O-E water corridor uses is its basis value 35.7 mill. tons per year, which is about 18% of the ascertained total figure. However, at individual commodities this share is considerably different. It is possible to add to the international transportations also domestic transportations that will take part only within the corridor and based on a very cautious estimate they might only little exceed the value of 2 mill. tons, while gravel sand would represent a decisive portion. The stated potential is really between the above mentioned limits. The Lorenzo's idea concerning the transportation in 1940 is doubled, and when compared with the ideas of the group of rapporteurs of EEC extending approximately to 2000, it is about half. Distribution of the potential according to commodities is also interesting. The biggest share is assigned to solid fuels; however, this share is not by far a decisive or dominant.

It is obvious that in the future it is possible to count on gradual growth of the exchange of products between the stated areas and thus on the growth of the transportation potential of the D-O-E water corridor. For example it is estimated in a study by Prognos, a Basel Institute, that



Grafické znázornění procentuálního zastoupení jednotlivých komodit v přepravním potenciálu vodního koridoru D-O-E.

Percentage share of individual commodities of the water corridor D-O-E transportation potential.

the YoY growth of the transportation of goods in Europe will reach 2.56 % (other forecasts stated the value of even 2.7%), while on waterways it is possible to expect the value of 2.04 %. If, for the consideration of the effectiveness of the D-O-E water corridor, we apply a rate of only

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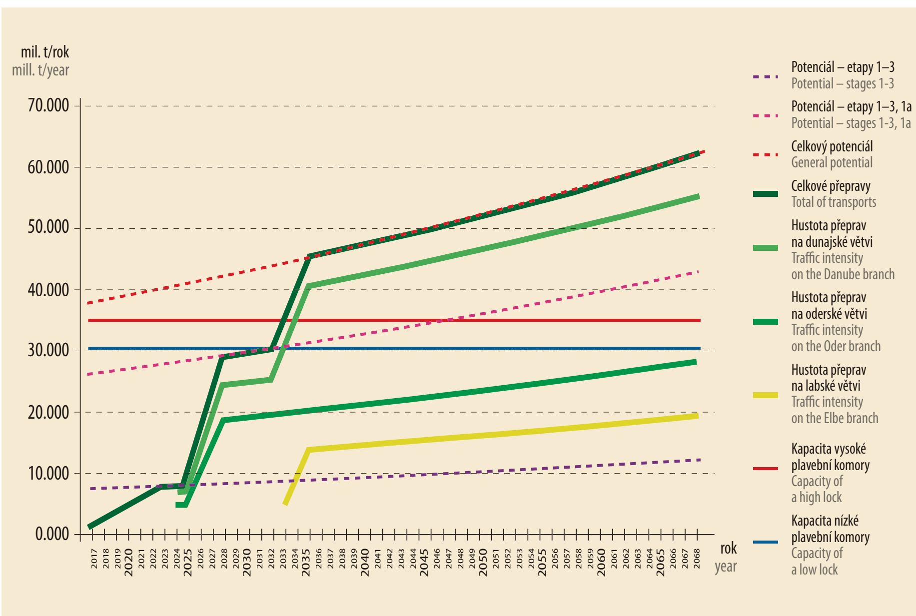
1 % the estimate of a future development of the transportation potential will be considered to be more than cautious. The current growth of transportation in the area of the Danube waterway (to which the first stage is connected) is actually much faster. Over the last 10 years the transportation in the Austrian-German border section of the Danube (Jochenstein lock and dam) has been growing at an annual average rate of 4.03 %, in the locks of Gabčíkovo at 5.28 % and on Mohan–Danube canal even at 8.40 %. It is generally expected that this extraordinarily fast growth of transportation will be supported in the future by a dynamically growing of goods (in particular of container goods) between Europe and Far East and also by a progressive growth of importance of the Rumanian port Constantza, that offers significantly shorter and in the future possibly more economical transportation route in comparison with "classic" directing of the overseas trade through North Sea ports. From Hodonín (CZ) terminal a container would have to pass – when using the route through Rotterdam – a distance of 21,382 km to get to the port of Shanghai (that overpasses all European ports by the volume of transhipping and is getting to the top on global scale); through the port of Constantza, very well accessible on the Danube, it would be only 16,833 km.

The development of real transportations will be, however, conditioned by the speed of realisation of the D-O-E water corridor. Real transportation will be approaching the potential figure gradually and in connection to the introduction of individual stages into operation. It is possible to depart from the fact that completion of stages 1, 2 and 3 will not enable fundamental development of the transit transportations – it will be possible only after the completion of stage 1a (between Oder and Danube), or stage 4 (between Elbe and Danube).



Růst přepravního potenciálu vodního koridoru D-O-E, přepravy v jednotlivých letech a odpovídající hustoty přeprav na větvích koridoru (scénář 2).

Increase of the water corridor D-O-E transport potential, respective transport volumes, and traffic densities of the separate branches (scenario 2).

Another input value is the average unit savings following from the transfer of 1 ton of goods from roads or railways to waterways. The highest possible savings are certainly reached at long-distance transportations that occur in particular between seaports and the centre of the continent. The volume of the transportation rates is affected by the transportation market and mutual competition of the forwarders, so that the determination of savings requires at least a rough analysis of market conditions in the area from which the transportation flows might be shifted to the D-O-E corridor. Typical rates of charges of water transportation for short, medium and long distances (according to the situation in 2004) are given in the following table:

Relace	Transp. distance. (km)	Rate (€/t)			Note (aim according to transportation distance is determined)
		One way	Return	Average	
ARA - Ruhr region	218	9.00	6.25	7.63	
Ruhr region – Central canal	278	4.25	3.25	3.75	Hannover
Ruhr region – Bremen	366	4.60	3.90	4.25	
Ruhr region – Mannheim	377	5.75	3.10	4.43	
Ruhr region – Mosel	393	9.25	8.00	8.63	
Berlin – Hamburg	449	3.80	4.50	4.15	
ARA – Central canal	496	11.50	9.75	10.63	Hannover
Ruhr region - Hamburg	521	7.00	5.25	6.13	
Berlin - Bremen	528	5.10	6.50	5.80	
Ruhr region - Main	556	7.00	4.50	5.75	Würzburg
ARA - Bremen	584	9.00	6.25	7.63	
ARA - Mannheim	595	12.50	6.50	9.50	
Ruhr region - Berlin	610	5.75	4.75	5.25	
ARA - Mosel	611	15.50	8.00	11.75	
ARA - Neckar	645	14.00	9.00	11.50	
ARA - Hamburg	739	13.75	7.50	10.63	
ARA - Main	774	14.50	7.50	11.00	Würzburg
ARA - Berlin	828	13.00	7.00	10.00	
ARA - Upper Elbe	890	19.80	11.50	15.65	Riesa
Mannheim - Austria	930	12.00	15.40	13.70	Linz
Berlin - Mannheim	987	8.25	8.25	8.25	
Ruhr region - Austria	1,157	21.00	18.25	19.63	Linz
ARA - Austria	1,375	23.00	21.00	22.00	Linz
Ruhr region - Slovakia	1,437	26.50	26.50	26.50	Bratislava
ARA -.Slovakia	1,655	28.00	28.50	28.25	Bratislava
ARA - Hungary	1,870	34.50	31.50	33.00	Budapest

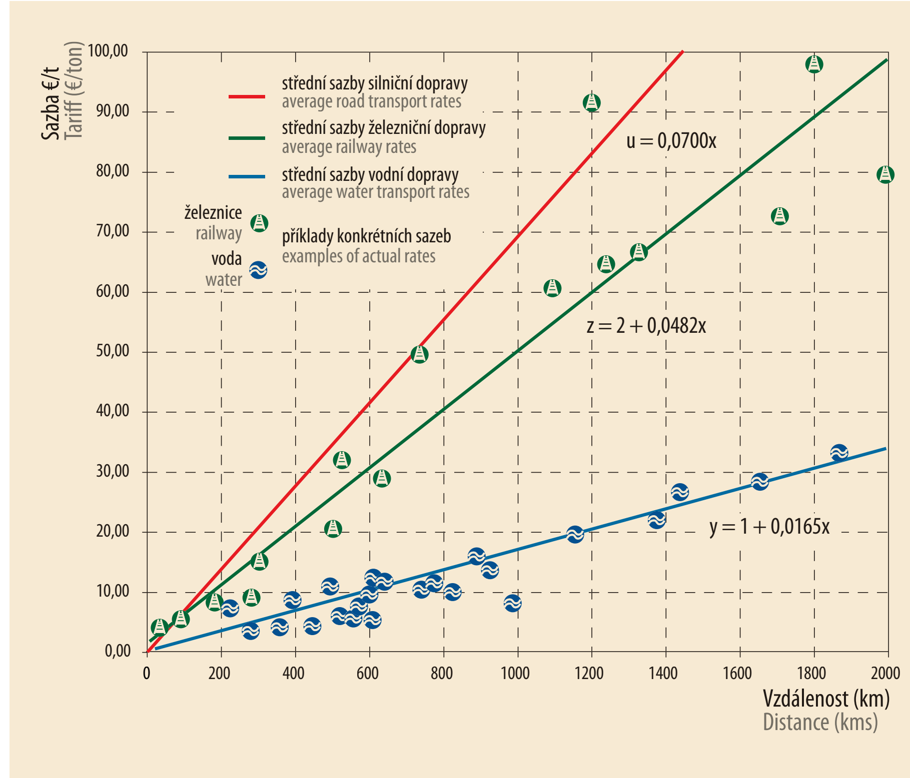
It might be appropriate to explain also the abbreviation ARA – that means Antwerp, Rotterdam and Amsterdam ports that are, mostly, not different from the point of view of the transportation rates.

A similar survey of typical rates of railroad transportation (again depending on the transportation distance and in the same area) is shown in the next table. The rates are based on specific tariffs of individual railways reduced by 20 %, so that also the fact that railway carriers usually provide discounts – in particular if waterways compete – is reflected in the analysis.

Relation	Trans. dist. (km)	Rate (€/t)
Choceň - Pardubice	37	4.40
Ostrava - Přerov	94	5.60
Ostrava - Břeclav	192	8.20
Bohumín - Pardubice	280	9.20
Přerov - Mělník	288	9.60
Ostrava - Bratislava	307	15.00
Ostrava - Dunaújváros	503	20.60
Choceň - Nürnberg	526	31.70
Ostrava - Linz	636	29.10
Ostrava - Koper	744	49.50
Choceň - Rotterdam	1,098	60.70
Brno - Ruse	1,198	91.50
Přerov - Rotterdam	1,245	64.70
Bohumín - Rotterdam	1,341	66.60
Ústí nad Labem - Constantza	1,711	72.70
Szczecin - Ruse	1,810	97.50
Szczecin - Constantza	1,993	79.10

In order to obtain a clear picture of inter-relations from the ascertained figures, the individual values are put into a graph. The sets of relevant points can be replaced with axes that best express the most probable level of transportation rate depending on the transportation distance. The red axis in the graph corresponds to average rates of road transportation.

From the graphic picture it is possible to learn specific savings of the transfer of the transportation flow to waterways depending on the transportation distance very quickly. The graph enables also to respect the fact that the route on navigation network is usually longer than the route of railroads or roads. At long distances – e.g. at transportation distance of about 2,000 km – the savings would be – with respect to railroads – about 40–50 €/t, with respect to roads almost 100 €/t, at medium transportation distances (about 1,000 km) about 30 or 50 €/t and at short distances (of about 300 km) only 10 €/t. The figures seem to be undoubtedly very favourable. However, it is necessary to take into consideration the fact that it is applicable only provided that a direct transportation on water is concerned. If the water transportation is combined, i.e. in case it depends on a previous or later transportation on railroads or roads, it will be encumbered by the costs of trans-shipping, in the average amount of 7 €/t (or, as the case may be, 14 €/t in case of



Srovnání přepravních sazeb různých druhů dopravy v závislosti na přepravní vzdálenosti.

Comparison of freight rates of different means of transport versus a hauling distance.

the necessity to involve both previous and consecutive haulages using roads or railways), and also the "initial" costs of the cooperating transportations will have an adverse impact. The value of the specific savings can range from 0 (short transportation distances, routes with two transhipments) up to almost 100 €/t (long transportation distances, direct servicing of clients by water transportation, transfer from the road to water).

Finding the mean figure would require to make a detail analysis of all possible distances involved in the net transportation potential and to look for a weighted average. Most probably the analysis would evidence for a higher level of savings because short and medium distances would be most reduced within the "elimination" – already in the methodology of the analysis of transportation demands itself, emphasis was put on long-distance transportations. However, such an analysis would be not only laborious but also useless: preference for transferring long-distance – and thus economically beneficial – transportations to the water connection will be logically stimulated by the transportation market. That is why it will be sufficient (and, at the same time, safe) if the maximum value of savings is determined at a very cautious value of 30 €/t.

The bottom level of savings can be specified in a relatively accurate way on the basis of the following concept:

The opponents of the project point out to the fact that the D-O-E water corridor is redundant because it is possible to make use of the existing network of the European waterways, in particular of the Danube, Elbe, Oder, by means of which it is possible to transport the given volumes of substrates close to the initial points of the D-O-E corridor itself, then to trans-ship them and bring them to the destinations with the use of the existing capacity of the railroad and road networks.

Similarly, it would be allegedly possible to transfer long-distant transit trans-continental relations to the water transportation, in particular on the Danube, and thus to make the best of the benefits of water transportation without having to build the connecting link of waterways. It would be enough to "bridge" the missing connection by roads or railroads.

Such arguments are quite unreasonable because they contradict the practical experience (in particular, almost nowhere the transportation in the system "water-railroads-water" has been put through). Furthermore, it would definitely result in the increase of the load of road traffic (see picture on page 297 that shows small competitiveness of the railway transport with respect to short and medium distances) and would require considerable costs of increase of trans-shipping capacities. Let's take, nevertheless, such a model of transportation as a comparative variant, resulting in minimum savings. Under the given assumption all goods transported on the Danube would be trans-shipped in the ports close to the diversion from the corridor (Vienna, Bratislava, Komárno, Budapest) and similarly also goods transported on the Oder in Koźle or Gliwice and goods transported on the Elbe in Pardubice, Mělník or Prague. From these points on, railroads would be used up to the sources and destinations of the transportation in the area of the D-O-E water corridor (i.e. at an average distance of about 200 km), or in the whole length of about 400 km (at transportation of a "transit" character). It is possible to compare the "uninterrupted sail" after the inter-connection with the described structure of operation of the "substitute" system and to calculate savings it will bring. Such comparison has got one priceless methodological advantage: it is not necessary to apply the total transportation distances in the calculation or to detect what conditions are upon distant sources or destinations of a relation (whether it is necessary to use previous or subsequent transportation, or not, etc.). Anything that takes place "beyond" the stated ports does not have any affect on the results because same conditions as in both compared variants are assumed. The difference is what happens "between" these ports according to the mentioned nature of the transportation and other circumstances: the probable savings of transportation ranges from about 6 to more than 20 €/t based on rough calculations. Certainly it will be safe (with a view to the decisive share of transits) if we accept the rate of at least 10.0 €/t. A medium value between the maximum and minimum would be 20.0 €/t. By using the stated three variant values in the analysis of the economic efficiency it is possible to reliable check the sensitivity of the final result depending on changes and reliability of the input values.

Apart from direct transportation savings, i.e. savings following from the real transfer of goods to waterways, there are certainly also indirect savings following from traffic and political function of the waterways and from the improvement of the European network of waterways as a whole. Their stipulation is however, methodologically difficult; for the time being we would not put it on our imaginary pan of scales.

There is another, non-disputable benefit relating to the transfer of transportation to waterways: saving of external costs. These are costs that do not appear in the "accounting books" of forwarders and are related, mainly, to the compensation for damage the traffic causes in the environmental area.

At water transportation, these costs are lower by at least 0.008€/tkm if compared with railroads or up to 0.020 €/tkm if compared with road transportation. If we consider that the mean value of the cost reduction will get close to the rate of about 0.010 €/tkm, and the medium distance of transportation realised on the D-O-E water corridor will reach – even at very cautious assumptions – at least 500 km, it will be possible to specify the savings of external costs most probably from the indicator of 5 €/t.

Quantification of the effects following from flood prevention function of the D-O-E water corridor would require more detailed and rather complicated analysis. If we wanted to simplify it, we might imagine this as savings of costs of two envisaged polders on the Morava and Bečva rivers the function of which would be fully replaced by the D-O-E corridor (or the polders with the establishment of which are counted on within the corridor project). However, by this the relevant effects would be expressed only partially because the effect of discharge capacity increase in existing river pools or of parallel leading of a part of the flood by the canal sections would not be expressed.

It would be possible to assess the water management effect of the D-O-E water corridor in a similar manner, i.e. by cost savings of key reservoirs of the Morava nad Dyjí river basin (e.g. reservoirs of Teplice nad Bečvou and Hanušovice) in the time horizon of their planned implementation. Also in this case, certainly the bottom level of the relevant effects is concerned, because the contributions of the D-O-E to water resources balance is much higher than with these key reservoirs and should be compared with a number of other reservoirs (if, at all, such reservoirs were realistic to be built and provided equivalent improvement).

Quantification of some other effects is even more complicated that is why we have not other choice than to disregard them, due to the given condition of the documentation.

It might be possible to assess the improvement of the environmental value of the landscape, including of renewal of humid biotopes, on the basis of the Hessen method, most probably by one-time benefit in the amount of 50–100 mil. €; however, this method is not official in the Czech Republic and its application might be criticised by the opponents. Thus it would be advisable to absolutely disregard this item.

Some considerations emphasise the increase of the attractiveness of the areas along the D-O-E water corridor for the development of economic activities. Both production activities and various services might be concerned – either relating to the transportation (logistics, storing), or recreation function, or tourism, etc. One can sometimes also encounter statements that this contribution of the D-O-E water corridor may be most significant by far. Its accurate assessment is however X the Unknown, as any forecast methods fail here. Thus also in this case we do not have any choice than to disregard the inclusion of these benefits into the effectiveness calculation.

It is possible to disregard also benefits of fish breeding because they will be negligent if compared with other items.

With more accuracy, it is possible to estimate the benefits in the area of employment given by savings of public sources thanks to the creation of new jobs. It is necessary to differ between two types of effects of the D-O-L water corridor on the employment rate. The first one relates to the implementation of this project, the other with the effects following from its functions and operation.

It is possible to determine the effects following from the realisation of the D-O-E corridor in the area of employment on the basis of analyses performed by the employees of the joint-stock company Stavby silnic a železnic (Construction of Roads and Railroads) in cooperation with the joint-stock company ÚRS and with the Department of Roads and Railways of the ČVUT (Prague Technical University). The analyses were aimed at the implementation of the road and motorway constructions, however, they can be applied also to the construction of the D-O-E water corridor without any reservations because the structure and demands of the construction works and supplies are practically the same in both cases. Thus in the event of the D-O-E water corridor it is possible to express the effect of creating of new jobs upon its implementation by tax incomes of the state

Affected area	Effect	Area from which effect follows			Volume (mill. CZK/year)	
		Construction	Industry	Other branches	Receivables increase	Expenses reduction
State budget	Incomes increase	0.078	0.057	0.022	0.157	
	Expenses reduction	0.018	0.023	0.009		0.050
Employment fund	Incomes increase	0.006	0.007	0.003	0.016	
	Expenses reduction	0.019	0.024	0.009		0.052
Social insurance	Incomes increase	0.048	0.059	0.023	0.130	
Health insurance	Incomes increase	0.022	0.026	0.010	0.058	
Total					0.316	0.102
Aggregate incomes following from the investments in the amount of 1 mill. CZK/year					**0.462**	

budget, savings of the state budget and finally the influences on the economy of the employment fund and also of the area of social mattes and healthcare. The specific effects are shown in the table adopted from the above mentioned analysis (the effects relate to the investments in the amount of 1 mill. CZK/year).

Therefore, the benefits in individual years of implementation can be derived, in the effectiveness calculation, from the relevant investments by means of the coefficient of 0.462. If some of the effects are expressed as savings of other investments (e.g. dams), it is necessary to include also the effects in the area of employment with the help of the same coefficient but in this case as a negative item.

It is impossible to find out the effects on the employment rate in the period of the operation in a simple manner because they are multiform and may have both plus and minus sign. Areas at which it is possible to expect positive effects include:

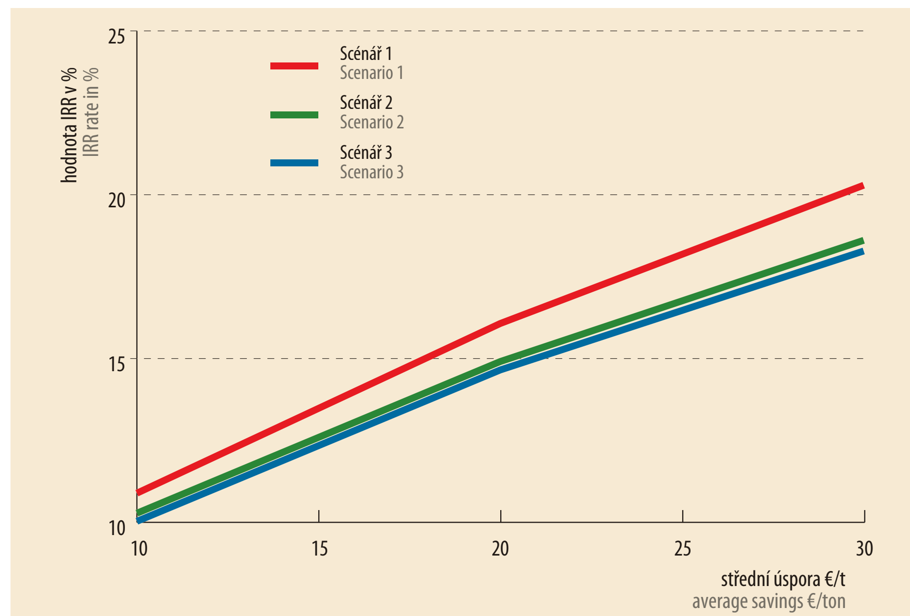
- water transport - where new jobs are created in large numbers, because the improvement of the European network of waterways enables the shipping agents to access new segments of the transportation market;
- related services, mainly of logistic nature;
- production of vessels and other facilities necessary for the operation of water transport;
- in certain sense also all branches of the national economy that might profit from the functions of the D-O-E water corridor (traffic, water management, etc.), increase their competitive abilities and develop quicker than until now.

On the other hand, it is impossible to conceal the fact that water transportation is known by its high productivity of labour. It will be therefore able to deliver the transportation with a lower number of staff than the railway or (in particular) road transportation. Thus, by transferring the costs to waterways the number of jobs in these branches of transportation will be reduced (at comparable transportation output).

A question difficult to answer is then the following: Will the final balance be positive or negative? To make the analysis of economic effectiveness safe, in any event it will be best to absolutely disregard the effects on the employment rate at the period of operation.

Percentage of Inherent Revenue

If we know the costs and revenues (at least those that may be, in the whole extent and unambiguously, or at least partially, quantified), as next step we can calculate the value of the Internal Revenue Rate – internal revenue percentage rate. For this it is necessary to distribute, in particular, the individual items in years in accord with the progress of the stages of construction. The time range of the assessment commences by the year of the start of the construction (being 2013) and ends after about 50 years after its putting into operation – i.e. in 2067 (at that time full operation also of the 4 stage would be started, which would require doubling of some of the locks – this has to be certainly included in the calculation too). It is true that in 2067 the individual parts of the D-O-E water corridor will not reach by far their technical life and their residual value should be reflected in black figures of the balance; however, this fact may be disregarded for the time being and consider it to be only a contribution to the reliability of the calculation. Certainly it is necessary to depart from the described three possible scenarios of the process of implementation and from three variants of savings of transportation costs – generally 9 potential combinations might be concerned, which will enable us to get, by means of interpolation, also an idea of the bordering values and by means of adequate extrapolation also to determine the "sensitivity" of the results, i.e. their potential change in consequence of any basic changes of the input prerequisites. It is not obviously purposeful to state in this book the relevant calculations if the next pages are not to contain only lists of figures. That is why it will be better to state only the total results in the form of a graph that shows the resulting values of IRR.



Závislost hodnoty IRR na scénáři realizace a střední výši přepravních úspor.

Dependence of the rate IRR on a realization scenario and an average level of transportation savings.

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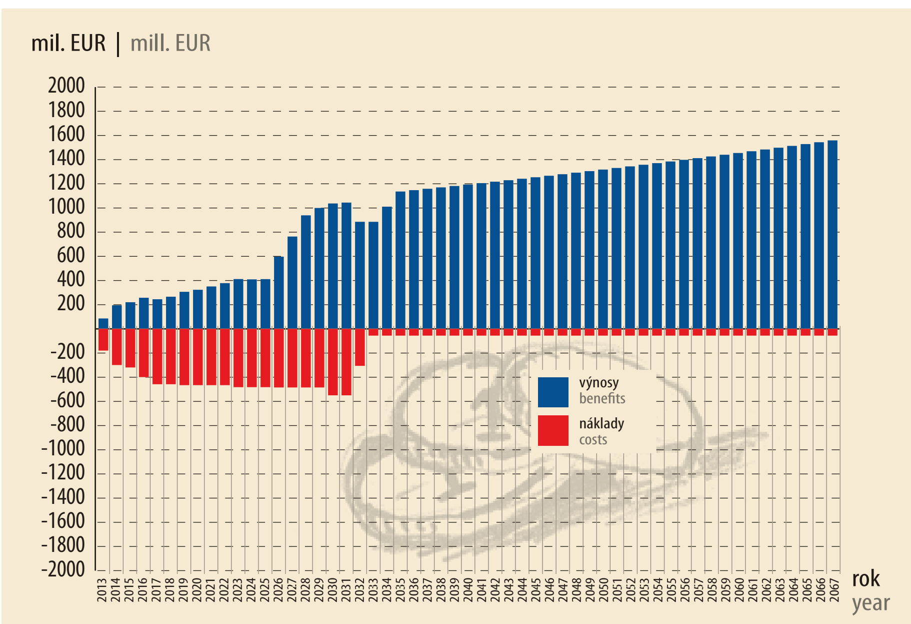
It follows from the graph:

Even at extremely pessimistic assumptions, the value of IRR exceeds 10 %, i.e. higher than the level of 6 % that is deemed to be an admissible minimum at infrastructure investments. At optimistic assumptions it ranges around 20 %. It is therefore possible to say, without any overstatement, that a similar favourable effectiveness is demonstrated at few investments in the area of infrastructure. Moreover, in the calculation there were several effects absolutely disregarded while others were included in the calculation only partially.

A fast process of construction, i.e. the first scenario, seems to be most beneficial. However, it is interesting that slowing down of the construction (shift to scenario 2) will be first reflected in a deterioration of the economic effectiveness, however, then further slowing down of the implementation (transition to the "slow" scenario 3) will have almost no adverse impacts. It seems that it is caused by the chosen process of construction that prefers (also at lower available funds) the first stage, admitting however postponement and slower implementation of the costly fourth stage. It follows that the implementation of the first stages is really urgent from the time point of view, but after their putting into operation it is possible to continue at any speed, no matter whether quickly or slowly.

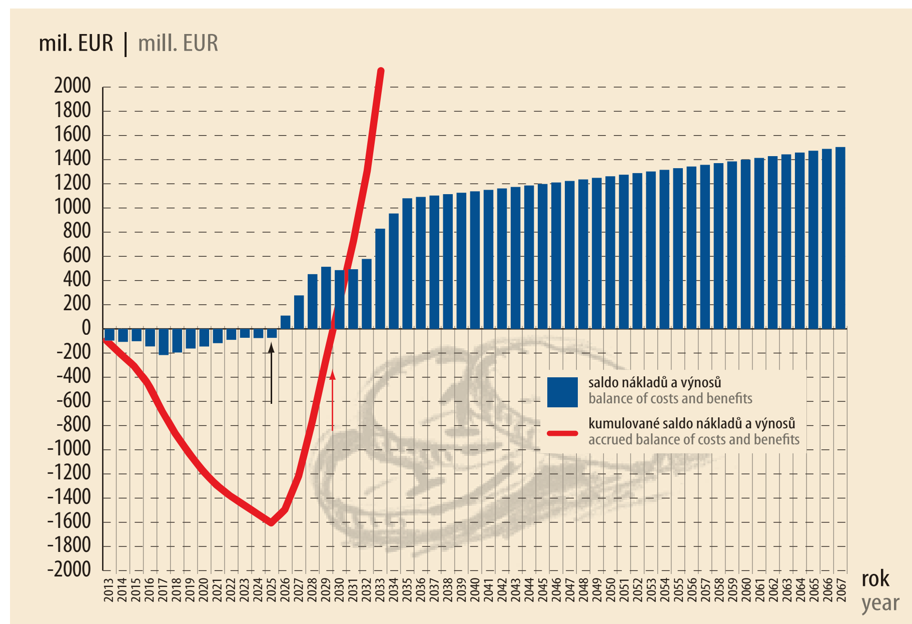
The results of the analysis should be sufficiently convincing even for the part of the general public that, as a result of spreading of simple – and do not be afraid to say naïve – ideas, sees in the D-O-E water corridor only a connection of three rivers that will be functional only after its complete finishing. In reality, the project is a sophisticated program, purposeful in each of its stages, for the implementation of which it is necessary to do only one thing – to start. It was the same with the commencement of construction of Czech motorway, started by the section from Prague to Mirošovice, dubbed by the critics ironically as a "shortway", which was nevertheless purposeful not only as a beginning, but also by itself. Also the first section of the Prague underground from Florenc to Kačerov was not any underground in the opinion of sceptics – also because it was quite short. Is there any reason to cast doubts on its purpose, or should its effect be acknowledged only after the completion of the whole underground network in Prague that is actually still far away?

In connection to this it is necessary to explain some – rather inaccurate but the more frequent – questions of the following nature: „When the funds invested into the implementation of the D-O-E will actually return?" Certainly, the method of examination – IRR – does not provide any answers to such questions because it is based on a date of the cost and revenue balancing stipulated in advance (in our case it is the year 2067), examining, in contrary, the interest rate that might encumber the relevant items in order to reach such a balance (thus – to say it in a very simple way – how high the interest rate may be stipulated at the loan facility for the implementation of the plan for the investor not to lose). However, it is necessary to satisfy also those who require an answer



Průběh nákladů na realizaci vodního koridoru D-O-E a příslušných výnosů za předpokladu středně rychlé výstavby (scénář 2) a střední hodnoty přepravních úspor.

Course of realization costs of the D-O-E water corridor and espective benefits on condition of the medium fast construction (scenario 2) and the average rate of transport savings.



Průběh salda nákladů na realizaci vodního koridoru D-O-E a příslušných výnosů za stejného předpokladu jako u předchozího grafu, a to v jednotlivých letech (sloupce) i kumulovaně (křivka).

Course of the balance realization costs of the D-O-E water corridor and respective benefits on the same conditions as in the previous graph in individual years (columns) as well as accrued (curve).

to the above stated question. Then it is possible to depart from a simple balance of real costs and revenues (without discount) and to express it in graph, e.g. under the assumption that scenario No. 2 will be implemented (medium-fast implementation) and taking into account a medium level of the transportation savings. The graph on the left shows expenses and revenues in individual years (costs by negative and revenues by positive figures). In the first years, the costs certainly considerably prevail because the revenues follow only from an increase of the employment and from the savings of the implementation of other measures in water management and in anti-flood protection. The graph on the right shows the balance of costs and revenues that are certainly negative first. However, already in 2025, i.e. 8 years after putting the first stage into operation, the value of the balance starts to be positive (this moment is marked with the black arrow), and at the turn of 2029 and 2030 (red arrow) all of the costs spent until then will have been paid back, as it is shown by the course of the cumulated values of the balance. The costs will be completely paid back even though that the construction of the costly fourth stage will be in progress at that time. Therefore we might say that return of the costs spent on the implementation and operation will take place three years before the completion of the construction. This result seems to be paradoxical; it is however absolutely correct and follows from the fact that the process of construction by stages – i.e. priority implementation of the stages less demanding from the investments point of view, however, promising significant effects – is reasonably applied.

Here, it is really possible to talk about effectiveness indicators attained only in a very few infrastructure projects.

The solving of the problem lies
in finding the solvers.

Van Herpen law

Lastly, on Financing

At each project or business plan we must ask who will actually pay its implementation. If we ask this question as late as in one of the latest chapters, it is only due to the fact that first we had to explain the purpose and solution of the plan and to say how much it will cost and what it will bring. Only then we can offer it to the investor or investors.

Favourable economic assessment expressed by the extraordinarily high value of internal revenue percentage rate does not certainly have to mean that the investors will be anxious to invest their money into the project. The concept of economic effectiveness is basically identical with the concept of business profitability only at the plans of a purely private nature. In such case, entrepreneurs (investors) bear all the costs (either financed from their own funds or by loans), and at the same time they make use of all the benefits, or collect the whole profit. Vice versa at projects following the development of the transport infrastructure – and certainly not only at waterways, but also at motorways, roads and railroads – those who finance the project are not identical with the entities that "collect" its benefits. For example, a city circumferential highway is paid by a public entity (i.e. the state), the benefits reached (e.g. shorter driving period, reduction of accidence occurrence) will affect drivers or city citizens without paying to the state directly. However, it would be hard to finance such highway from the private sources.

We might object that there are also routes financed exclusively from private funds. Then they are encumbered by a fee for their use (turnpike toll), assuring adequate return of the invested capital and sufficient profit to the investor. At the D-O-E water corridor the requirement for financing only from private sources would not be reasonable due to several reasons (although it might be possible with a view to the favourable economic indicators):

The D-O-E water corridor is to function in a competitive environment that is characterised by the development of the transportation infrastructure financed practically exclusively from the public funds. E.g. it is known that the ideas of financing development of motorways in the Czech Republic with the use of private capital have always wrecked due to the excessively high turnpike toll that would be connected with such financing. Financing of construction of waterways exclusively from the private capital would handicap it in the competition with other segments of the transportation infrastructure because it would result in excessive rates of turnpike tolls (i.e. lockage fees) and it would be unreasonable in terms of transportation-policy.

The amount of lockage fees is limited also by the condition that it should not be too different from the rates applied at other paid waterways. At this point let us mention that in Europe actually on all waterways fees are applied, except for rivers on which freedom of navigation and free operation is stipulated on the basis of an agreement (Rhine, Danube), or rivers where such arrangement is generally accepted also upon the absence of valid contracts (Elbe).

Usually, standard fee rates are very low. Their significant increase might give raise to the protests, or possibly revenge actions. On the other hand, it is necessary to take into account also

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the fact that the D-O-E water corridor is a connection of a pan-European importance and that also those countries (e.g. their shipping agents and forwarders) that will not directly participate in the realization, will profit from it. An adequate amount of lockage fees may be a tool of fairer distribution of the costs of implementation.

The obvious limit of the amount of fees follows also from the condition that they must not be de-motivating, i.e. discouraging the forwarders from the use of the connection. This might happen, in particular, on short transportation distances from which low savings follow.

The D-O-E water corridor has a number of other functions of public interest (anti-flood protection, recreation, environment improvement) and also functions important for the development of regions the alternative assurance of which would be undoubtedly financed from public sources.

If, at one hand, it is necessary to refuse the idea of financing the construction exclusively from private sources, it does not mean that it would be appropriate to absolutely exclude the private capital in any form. Thus it is necessary to apply a combined system of financing that may have several variants.

The basic idea of the combination of various sources of financing the D-O-E water corridor can be shown in the table.

The aim of the project of financing will be distribution of the investment costs among individual partners so that the participation in the investment is advantageous for each of them. The most complicated issue is the problem of distribution of public funds of the riverine countries – the Czech Republic, Austria, Poland and Slovakia, and of the European countries. Three criteria of such distribution are available.

As first option, specification of the shares according to the principle that each constructs the section of the D-O-E water corridor located on their territories. Such a share of investments would be in the first stage extraordinarily advantageous for the Czech Republic, in the territory of which there is only a small potion of the route of the first stage, while the expected

Kind	Form (source) of funds	Close specification	Motive (i.e. reason that an investor may have for investing their funds)	Scope and manner of the return of investment funds	
				Directly	**Indirectly**
Public funds	Public funds of the countries through which the water way goes	Budget of the Czech Republic, or Governmental Fund of Traffic Infrastructure Development	Support of national economy development, employment increase, anti-flood protection, etc.	Partially through tax mechanism and savings in the social affairs area	To the extent exceeding the invested funds resulting from the Gross National Product and reduction of negative impacts on environment
		Budget of the Federal Republic of Austria	Support of national economy development, employment increase	Partially through tax mechanism and savings in the social affairs area	To the extent exceeding the invested funds resulting from the Gross National Product and reduction of negative impacts on environment
		Budget of the Poland Republic	Support of national economy development, employment increase, anti-flood protection, etc.	Partially through tax mechanism and savings in the social affairs area	To the extent exceeding the invested funds resulting from the Gross National Product and reduction of negative impacts on environment
		Budget of the Slovak Republic	Support of national economy development, employment increase	Partially through tax mechanism and savings in the social affairs area	To the extent exceeding the invested funds resulting from the Gross National Product and reduction of negative impacts on environment
	European Union Funds	Individual Funds of Union	Support of the development of EU countries, improvement of the traffic infrastructure of EU countries, fulfilment of strategic aims	Partially through effects in economy of the member countries and EU as a whole	To the extent exceeding the invested funds resulting from the global development of EU and reduction of negative impacts on environment
Private Funds	Direct implementation of project	Construction of an adequate part of the project controlled by a franchiser	Franchiser's profit	To the extent exceeding the investment of the franchiser (navigation fees for the franchise period are the source)	
	Bank loans	Loan Contracts	Banking industry profit	To the extent exceeding loan by relevant interest. Navigation fees for the period of loan maturity are the source of amortisation	
	Bonds	Issue of bonds	Bond holders' profit	To the extent exceeding nominal value of the loan. Navigation fees for the period of bonds are the source.	

economic effects would result in the benefits for the Czech economy mostly. Contrary it would be less advantageous for Austria and Slovakia. These countries would bear a decisive portion of the first stage while they would participate only minimally in the effects. In further stages this "territorial" principle would however have opposite effects: construction of the following stages would encumber only the Czech Republic (or in stage 1a Poland), while its effect would not grow so much. At the moment of reaching the connection of Danube-Oder the benefits of Austria, Slovakia and Poland and also other European countries connected to the navigation network would immediately rise. Therefore, it is impossible to recommend the territorial principle because it would be in conflict with the economic interest arisen in individual construction stages.

A principle of distribution according to the effects – either "immediate" (expectable at the relevant stage) or target ones – seems to be fairer. When applying it, it is possible to suitably involve also those countries through the territory of which the connection does not run, but that may expect significant benefits from its implementation, into financing. As far as the member EU countries are concerned, their contribution can be in the form of joint EU funds.

In order to involve also other countries in the system of financing in a more consistent manner (including the countries that are not member EU countries), lockage fee must be applied. Collection of such fee may be also a means for the acquisition of private sources for co-financing of the project.

Specification of an average amount of lockage fees from which it will be possible to deduce also a potential participation of private equity would be a key issue. In reality, the fees will be obviously differentiated according to the type of the transported cargo and charged also for unloaded cargo vessels, passenger vessels, etc. On German canals and artificial waterways such a value is roughly about 0.00304 €/tkm. However, it is a very low value because it would result – in particular in first stages – in too low revenues of the collected fees and would not enable more significant participation of the private capital. However, it is possible to depart from the idea that on the waterways of crucial importance fees are usually higher.

The D-O-E water corridor undoubtedly belongs to such waterways – representing extension of the "free" Danube route and being simultaneously the only access to Central and Northeast Europe from the Danube area not encumbered by long diversions.

After consideration of potential sources of financing, in any case it is impossible to speak of lack of financial means for the implementation of the D-O-E water corridor. The problem of financing is absolutely different – i.e. lack of good will to "extend one's hand" and simply be willing to acquire the funds, and also in the non-existence of an operational organization that would assume liability for the collection of all potential funds from various sources (be it national and international, public and private) and their reasonable spending on gradual implementation.

We might find a number of cases when the establishment of such an organisation – e.g. an international equity company – would be a decisive step for the establishment of significant transportation, water administration and other projects.

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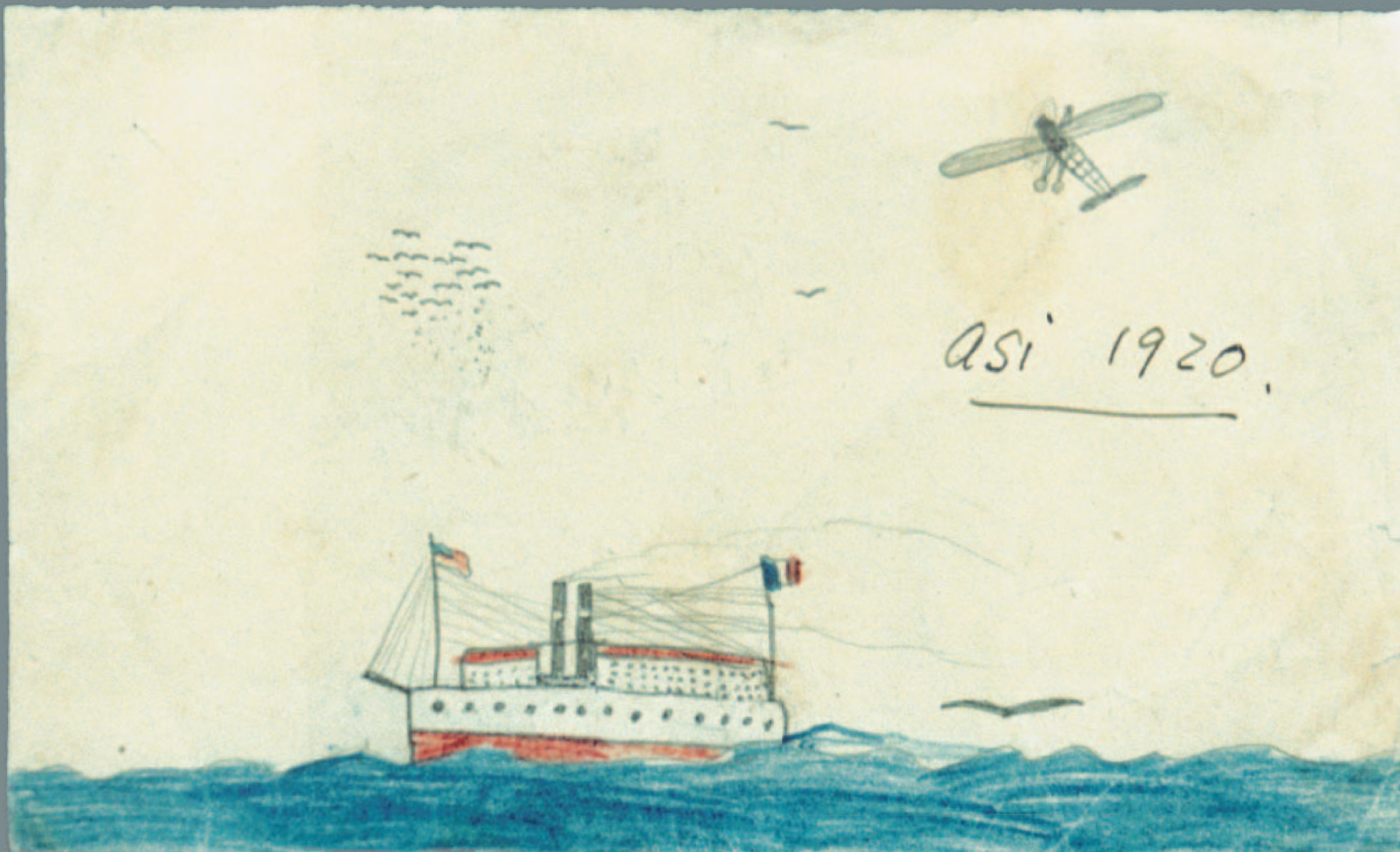
asi 1920.

A MARI
USQUE
AD MARE

(inscription on national emblem fo Canada)

Křižovatka (nejen) tří moří

Meeting of (More than) three seas

VIII

Titul této knihy je výsledkem kompromisu, který autoři vybírali dlouho. Vzbuzuje ne právě přesné představy o funkci vodní cesty. Jako by měla skutečně sloužit plavbě přes celý kontinent od moře k moři, a nikoliv spojení zdrojů a cílů významných přepravních proudů, ať už leží při pobřeží nebo ve vnitrozemí. Vodní koridor D-O-E není ostatně pouze dopravní cestou.

Titling of the book has become a compromise of long selection. It implies a rather inaccurate idea of the function of the waterway. As if it was indeed intended for navigation across the continent, from one sea shore to the other, not for connection of resources and destinations of important transport streams both on the coast and in inland. Moreover, the D-O-E water corridor is not merely a waterway.

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Labský laterální průplav se napojuje na Středo-zemní průplav v blízkosti Wolfsburgu. Trojúhelníková nádrž umožňuje představu o budoucí přerovské „křižovatce“.

The Elbe Lateral Canal joins the Central Canal near Wolfsburg. The triangular pool gives a notion of the future Přerov “junction”.

Starty na „cesty k mořím“ se odehrávaly zpravidla na brněnském letišti. Zleva: doc. Miroslav Raudenský – pilot a fotograf, ing. Josef Podzimek – fotograf, ing. Jaroslav Kubec – navigátor a fotograf.

Our sea-going journeys usually took off from the Brno airport. From the left: Miroslav Raudenský – a pilot and photographer, Josef Podzimek – a photographer, Jaroslav Kubec – a navigator and photographer.

Let’s admit that a real traffic junction will be once built not far from Přerov. It will not have traffic lights and will neither witness frequent traffic accidents we are used to see on the roads. It will have shape of a triangular pool from which canal routes will run in three directions – similar to the place of the connection of the Elbe Lateral Canal to the Central Canal close to the famous automobile plant of VW at Wolfsburg. However, individual branches will not be directed to the west to the Rhine in the Netherlands, Belgium or France, to the north to Hamburg, and to the East to Berlin, Oder and to Poland, but simply to the Black, Baltic and North sea in our case. The Přerov junction will be different from others also by the fact that it will be located exactly in the heart of Europe. The routes on the rivers that are – or used to be and might be again – transportation and economic arteries of European importance, are to run in three directions from Přerov. On their banks a lot of important chapters of the European history have been written. One day, we will sail on these routes, either on the board of a tourist vessel or cruiser, private yacht or boat, to travel over Europe. That means to enjoy the trip not speeding up on motorways in between lines of trucks and anti-noise barriers. As pilgrims we will notice a lot that we miss today. Somebody may like to see, in particular, the country and perceive the beauty of nature, while others may want to visit historical places of interest and others would appreciate what has originated from the architects’ invention on the river banks or from the engineers’ effort on the rivers themselves. And others will observe ships that have belonged to European rivers, from time immemorial, and belong to them even more nowadays – when ever-wider motorways pretend to be a cure-all for traffic problems.

The authors of the book could not resist the temptation to get on a trip from the imaginary junction at Přerov to the seas already today. They had to, however, choose a means of transport enabling literally „bird’s-eye view“ and some kind of time and factual “shortcut” – a plane. They documented the country on the route of the corridor itself by the same means in order to get pictures for the previous chapters. That is why in this “travel book” we can skip the relevant places or “fly over” them and concentrate only on the Danube, Oder and Elbe. On their banks there are lots of places that are worth visiting on the way to the sea and also worth contemplating for a while.

Down the Danube to the Black Sea

The Danube is the second biggest river of Europe after the Volga, and it deserves the designation “large stream” already in places where D-O-E water corridor is to supposed be connected to it – at Vienna or where the Morava empties at Devín. The importance of the Danube is not, however, only in the potency of its flow but also in the role it has played and still plays in the European history. In deep history this river would divide Europe, setting apart two very different cultural worlds. The Danube constituted a part of the limes Imperii Romani, borders of the Roman Empire. There was a chain ring of Roman military camps along its banks. Already in the first section of our trip we pass Vindobona – the-today Vienna – and the close Roman camp Carnuntum near Austrian Hainburg. The protectors of the Roman border set their camp on a close steep hill on which Devín was later established and settled also on the hill on which Bratislava castle is located today.

S ohledem na rostoucí hrozbu povodní bylo ve Vídni zřízeno odlehčovací rameno Dunaje. Průtok ramenem ovládá řada jezů. Za normálních okolností je však vtok do ramene uzavřen, takže se do něj dostává voda z řeky hlavně průsakem. Rameno je tedy vhodné pro koupání. Dlouhý a úzký ostrov mezi hlavním korytem a ramenem slouží různým formám rekreace.

Increased threat of floods gave birth to a flood diversion canal on the Danube in Vienna. Its discharge is controlled by a number of dams. In ordinary circumstances, the canal inlet stays shut and the river water only seeps in, so the canal is a convenient place for swimming. The long and narrow island between the main riverbed and the canal hosts various types of recreation.

Na severním břehu odlehčovacího ramene vznikl i rozsáhlý administrativní komplex, využívaný zejména mezinárodními organizacemi – UNO City.

On the north bank of the flood diversion canal a large office complex (UNO City) was built to be resided mainly by international organizations like UNO.

V hlavním vídeňském přístavu Freudenau, v blízkosti vodního díla stejného jména, jsou soustředěny logistické služby, zaměřené hlavně na kontejnery, osobní automobily a kusové zboží.

Freudenau – the main port of Vienna – centralizes logistic services concerned mainly with containers, personal vehicles and general cargo.

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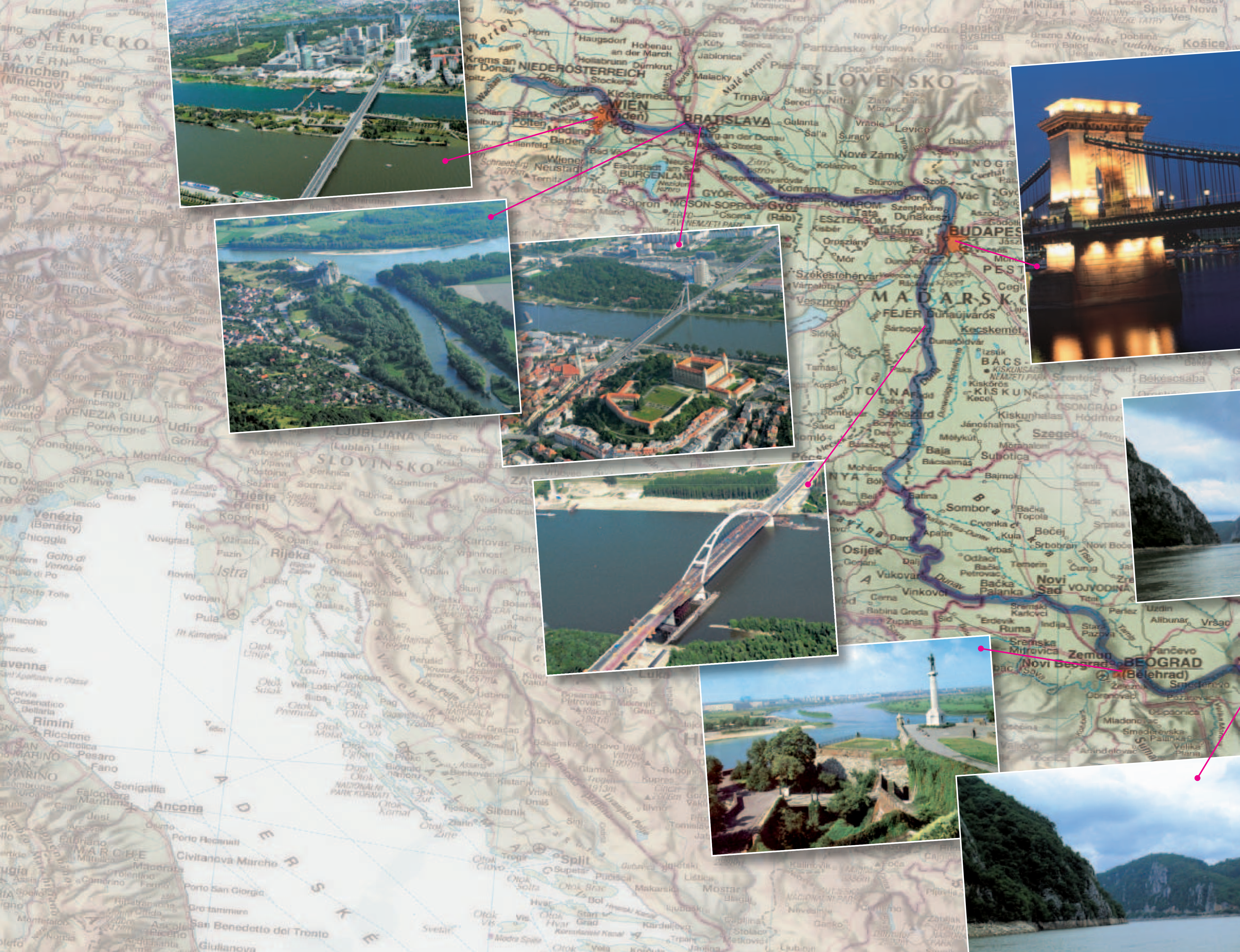
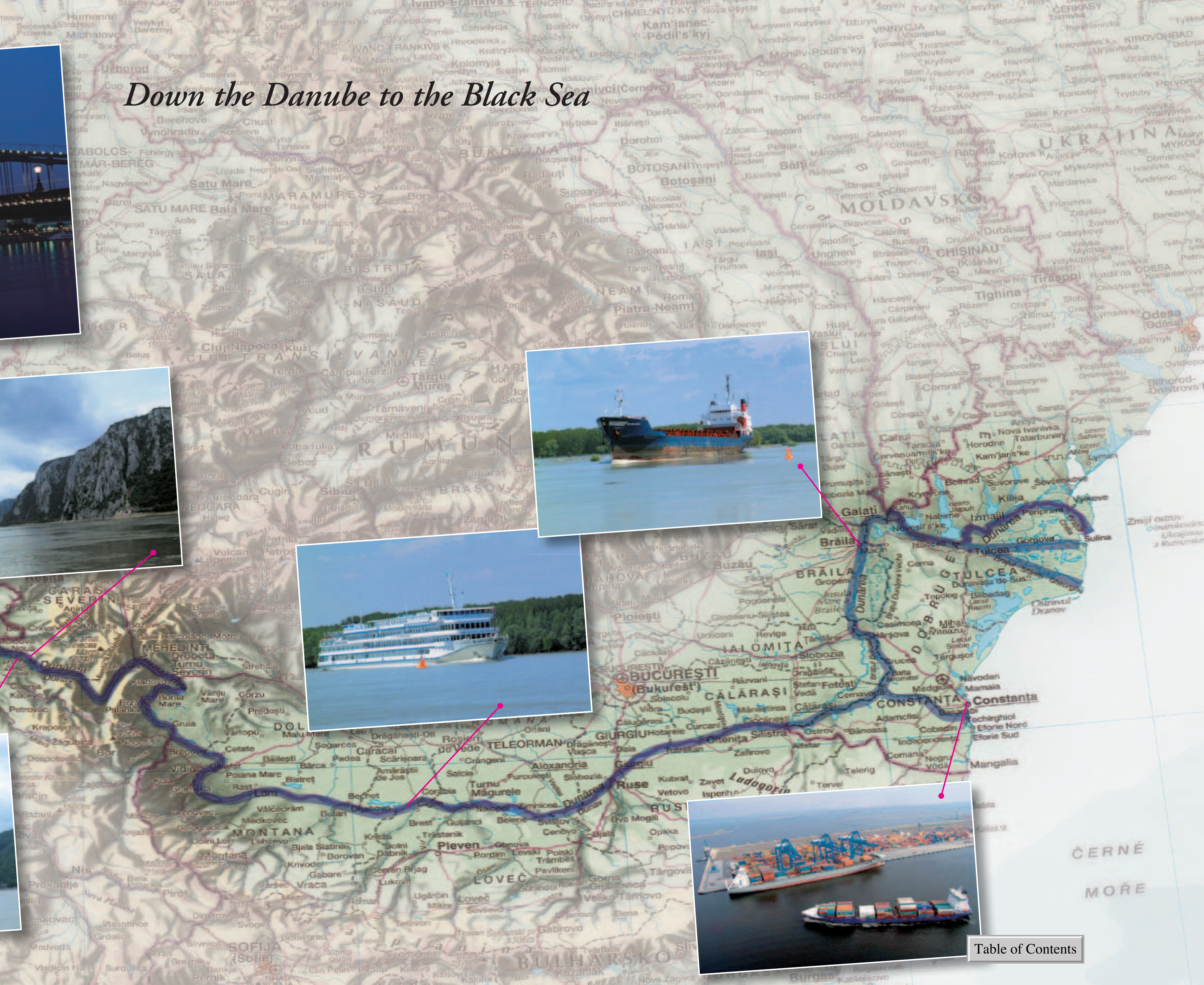

NĚMECKO
München (Mnichov)
NIEDERÖSTERREICH
WIEN (Vídeň)
BRATISLAVA
BURGENLAND
SLOVENSKO
Trnava
Nové Zámky
Komárno
Győr
BUDAPEST
MAĎARSKO
Kecskemét
Szeged
Subotica
Osijek
Novi Sad
VOJVODINA
BEOGRAD (Bělehrad)
Novi Beograd
Zemun
Pančevo
SLOVINSKO
LJUBLJANA
Trieste (Terst)
Rijeka
Istra
Split
Mostar
Ancona
Rimini
FRIULI VENEZIA GIULIA
Udine
Venézia (Benátky)

Down the Danube to the Black Sea



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Na levém břehu Dunaje mezi Vídní a Devínem se rozkládá národní park (Nationalpark Donau--Auen) s rozsáhlými lužními lesy. Regulační zásahy na Dunaji jsou plánovány tak, aby zlepšily podmínky pro plavbu a současně zdůraznily přirozený charakter levého břehu řeky.

A national park (Nationalpark Donau-Auen) with vast alluvium forests spreads across the left bank of the Danube between Vienna and Devín. Regulating measures on the Danube are planned to improve the navigation circumstances and enhanced the natural character of the left bank at the same time.

Historický Hainburg (vpravo) a národní park dunajských niv (vlevo).

The historical Hainburg (right) and the national park of the Danube alluvium (left).

Hrad Devín střeží strategické ústí řeky Moravy do Dunaje.

The castle Devín guards the strategic meeting of the Morava with the Danube.

Bratislavský hrad s Novým mostem, jehož před-mostí se téměř dotýká dómu sv. Martina, kdysi místa korunovace uherských králů. V pozadí – na levém břehu řeky – vyrostlo na místě skromného předměstí největší bratislavské sídliště Petržalka.

Bratislava castle with the New Bridge. Its head almost touches the St. Martin Cathedral, where Hungarian kings used to be crowned. At the back (the left bank) the Bratislava largest housing estate Petržalka has outgrown a former modest suburb.

Oba břehy Dunaje spojuje v Bratislavě 5 mostů. Sledujeme-li živou frekvenci na nich, stěží si dovedeme představit, že ještě po druhé světové válce sloužil jediný a nejužší z nich: Starý most. Na snímku je vpravo nejnovější z mostů – elegantní most Apollo – a vlevo Prístavný most, který je dvoupatrový. Spodní úroveň slouží železnici, horní dálnici. Název Apollo „zdědil" most po proslulé rafinerii minerálních olejů, která byla zničena za války bombardováním a rozkládala se na jeho levém předmostí, tj. na ploše, kde dnes vyrůstají reprezentační budovy včetně Slovenského Národného divadla (v pravém dolním rohu). Vlevo jsou zachyceny bazény starého přístavu.

Bratislava banks are connected with 5 bridges. Their busy traffic hardly lets you imagine that after WWII only the narrowest of them, the Old Bridge, was already there. The picture shows the newest one, an elegant bridge Apollo (right) and the two-storied Harbour Bridge (right): with the lower level for railway, the higher one for motorway. The bridge Apollo inherited its name from a renowned refinery of mineral oils, blitzed in WWII. It used to lie on the left bridge-head, in the place of today's representation buildings including the Slovak National Theatre (right corner). The old port pools are in the left.

Většina překladu se dnes soustřeďuje v novém, moderním přístavu Pálenisko po proudu od Prístavného mostu.

Nowadays most transhipping is done in the modern port of Pálenisko downstream the Harbour Bridge.

Vodní dílo Čunovo na okraji slovenské metropole bylo vybudováno v letech 1991–1992 slovenskou stranou za účelem převedení dunajské vody do derivačního kanálu k vodní elektrárně Gabčíkovo, a to jako „dočasné" řešení, vynucené nesouhlasem maďarské strany s dokončením celé soustavy Gabčíkovo–Nagymaros. Vedle jezové části jsou součástí vodního díla i plavební komora, umělá slalomová dráha a vtokový objekt, zajišťující průtok Mošonským ramenem Dunaje.

The water project Čunovo on the outskirts of the Slovak capital was built in 1991–1992. As the Hungarian never agreed with a completion of the Gabčíkovo-Nagymaros system, the Slovak side designed it as a "temporary solution" to bring the Danube water to a derivation canal of the hydro-power plant Gabčíkovo. Along with the weir part, the water project has a lock, an artificial slalom track, and a water intake providing sufficient flow in the Mosoni-Duna.

Derivační kanál vodního díla Gabčíkovo neodvádí samozřejmě z Dunaje veškerou vodu, aby nenarušil biologickou rovnováhu v řece. Výpustným objektem u Dobrohoště odtéká dostatek vody do soustavy ramen.

The Gabčíkovo derivation canal does not drain all the Danube water not to disturb its biological balance and even allows sufficient water supply for the branch system between the canal and the river itself, especially through the water outlet opening at Dobrohošť.

Lesní komplexy, protkané bočními rameny Dunaje, rozhodně netrpí nedostatkem vody.

Forest complexes of the Danubian side branches have more than plenty of water.

Following the break-up of the Roman Empire, the Danube ceased to be a border and became a link between the Central Europe and the Near East. Ships on the Danube transported hundreds of thousands crusaders along the stream, and precious goods from the Orient against the stream. Bratislava was, already at that time, an important port and centre of trade. It retained its importance over the following centuries, and in the 16th and 17th centuries, when Buda (the right-bank part of Budapest) was annexed by Turks, it became a factual capital of Hungary. Today it is the Slovak capital. By the way, which European river can boast by the fact that four capitals are located on it: Vienna, Bratislava, Budapest and Belgrade?

If we skipped several centuries in the previous paragraph and got too easily from the history to the presence, it has its reasons. Bratislava is a place where the nature of the river immediately changes. It is necessary to ask why it is like that - and to prefer geography to history. Under Bratislava, the Danube leaves the narrow valley characteristic for the river's upstream and goes into a wide plain. Its decline decreases abruptly from 35–40 cm/km to 6–8 cm/km. Also the speed of the water stream slows down and the river looses the ability to take away the sand gravel and sand collected mostly in the valleys of its Alp tributaries. Similarly as rivers in their estuaries – when they loose their carrying power and deposit sediments into the wide delta, going through many branches and islands and little islands – also the Danube under Bratislava has formed a kind of inland delta. The most significant branches are those turning left: Small Danube, going around the Great Rye Island, the Mosoni-Danube running right from the main river bed behind Small Rye Island. There used to be and are lots of these branches, although minor ones, and by sedimentation the terrain of the "delta" gradually elevated above the surrounding landscape and the danger of floods has consequently increased. On the other hand, various shallows would form in the river bed, making the river navigations sometimes quite difficult. The volume of gravels mined annually in the shallow section, with the aim to increase a sustainable condition of the river, could be calculated in millions of m^3 per year. However, industrial mining for the needs of construction gradually prevailed and the situation reversed: the river started to countersink and its bed became unstable. The situation was resolved by the water project Gabčíkovo, establishing an almost 30 km long derivation canal, thanks to which there is a fall of 24m that can be power-used. Due to extraordinary parameters of the canal it is possible to bring up to about 5,000 m^3/s to eight units of the power plant; the maximum output amounts to almost 700 MW and the medium annual production can reach 2–2.5 thou. GWh. Thanks to the canal the river navigation can by-pass the feared shallows and both Rye Islands are, furthermore, perfectly protected against any catastrophic floods. Now, if we return back to the history just for a moment, this time quite recent history, we would have to describe the passionate disputes on the solution of this water project and in particular, its effects on environment and countryside along the river and in the network of minor branches around the main stream. However, analysing all pros and cons would probably be unreasonable, because none of the pessimistic forecasts has materialised – as demonstrated by new detailed studies by environmentalists who did not analyse just not hypotheses but the real conditions after the completion of the dam construction. Monitoring indicates a lot of positive changes, e.g. regarding volume of underground water reserves and their quality, preservation of flood-plain forests that had been endangered by drying up before the construction of this water project, etc.

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Pohled na stupeň Gabčíkovo a přívodní kanál, který má parametry vycházející z požadavků energetiky, nikoliv plavby. Šířka jeho hladiny činí 350 až 630 m a hloubka 7,3 až 14,3 m.

View of Gabčíkovo locks and derivation canal. Grand parameters of the canal follow rather the demands of energetics than navigation. The canal provides the hydropower plant with the necessary discharge. Its width spreads to 350 – 630 ms, the depth varies from 7.3 to 14.3 ms.

Odpadní kanál pod elektrárnou Gabčíkovo se znovu připojuje k Dunaji u obce Sap (v pozadí). V popředí Bagomerské rameno Dunaje.

Tailrace canal of the Gabčíkovo power plant joins the Danube at the village Sap (behind). In front, the Bagomer branch of the Danube.

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But if we want to be really objective we must admit that not everything was as successful as the constructers had expected before implementation of this water project. The causes did not consist in any conflict between nature and technology, but instead in the political circumstances. The relevant section of the Danube is a bordering one and that is why the water project had been prepared as a joint – i.e. Slovak (at that time Czechoslovak) and Hungarian project. Originally, cooperation on its preparation and implementation of the whole system Gabčíkovo–Nagymaros on the basis of a treaty of 1977 was very constructive. However, at the beginning of the 1990s, the Hungarian party – when the water project Gabčíkovo was almost completed – withdrew unilaterally from the treaty, with reference to the "environmental catastrophe" that was allegedly threatening in connection with the completion of the project. Then, Slovakia finished the remaining part of the water project in its territory by its own forces, while work on the related water project Nagymaros (located in the Hungarian territory) was suspended and the parts of construction that had only begun were liquidated in presence of enthusiastic environmental activists. The absence of the Nagymaros level, which was not supposed to be big in terms of its size and which was basically aimed at just balancing the fluctuating discharge of water at top performance of the Gabčíkovo power plant, degrades the energetic function of the system to a certain extent. It's a pity that the project has not been completed in its entirety, but the damage was perhaps worse for the politics than for the energy industry because people lost their trust in politicians. Is it possible to believe those who under the conditions of newly arising ideas stressing (obviously correctly!) the interest of environment and landscape, were getting "points" by "charming" populism and then – when obviously no environmental catastrophe happened – they are afraid to come clean? Memories of the project, during which pragmatic approach gradually changed into series of evasions by one party, leave therefore a strange aftertaste. Maybe it will disappear after the water project Nagymaros is finally constructed one day.

The Danube waters do not stay in Nagymaros for a long time and approach another capital city – Budapest. The capital of Hungary is undoubtedly the most beautiful city on the Danube. It is located on both banks of the river, while Vienna and Bratislava were, until

V ústí Mošonského ramena do Dunaje se buduje nový moderní přístav Györ-Gönyü.

In the mouth of the branch (Mosoni-Duna) the new modern port of Györ-Gönyü is being built.

Komárno, město s velkým přístavem a loděnicí, leží při ústí Váhu – i když bychom mohli dolní tok Váhu nazývat i Malý Dunaj, neboť obě řeky se spojují již u Kolárova, o více než 20 km dále proti proudu.

Komárno – a town with a large port and shipyard lies at the mouth of the Váh. Its lower reach may be easily called the Small Danube, as the rivers meet more than 20 kms upstream at Kolárovo.

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recently, cities only on one bank having reached across the river quite short time ago. And Belgrade has actually never spread to the other bank of the Danube. Budapest is distributed symmetrically on both banks of the Danube thanks to integrating two, resp. three towns: Buda and Óbuda on the right bank and Pest on the left bank. The towns were officially united in 1872. In conformity with this, the main architectural dominants of the city are located on both banks of the river: the royal castle and Matthias Church on the right bank and the buoyant building of the Parliament, that seems to grow up from the river, on the left bank. Both banks of the city are connected by 10 bridges. Two of them enable access also to the large Margaret Island in the middle of the Danube with beautiful parks and thermal pools. There are many hot springs and spas in the city, known already in the ancient world. They were enjoyed also by the Romans, who had established the town of Aquincum in the place of the later Óbuda, the remains of which have been preserved till the present time.

Down the river from Budapest we see bridges across the Danube less and less frequently. The river is too wide there and its bridging is too expensive. As far as the Serbia-Croatia border (which is identical with the stream-line of the Danube in the next section) we would see only two bridges, but they are double (both with roads and railroads). In this section of the river

Hlavní budpešťský přístav Czepel leží po proudu od centra a má 4 moderně vystrojené bazény.

Czepel, the main port of Budapest lies downstream of the centre, and has 4 modernly fitted basins.

Dunajský přívoz v Adony pod Budapeští nabízí místo pro 10 i více osobních automobilů.

The Danube ferry in Adony below Budapest carries 10 or more cars at a time.

Pohled proti proudu Dunaje, oddělujícího Budu na pravém břehu (na snímku vlevo) a Pešť (vpravo), nabízí defilé hlavních budapešťských mostů. V popředí je most Svobody (Szabadság híd), na jehož předmostí jsou okázalé budovy Gellértových termálních lázní. Následuje moderní Alžbětin most (Eszsébet híd) a poté nejstarší a patrně nejkrásnější Széchenyiho řetězový most (Széchenyi lánchíd). Projektantem mostu byl britský stavitel Clark a také jeho železné díly byly vyráběny v Anglii a přepravovány údajně loděmi po Rýnu, Ludvíkově průplavu a Dunaji. V pozadí je Markétin most (Margit híd), jenž vedle spojení obou břehů řeky zajišťuje také snadný přístup na Markétin ostrov (Margitsziget).

An upstream view of the Danube, dividing Buda of the right bank from Pest on the left, parades nicely the bridges of Budapest. The head of the first one – Liberty Bridge (Szagadság híd) – houses proud buildings of Gellért Thermal Spa. Next comes the modern Elizabeth Bridge (Eszsébét híd), and the oldest and probably the most beautiful Széchenyi chain bridge (Széchenyi lánchíd). Designed by the British architect Clark, its steel parts were manufactured in Britain and shipped along the Rhine, Ludwig Canal and the Danube. Margaret Bridge (Margarit híd) in the rear connects the banks and Margaret Island (Margitsziget).

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U přístavu Dunaújváros je Dunaj široký téměř 500 m.

At the port of Dunaújváros the Danube reaches the width of 0.5 km.

Stavba nového silničního mostu přes Dunaj v blízkosti města Dunaújváros – po jejím dokončení se možnosti překonání široké řeky přece jen zvýší.

A new road bridge across the Danube close to the town of Dunaújváros will significantly upgrade the options how to cross the large river.

there are nevertheless nine big ferries (kompátkelés) used for passenger cars and lorries. The last Hungarian town on the Danube is Mohács. It is a significant place also for the Czech history because the Czech king Ludwig Jagiello died here in a battled with Turks in 1526, trying in vain to prevent the Turkish expansion up stream of the Danube. Coincidentally in the same place, however, the Turks were defeated by the Austiran army in 1687 and were forced to leave Hungary.

The border section of the Danube between the territory of Croatia and Serbia became recently a war zone, as a result of the split up of Yugoslavia. The war events did not avoid the city of Novi Sad (located farther down the river) where all four bridges across the Danube were destroyed by bombing. The tragic events of the Yugoslavian crisis had paradoxically one positive effect. Among the destroyed bridges there was also the Marshall Tito bridge (later the Varadin bridge) built after the Second World War at which the clearance above the highest navigation level was only 6.07 m, i.e. almost by 3.5 m lower than required by the recommendation of the Danube Commission and by more than 1 m lower than other bridges under Vienna. It therefore used to be a bottleneck in the very centre of the Danube waterway. Very often queues of higher vessels would form there, waiting for lower height of the water that would enable them to get through. Removal of this navigation obstacle, no matter how painful by itself, entailed

further problems caused by quickly built up temporary pontoon bridges. First, these blocked the river completely; gradually only occasional river traffic was allowed for several hours or days in a week. However, also this crisis has been overcome and vessels can now sail between the town of Novi Sad on the left bank and historical fortress Petrovaradin on the right bank of the Danube without any problems.

Memories of recent and tragic events should not divert us from the fact that it is close the town of Novi Sad, the main and actually the only navigable tributaries (if we do not mention Váh meeting the Danube in Komárno that is navigable only partially) discharge into the Danube – without which this large stream would be only a line transportation way lacking any important branches. Not far from the Hungarian territory it is the river Dráva, intensively utilised as far as to the Croatian port of Osijek, and at Slankamen, down the river from Novi Sad, the Tisza that is navigable with some difficulties along the whole territory of Hungary to the Slovak border (vessels navigate to the Slovak territory thanks to the Bodrog river mouthing to the Tisza at Tokai). Further down the river, the Sava mouths to the Danube close to Belgrade; through this river also the ports in the territory of Bosnia and Herzegovina and Croatia are connected to the Danube. Its navigable section reaches almost to the capital city of Croatia – Zagreb. Directly in Novi Sad, a dense network of canals designated as „System Danube –Tisza–Danube“ connects to the Danube. A total of 650 kms waterways is concerned built not because of transportation needs but in particular as the basic skeleton for draining and irrigating the vast farming areas in Vojvodina. Thanks to the locks designed in a large scale, the network it is accessible for most Danube vessels.

The backwater of the biggest water project on the Danube, the Iron Gate, reaches almost as far as to the town of Novi Sad. Thanks to the long pool and wide surface the navigation conditions in this section of the Danube are comparable with the conditions of the lower course of the Mississippi, if not even better. Here, we can meet pushed convoys exceeding by its size the convoys on the Rhine and comparable with pushed convoys on big rivers in the USA. The capital of Serbia – Belgrade – is located at the junction of the rivers Danube and Sava. Exactly above the junction, the fortress Kalemegdan towers. It used to be a Roman army camp and later was controlled by Goths, Huns, Slavs and, of course, also by Turks from whom it got its current name. In the 18th century the fortress was re-built and enforced. In the 19th and 20th centuries it was converted in a beautiful park and its past is reminded only by the exhibits located there – and maybe also an impressive statue of a Winner by Ivan Meštrović, that is apparently the most significant symbol of Belgrade.

Novi Sad, 1999. V posledním desetiletí se mosty přes Dunaj nejen budovaly, ale i bořily.

Novi Sad, 1999. In the past decades bridges over the Danube were not only built…

Tak vyhlížely zbytky mostu Svobody v městě Novi Sad po bombardování v dubnu 1999.

The remains of Liberty Bridge in Novi Sad after bombing in 1999.

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From Belgrade a waterway of exceptional quality is available as far as to the Black Sea. But maybe this sentence should be in conditional because one should mention specific problems following from the not ideal draft conditions on the Bulgarian-Roumanian and the Rumanian part of the route. However, they are only minor defects if compared with the fact with what obstacles the Danube navigation had to face in the past. To the East from Beograd, the Danube had to challenge the high edge of the Carpathian Mountains which the large stream managed to cut, however, at the price of narrow defiles and rapids. The water outbreak is called the Iron Gate, although the word cataracts would be more appropriate and the name Iron Gate should applied only to the most difficult of the rapids – cataracts.

Now it is the right time for returning to the – very ancient – history. The mountain barrier seemed insurmountable too the Greeks who tried to get from the Black Sea up the stream of the Danube (called "Istros" by them). The river seemed to run from the defiles of the mountain range and they though that effort to get farther up the river, against the cataracts, did not have any sense (the word cataract is of Greek origin). The Latin name Danubius was a Roman designation for the river running to the west of the Carpathian mountain range. It is not excluded that for some time – until the depth of the rocky defiles through which the Danube runs was properly examined – Istros and Danubius were considered to be two different and unrelated rivers. The river, up to 2 kilometres wide at some places, had to shrink substantially in order to get through the Great and Small Kazan gorge having the width of 150 m. Seemingly, in this narrow place of cataracts the waters should highball at an incredible speed so that the volume of water (medium discharge reaches 5,600 m^3/s in the cataracts) "could squeeze" through the gorges. But it was the opposite: in Kazan gorges the surface had a slight decline and the stream was almost invisible. The explanation of this paradox is simple. In Kazan gorges the width of the water bed was compensated by an extraordinary depth exceeding 50 ms. The river bed goes down even below the sea level. The largest current and highest speed was seen, in contrast, in the extraordinarily wide and shallow parts of the river there, full of rocks. The most dangerous place was the Iron Gate –the last of the cataracts down the river from the Ada Kaleh island where the water level was reaching the inclination of 4.17 ms per kilometre and the speed of the stream almost 20 km/h. Today we cannot get the evidence because all the rapids disappeared under the water line of the water project the Iron Gate. The romantic island Ada Kaleh, that had not only a Turkish name but also Turkish inhabitants, is also under water today.

K regulaci plavby obtížnými zákrutami a úžinami dunajských kataraktů sloužily četné signální stanice. Jejich funkce je dnes stále více nahrazována moderními informačními systémy.

Numerous signal stations controlled navigation through difficult bends and narrows of the Danube cataracts. Nowadays they are being largely substituted with modern information systems.

Panorama „Kazanů" v dunajských kataraktech.

The Kazan gorge in the Danubian cataracts.

However, let's go back to the beginning of the attempts to get through the cataracts. The first success was the road between Belgrade and Turnu Severin located under cataracts, built by the Roman emperors Tiberius and Traianus. The designation "road" is rather exaggerating because in many of the gorges it was just a narrow path cut into the rocks or built on consoles. The water of the dam flooded the path; only the memorial table reminding of the success of this celebrated project was moved above the elevated surface of the river. At the end of the road, at Turnu Severin, it was necessary to cross the Danube. That is why the emperor Traianus constructed, A.D. 105, a daring bridge here on 20 stone pillars with wooden arches having the span of 63 m. He also tried to improve the navigation conditions in the Iron Gate by quarrying a 3.5 km long navigation canal. After the fall of the Roman Empire, no important attempts to improve the navigation in the dangerous cataracts were made for many centuries. Navigation was possible only with high river stages when the water was deep enough above the cross-cliffs. Only in 1832 the Hungarian engineer Vasárhelyi Pál made a detailed geodesic survey of the cataracts and proposed the improvement of their navigation by deepening the canals in the rock bed of the individual rapids and construction of longitudinal concentration dikes so that the water level inclination was partially levelled, a sufficient depth was assured also at low water river stages and speed of the stream was moderated. Most work was completed as late as in 1890–1898 – i.e. almost after 1,900 years from the implementation of plans of Traianus.

Not even after the regulation of cataracts the navigation in this section was smooth. In particular, when navigating up the river: in the canal Sip (excavated in the Iron Gate) the tow boats could tow only one boat, or they had to be helped by a steam locomotive. In other places it was usually necessary to ask for additional assisting special tow boat „Vaskapu", that was moving up the river by spooling an anchored steel cable. This is also a history now, thanks to the water project Iron Gate I that was implemented after the World War II as a joint project of the former Yugoslavia and Rumania. The maximum fall of the dam reaches 34.5 ms and the vessels get over it by two-locks having the dimension of 310 x 34 ms both on the Serbian and Rumanian bank. The total output of hydropower plants located also on both banks amounts to 2,050 MW and the medium annual production is 11,3 TWh. These are parameters comparable with a big atomic power plant, e.g. Temelín in South Bohemia.

Tlačná souprava je připravena k vyplutí z „horní" plavební komory na rumunské straně vodního díla Železná vrata proti proudu. Nosnost takových souprav, které by mohly být ještě zvětšeny, přesahuje 10 000 t. Dunajská vodní cesta nabízí možnosti, jakých ještě nebylo zdaleka využito.

A pushed convoy is ready to leave the upper lock on the Romanian side of the water project Iron Gate upstream. Carrying capacity of such convoys exceeds 10,000 tons, and they could be further expanded. The Danube waterway offers opportunities far from being fully utilized.

Traianova tabule.

Traiannus' Table.

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Vodní dílo Železná vrata I. Výkon hydrocentrály u tohoto díla odpovídá velké jaderné elektrárně.

The Iron Gate I: the output of the power station compares to a large nuclear power plant

Vodní dílo Železná vrata II.

The Iron Gate, project II.

About 80 km down the river a smaller hydropower plant Iron Gate II was constructed, with a rise of of only 12.7 m but with generously dimensioned locks. Past Iron Gate II the Danube runs in a smooth stream. It has got 860 km ahead for the sea, it during which its surface declines by 29 m, i.e. in average by only 3.3 cm per each kilometre. At such a small current the speed of the flow decreases down to only 2 km/h and the width of the river bed usually exceeds 1 km. The density of bridges is even lower than in the central Danube. But their height is considerable and does not obstruct navigation of even minor sea vessels. In the whole Rumanian – Bulgarian section there is only one bridge, between the town of Giurgiu and Ruse, used both by trains and cars. In the short section before the delta, where both banks are Rumanian, the last three bridges of the river are located. The big width of the river means also disadvantages for navigation because the navigation line in some places is not stable: there are shallows the exact knowledge of which is a condition of safe managing of vessels. That is why there was a rule until recently that route section steersmen specialised in short specific section – the condition and unstable situation of which they had to know in detail – were assigned to the wheel houses of the tugs and push boats. Difficult shallows are, in particular in the Rumanian territory between towns of Călăraşi and Hârşova, where it is often better to navigate in the branch of Borcea than by the main riverbed of the Danube.

Down the river from Hârşova the conditions immediately improve and the ports Brăila and Galați are "pure-bred" sea ports where Danube vessels meet sea going ships – however, only small and medium-sized ones because the access to these ports from the sea is limited by the Danube delta. In the delta the Danube branches into three streams – the northern Chilia, the central Sulina and the southern Saint George, among which there are hundreds of minor branches separated by islands, swamps and impenetrable areas of reeds. It is a real heaven for birds, fish and other fauna. However, the problem is that in the delta the Danube deposits all its "load" of sediment from its river basin, at estimated volume of about 50 million of tons per year. The area of the delta is growing and annually it "cuts" tens of metres from the sea. Sediments, at the same time, build up in the mentioned three main branches and in the sea in front of them, so it is not simple to maintain the depth sufficient for the access of the sea going vessels to the ports. It is relatively easiest to maintain the depth in the Sulina branch where the admissible draft of vessels gets close to 7 m, while into Chilia branch it is possible to navigate only with a five metre draft. That is why the seaports on the lower course of the Danube were always in the shade of its competitors in the Adriatic Sea and North Sea and played only an inferior role in trade.

A radical change occurred only after the canal Cernavoda–Constantza (Danube – Black Sea) was built in 1984. Thanks to this canal, the Danube was connected for the first time in the history to a high-capacity seaport offering access to big sea going vessels. The port of Constantza has depth of 19 m at the main berths, that are to be deepened to 22.5 m in future. The canal itself enables also an easy access of seagoing and river-sea vessels from the port to the Danube, because it enables navigation of vessels with the dimensions of 138.3 x 16.8 ms at admissible draft of 5.5 ms. The size of pushed convoys in the canal is restricted to 296 x 23 ms, which corresponds to a push boat and six standard barges and total capacity of 18,000 tons. The proximity of the port of Constantza to the Suez Canal offers there are good competitive conditions for its inclusion into the European overseas business with the Middle and Far East. In future, this fact will actually result in an increase of the importance of the Danube waterway: it will connect more and separate less the Europeans, as it used to be in the time of the Roman Empire.

Having mentioned the Roman Empire again, we cannot forget in connection with Constantza that it was exactly this town – called Tomis at the beginning of our era – year 18 the famous Roman poet Publius Ovidius Naso died in banishment. A that time the coast of the Black Sea did not use to be a very pleasant place where lots of tourists travel, also down the Danube, unlike nowadays. The times are changing.

Let's now return to starting point of our flight and travel to the north to the Oder and to the cold Baltic Sea.

David a Goliáš – setkání na dolním Dunaji.

David and Goliath – a meeting on the Lower Danube.

Dolní Dunaj má všechny atributy skutečného veletoku

The Lower Danube has all attributes of a large stream

Velké tlačné remorkéry a jejich soupravy na dolním Dunaji, jehož šířka místy překračuje 1 km, příliš nezaostávají za tím, co bychom mohli vidět na Mississippi.

Large push boats and their convoys on the Lower Danube; at times the width of the river exceeds 1 km, which pretty much measures up to a Mississippi standard.

Konstrukce lodí, např. osobních, není omezována nízkými mosty.

Construction of vessels, e.g. passenger ones, is not limited by low bridges.

Na řece potkáváme lodě pobřežní plavby (coastery) i menší námořní lodě.

On the river you will meet coasters as well as smaller sea-going vessels.

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Celková dispozice přístavu Constanta se značně liší od uspořádání přístavů ležících v ústí velkých řek. Celá vodní plocha přístavu na mořském pobřeží je chráněno systémem vlnolamů. Na družicovém snímku je vidět vyústění průplavu Cernavoda–Constanta (1), nová část přístavu s rozvíjejícím se kontejnerovým terminálem (2) a stará část s překladními polohami pro hromadné sypké zboží (3).

General layout of the port of Constanta is quite different from the usual setup of estuary ports. The whole water surface of the seashore port is protected by a breakwater system. The satellite photograph shows the mouth of the canal Cernavoda–Constanta (1), the new part of the port with a developing container terminal (2), and the old port part with transloading sites for bulk goods (3).

Provoz v kontejnerovém terminálu.

Operations in the container terminal.

Vyústění průplavu Cernavoda–Constanta s komorou Agigea.

The mouth of the Cernavoda–Constanta Canal with the lock Agigea.

Kontejnerový terminál.

The container terminal.

Stará část přístavu Constanta se skládkami uhlí a rud.

The old part of the Port of Constanta with coal and ore yards.

Satelitní přístav Midia leží severně od přístavu Constanta.

The satellite port Midia lies to the north of Constanta.


1


2


3

Down the Oder to the Baltic Sea

The Oder, if compared with the Danube, is a "modest" river both from the point of view of its discharge and the length. From the place where the "official" spring of the Oder is to its estuary, the river is only 861 km long – less than one third of the length of the Danube (2860 km). At the beginning of the 17th century the spring of the Oder was not definitely known. That inspired also Jan Amos Comenius, when staying in the town of Fulnek, to visit the Oder hills to find this spring. The question is whether the "official" location of the Oder spring is correct. If we take a strictly geographic standpoint, in Ostrava the Opava River does not mouth to the Oder but, a vice versa, the Oder mouths to the Opava which is larger. That is why the trip to the spring should be directed along the Opava but only to the proximity of the town of the same name where the Opava meets with the bigger Moravice River. Then along the Moravice we would reach its spring in the height of about 950 metres above sea level, in Velký kotel not far from the majestic mountain of Praděd. This real spring is thus located in a more impressive place than the one generally acknowledged – under the hill of Vysoká in the height of only 652 meters above sea level. However, we will not change geographical atlases and we will not rename the Oder to Moravice.

The D-O-E water corridor is connected to the navigable Oder in the town of Kędzierzyn-Koźle, traditionally called Kozlí in Czech. A view of large port with three basins makes one think that the not big river Oder was comparable to the Danube in the past as far as the importance for navigation is concerned. It was due to its close location to Upper-Silesia coal field, from where huge volumes of coal were transported down the Oder, primarily to Berlin connected with the Oder by the canal Oder–Spree. Transportation up the river was of much lower volume. The ores for the Ostrava metallurgical works, transported namely by vessels with the Czechoslovak flags in the past, played an important role in this respect. Before the World War II the total volumes transported on the Oder were nearing the level of 9 mill. t/year and in the port of Koźle the transhipping reached almost 4 mill. tons. In order to manage it, the port was equipped with several wagon dumps, huge and rationally designed arrangement of tracks and a multitude of cranes. Today, it has lost its importance significantly – and it is the same with coal. To some degree it was affected also by the establishment of waterways directly from Koźle to the coal fields. First it was the Klodnica canal, dimensioned for vessels with the capacity of only 100 tons, that were towed by horses or even only by a human force. It was built at the break of the 18th and 19th centuries and some of its remains are maintained as technical places of interest. Before the World War II it was replaced by a larger canal – Gliwice canal and the centre of loading the coal was transferred to more up-to-date port – Gliwice port.

On the canalized section of the Oder, locks and dams in short distances follow. It is a result of the state of the technology at the time of their construction, when the constructors "were able" to build only dams with frames and needles and the establishment of a navigation lock and dam with the fall exceeding 2 m was a problem. The first stage of canalization from Koźle to the mouth of the river Nysa Kłodzka was implemented in 1891–1895, so the constructions are older than one hundred years. Luckily the historical locks and dams did not become a mere museum of engineering; after 1905–1917, when other locks and dams were established as far as Redzin under Wrocław, the original ones were completed with bigger modern locks and later other modernising steps were

Dnešní pohled na přístav Koźle je nerozlučně spojen s jistou nostalgií. Kdysi to byl jeden z nejvýkonnějších říčních přístavů v Evropě se třemi bazény, vybavenými kapacitními překladními mechanismy včetně celé baterie vagónových výklopníků. Přístav disponoval rozsáhlým kolejištěm navrženým tak, aby přístavba vagónů k výklopníkům byla maximálně operativní. Na snímku vlevo je vidět vyústění Hlivického průplavu, jehož hladina se ztrácí v pobřežním stromovém doprovodu. Vpravo v pozadí je vidět stupeň Koźle na řece Odře.

A today's view of the port Koźle evokes certain deal of nostalgia. Once it was one of the most efficient river ports in Europe, with three basins fitted with capacity reloading mechanisms including a battery of wagon tipplers. The port had a large railyard, designed so that the contact of cars with tipplers was maximally convenient. The picture shows the mouth of the Gliwice Canal disappearing in the bank tree line. Behind, on the right, the lock of Kozlí on the Oder.

Dvojité plavební komory Nowa Wieś na Hlivickém průplavu. Ze zdrže tohoto stupně měla podle představ ze čtyřicátých let odbočovat trasa vodního koridoru D-O-E.

The double locks Nowa Wiés on the Gliwice Canal. According to the 1940s propositions, the route of the D-O-E corridor would branch off the pool of this lock.

Hlivický průplav je sice využíván hlavně pro přepravu uhlí z průmyslové Hornoslezské pánve, na jeho březích lemovaných lesy a loukami však blízkost uhelných dolů není příliš znát. Zato čistota vody v průplavu prozrazuje, že průmyslové podniky zatím nevěnují čištění svých odpadních vod patřičnou pozornost. Snímek zachycuje poslední z kaskády šesti stupňů na průplavu v lokalitě Kłodnica, jehož dvojitými plavebními komorami sestupují plavidla o 10,4 m, aby dosáhla úrovně kanalizované Odry.

Although the Gliwice Canal has been used mainly for coal transportation from the industrial Upper Silesian coal basin, its banks, lined with woods and meadows, do not reveal vicinity of coal mines. Only water of the canal shows that the industrial concerns pay small attention to its quality. The picture shows last two of six locks on the canal at Kłodnica. The double lock takes vessels 10.4 ms lower to reach the level of the canalized Oder.

taken, of which the most significant is a systematic replacement of the dams with frames and needles with modern constructions.

However, modernisation of the Oder is recently too slow and is behind the real requirements concerning the economic standard and reliability of water transportation so that the current utilisation of the Oder is too far behind a top level that it reached before the WWII.

The crisis of the Oder navigation is obvious when looking at the former vibrant ports. The port in the city of Opole – metropolis of the Opole Voivodeship – shows the trans-shipping close to zero and minor ports in the canal section between Koźle and Wrocław are absolutely out of operation. Is the crisis caused only by the fatal negligence of the modernisation of the Oder? Recently an interesting opinion appears – i.e. the crisis is a result of the radical changes after the World War II and it has got the same emotional background. It is impossible not to mention the deportation of the German

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Down the Oder to the Baltic Sea

V rámci první etapy kanalizování Odry byly zřízeny malé plavební komory i u starých pevných jezů – např. v městě Oława. Současná trasa vodní dopravy je však vedena laterálním průplavem (v pozadí).

Within the first stage of the Oder canalization, even old fixed dams were equipped with small locks, e.g. in Oława. New navigation route uses – nevertheless – a lateral canal (at the back).

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Kanalizovaná Odra – staletá kaskáda nízkých stupňů, sloužící po modernizaci dodnes

Stupeň Januszkowice je první pod Koźle. Je vybaven dvojitými plavebními komorami starší i novější „generace". V rámci modernizace byl původní hradlový jez nahrazen v roce 1979 sektorovým jezem a později doplněn i vodní elektrárnou.

The lock Januszkowice is the next below Koźle. It is fitted with double locks of both older and new generation. Its modernizaion in 1979 replaced the original dam with frames and needles with one with sector gates. Later a hydropower station was built.

Podobně je vybaven i další modernizovaný (v roce 1981) stupeň Krępa.

Similarly equipped is another modernized (in 1981) lock and dam Krępa.

U stupně Kąty zatím vodní elektrárna chybí, její investor se však jistě přihlásí. Modernizované jezy nakanalizované Odře nabízejí totiž podstatně výhodnější podmínky pro využití obnovitelné vodní energie než staré a nespolehlivé hradlové jezy.

The lock and dam Kąty has no hydropower station yet, but surely its investor will appear soon, as the modernized dams offer much more convenient utilization of the renewable water power than the old unreliable ones with frames and needles.

V situativním řešení stupně Groszowice se promítají zvyklosti vlečné technologie plavby, která se dokázala snadno vyrovnat i se značně zakřivenými rejdami plavebních komor.

The layout of the lock and dam Groszowice reflect practice of tow technology, which could easily adjust to considerably bent lock approaches.

Stupeň Chróścice je jedním ze dvou posledních stupňů, které ještě nebyly v době dokončování rukopisu této knihy modernizovány, takže je i nadále vybaven pouze historickým hradlovým jezem.

The lock and dam Chrośnice is one of the last two which were not modernized before completion of the book manuscript. It has only a historical dam with frames and needles.

Výstavba malé vodní elektrárny u modernizovaného stupně Zawada.

Construction of a small hydropower station at the modernized lock and dam Zawada.

The canalized Oder – a centennial cascade of low locks and dams – after modernization, it has served until today

Plavební komory Zwanowice (z nichž jedna byla vybudována v nedávné době a má již vyhovující parametry) byly zřízeny na delším laterálním průplavu.

Locks in Zwanovice (one of them recently built with already suitable parameters) were built on the longer lateral canal.

Pevný jez v Brzegu je sice již prastarý, vytváří však zdrž plně vyhovující plavbě.

Although quite ancient, the fixed dam in Brzeg fully suits navigation purposes.

U stupně Janowice byl zřízen druhý z delších laterálních průplavů, na kterém jsou nejen dvojité plavební komory, ale i vodní elektrárna.

The second of longer lateral canals was built at the lock Janowice. Not only it has double locks but also a hydropower station.

Řeka Odra má ve Wrocławi řadu přirozených i uměle vybudovaných ramen. Snímek ukazuje plavební cestu „2. generace“ (vlevo podél hustého stromořadí), odlehčovací kanál (uprostřed) a nejnovější trasu „3. generace“ s plavební komorou Zacisze (vpravo).

The Oder in Wrocław has a number of natural and artificial branches. The photo shows a waterway of 2nd generation (left, along the thick alley), flood diversion canal (centre), and the newest route of 3rd generation with the lock Zacisze (right).

Stupeň Rędzin pod Wrocławí je vybaven dvojitými plavebními komorami a relativně vyhovujícím jezem. Byl až do roku 1958 posledním stupněm na kanalizované trati, což působilo problémy v důsledku postupující eroze a snižování hladin pod stupněm.

A lock and dam Rędzin below Wrocław with double locks and a relatively suitable dam had been the last one on the canalized route until 1958. It suffered from problems as a result of advancing erosion and water level drop below the lock and dam.

Staveniště stupně Malczyce. Na snímku je téměř hotová plavební komora včetně velkorysých rejd a rýsují se také základy jezu. Bohužel realizace tohoto díla, jehož význam je pro překonání stagnace oderské plavby zásadní, probíhá neuvěřitelně pomalu…

Building site of the Malczyce lock and dam: an almost completed lock with generous approaches and an outline of the dam foundations. Although the project is the key to break stagnation of the Oder navigation, the works proceed unbelievably slowly…

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Zdrže kanalizované Odry jsou poměrně úzké a díky porostům na březích jsou často zelenými oázami uprostřed zemědělsky intenzivně využívané krajiny, o čemž svědčí snímek zdrže Lipki. Jsou také poměrně krátké, což rychlosti plavby příliš nevyhovuje. Přesto však nabízejí vcelku uspokojivé podmínky i moderním soupravám s nákladem 1000 t, jejichž délka dosahuje cca 110 m, stejně tak jako přiměřené hloubky, jejichž zvýšení by nemělo být problémem.

Pools of the canalized Oder are relatively narrow; vegetation of their banks creates green islands in the intensively farmed countryside, as shown in the photo of the pool Lipki. They are also quite short, which does not suit much navigation purposes. Still, they offer adequate depths (their elevation should not be a problem) and decent conditions for navigation of modern convoys carrying 1,000 tons and approximately 110 ms long.

Jedna z propagačních plaveb pořádaných v rámci akce „Flis Odrzański“.

A promotional cruise within the project “Flis Odrzański”.

inhabitants from the Oder region and settling of the towns by Polish inhabitants which resulted in a of loss of traditions. New inhabitants have not established any relationship to the river and for many years it was a “foreign” river for them, giving them trouble– in particular by floods – and bringing them almost nothing. The activities of the incentive movement called the „Oder Raft“ (Flis Odrzański), that addresses, in particular, the youth, has announced the program „3 T for the Oder“ (transport, transit, tourism). They are based on the effort trying to do away with this phenomenon. The members of the “Oder Raft” organise demonstrative sails from Brzeg near Opole to Szczecin – i.e. for a distance of 550 km, in which tens of boats participate – from the small motor units or sailboats to big passenger ships. However, the biggest attraction is a real raft the construction and leading of which is entrusted to a group of traditional rafters from Ulanów on the Vistula. Each stop of the convoy in the towns on the river is connected with cultural program. In the memorandum adopted within the event in 1999 it is e.g. said:

- the Oder can become the cheapest, and for humans and nature the safest traffic way.
- the Oder can become an axis of the Oder traffic corridor North – South. formed by the waterway, railways and motorways.
- the Oder offers a transition way for the Czech Republic, Germany, Sweden and other European countries.
- the Oder is a border river offering exceptional economic, tourist and natural values. It should not divide the European countries but connect them within the family of the European Union.

Současné přístavy na Odře – čekání na nové příležitosti

The Oder ports of today – waiting for new challenges

Přístav Chorula u Opole je určen nakládce volně loženého cementu z cementárny Górażdże – jeho současné využití je však mizivé.

The port Churula at Opole is to load bulk cement from the cement mill in Górażdże – currently minimally used.

Nejživější provoz z přístavů na kanalizované Odře vykazuje díky vykládce uhlí Městský přístav ve Wrocławi.

The City Port of Wrocław stays most active of all the ports on the canalized Oder thanks to unloading of coal.

Ve Wrocławi jsou i další přístavy, zejména Popowice (v popředí), kde je soustředěn překlad stavebnin, a dva ochranné přístavy Osobowice při protějším břehu řeky.

There are other ports in Wrocław, namely Popowice (front), where building materials are transhipped, and two shelter ports Osobowice on the opposite bank.

Přístav Ścinawa na regulované trati je přizpůsoben zejména vykládce volně loženého cementu a umělých hnojiv, zatím však čeká na větší využití, kterému brání současný stav regulované Odry.

The port Ścinawa on the regulated route is designed for unloading of bulk cement. The current situation on the regulated Oder prevents it from larger utilization.

Přístav Nowa Sól na nespolehlivém regulovaném úseku je dnes více historickou památkou než perspektivní lokalitou.

The port Nowa Sól of an unreliable regulated stretch has become rather a historical monument than a prospective location.

Zato nedávno dokončovaný moderní německý přístav Schwedt na Západní Odře (resp. na průplavu Hohensaaten–Friedrichsthal) může být přístupný i říčně-námořním lodím a čeká jistě jen úspěšný rozvoj.

The recently finished modern port Schwedt on the West Oder (on the Hohensaaten – Friedrichsthal Canal), which admits even river-sea going vessels – is in for more of its successful development.

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The towns should not turn their back to the river, they should become the towns on the river again – such is the motto of the Oder Raft. However, on the Oder there is one city that can be a good example and that has been a city on the river for many years, similarly as Budapest on the Danube. It is Wrocław. The symbiosis of the metropolis of the Lower Silesia with the Oder has got a slightly different form because it is founded on several branches of a not too big river and on the islands among them. On these islands, the main architect treasures of the city are located.

On the Cathedral Island – that is an island only according to its name because the branch that runs around it disappeared in 1807 – there is, in particular the Cathedral of St. John the Baptist – a large construction and an example of the brick gothic common with most churches in the city. Not far from the cathedral, there is a "two-storey" church of St. Cross, from which it is possible to cross the Oder branch to the Sand Island with the church of the Holy Virgin. The city of islands is certainly also the city of bridges. There are tens of only the big ones. Many of them are interesting from their architectural point of view – e.g. Grunwald bridge with huge columns and hinged bridge deck. Several routes in a number of branches are used by Oder ships to sail across the city. First the so-called South Oder was used and there are two locks constructed already in the 18th century – one of them is located by the mentioned Sand Island located. The waterway of "the second generation" leading through the "old" Oder and the canal along it was established at the end of the 19th century. It "by-passed" the city centre and there are two locks on its route. However, after a short time it was not enough for the transportation and that is why the waterway of the third generation with its route farther from the centre and furnished with three, this time longer and more efficient locks, was built. In the "Wroclaw water junction" (if we include also the suburb parts of the city) there are nine locks of various size and various age and also several ports of which the City Port is the most vivid thanks to the rather intensive discharge of coal from Upper Silesia.

The last and relatively the newest lock and dam on the Wrocław Oder is Rędzin on the downstream end of the city. It is equipped with double locks (thus, if we included both of them there would not be 9 but 10 locks in the city in total) having dimensions which are still convenient today. The younger one originates in 1934. After it, the regulated route without dams and locks would. This line, however, caused problems because the bottom of the regulated section gradually sank due to erosion – which is a feature usual under similar conditions. The depth above the lower sill of the locks in Rędzina was getting lower and lower and finally it got to the catastrophic level: loaded vessels coming from the regulated section were not allowed to enter into the locks. That is why it was necessary to commence the construction of another lock and dam in the area of Brzeg Dolny. If compared with former locks and dams on the Oder – this is a relatively modern project with the fall of 5–7 m which was completed in 1958. However, already after 20 years it became obvious that the situation would return. Lowering of the bed below the lock and dam got such an extent that the whole Oder waterway was actually divided into two parts and the continuous long-distance navigation is possible only under extraordinarily high water levels. Even discharging of water from the reservoirs on the branches of the Oder that were constructed with the aim to stabilise the conditions on the regulated section does not help. Careless undervaluation of the consequences of the river erosion is thus the main cause of the current crisis of the Oder navigation.

Already when looking at the deep cut and narrow riverbed under the lock and dam is sad and evokes the impression that the vessels in such a narrow bed, stringent with a lot of groins cannot pass each other. Treatment of this Oder problem is certainly known and luckily it may be available in a short period of time. It is the construction of another lock and dam - Malczyce, which has got to an advanced stage but it proceeds unbearably slowly. Already today they speak also about another lock and dam - Lubiąż. However, it is still far future, and that is why on the surface of the Oder in Lubiąži only a huge baroque Cistercian Abbey is mirrored. Its picture on the surface is only seldom broken by a sailing boat. It seems that the solution of the problems of the Oder and its regulated section will require an absolutely different approach. However, we have already spoken about it.

For the time being, the river ports on the regulated Oder – Ścinawa, Glogów, Nowa Sól, Cigacice – do not show any bigger traffic. The river seems to sleep. Its picture does not change even under the mouth of the Lusatian Neisse, from which the border between the Poland and Germany

Nejstarší trasa plavby procházela ve Wrocławi rameny Odry přímo středem města, např. okolo Pískového ostrova (Wyspa Piaskowa) s kostelem Panny Marie na Písku, kde se dodnes zachovala historická plavební komora (śluza Piaskowa – na obr. vlevo), zřízená v letech 1791–1794. Byla původně dřevěná, později zděná. V roce 1996 byla citlivě upravena, a je dodnes funkční. V pozadí je Tumský ostrov a kostel sv. Kříže.

In Wrocław the oldest navigation route ran along the Oder branches right through the city centre, around the Sand Island (Wyspa Piaskowa) with the Church of the Virgin Mary On Sand, and a preserved historical lock from 1791–1794 (śluza Piaskowa – left). Originally it was made of wood, later of brick. In 1996 the lock was carefully restored and is operable now. Tumsky Island and the Saint Cross Church at the back.

Plavební trasa „třetí generace", obcházející centrum Wrocławi. V popředí bazén loděnice Zacisze. Paralelně s laterálním průplavem probíhá odlehčovací rameno Odry (v pozadí).

A navigation route of the "third generation" circling around Wrocław centre. A basin of the shipyard Zacisze in front. The flood diversion canal runs parallely to the lateral one (at the back).

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Regulačními výhony spoutaná Odra meandruje okolo výstavného komplexu opatství v Lubiążi…

The Oder, bound in regulation groins, meanders around the proud complex of the abbey in Lubiąż…

...a nemění svůj charakter ani v nedaleké Ścinawě. Tento úsek je pro vodní dopravu nejobtížnější.

… and keeps its character even in near-by Ścinawa – in the navigationally most challenging section.

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runs. It does not change even after near Fürstenberg, where the canal Oder-Spree, on the banks of which there is a huge metallurgical plant, mouths to the Oder. The situation does not change even from Frankfurt on Oder. A change to better is brought only by the mouth of Warta at the town of Kostrzyn. Thanks to the "contribution" from this river, the rate of flow and depth in the Oder improves so much that bearable operational conditions are guaranteed also at dry periods. Also the port Kostrzyn, located on the Warta, has succeeding in avoiding a deep decline of its trans-shipping activities. However, a fundamental activation can be observed down the river from the mouth of the canal Havel – Oder, through which transportation flows between Szczecin, Berlin and Western Europe. At present, the canal is expecting further growth of transportation and undergoes modernisation. The construction of the new canal lift Niederfinow forms a part of the modernisation. The original canal lift through which the ships can be raised from the Oder valley by 36 m directly to the dividing pool of the canal is able to manage the transportation, however, soon it will be 80 years old and it deserves a break. Apart from that the modernised canal is to be used also by bigger vessels the sizes of which exceed the possibilities of the canal lift.

Two locks are used for the connection of the canal to the Oder at Hohensaaten. Each of them mouths into another of two parallel routes directed to Szczecin from there. One of them runs down the East Oder in which almost all water runs, the other one down the canal that mouths to West Oder at Schwedt. In the territory of Germany the west route is better navigable, although almost no water runs there – its level is actually at the sea level. Into the port of Schwedt. even river-sea ships sail. There is a number of lateral connections between the East Oder and the West Oder and some of them are navigable, but, in particular the whole area between both branches of the river are interwoven with minor river branches, lakes, pools and wetlands. Due to precious and natural scenery the wide valley of river-flood plain between the river branches was declare the National Park (Nationalpark Unteres Odertal), a part of which is formed by both routes of the waterway.

The East Oder and the West Oder join again as late as in Szczecin. The word "join" is not exact because although they are connected in the suburbs of the city by the canal Klucz–Ustkowo, the Oder maintains its flow also after this connection and under the name Regalica it mouths into the lake Dąbie. Between this lake and the "connected" Oder, that is called in the city Oder Szczecińska, there are many canals (such as Parnica, Duńczyca, etc.), in the network of which there are basins of the Szczecin port. To make the chaos in the names complete, the Oder Szczecińska meets the canal Iński Nurt, running from the lake Dąbie, and it finally loses its name because the river running to the sea is called Domiąża. This is the river that brings the Oder water into the Szczecin bay (Zalew Szczeciński), and in which the marked route for sea ships going to Szczecin leads. In this bay also the river ships (if they meet the stipulated terms and conditions) sail, to reach the port of Świnoujście, that is a part of the whole port complex and is used for servicing (or lightening) bigger sea-going ships that due to their big admissible draft cannot get to Szczecin. The docks in Szczecin

Vrcholová zdrž průplavu Odra–Spréva probíhá středem hutního kombinátu ve Fürstenberku.

The dividing pool of the Oder–Spree Canal cuts through the centre of the metallurgical complex in Fürstenberg.

Sestup z vrcholové zdrže průplavu Odra–Spréva k Odře zprostředkuje jediný stupeň s dvojitými plavebními komorami.

Descend from the dividing pool of the Oder–Spree Canal to the Oder is solved with double locks.

Frankfurt nad Odrou leží na levém břehu řeky, která tvoří polsko-německou hranici. Na pravém břehu je polské město Słubice (v pozadí).

Frankfurt an der Oder on the left bank outlines the Polish-German border. The Polish town of Słubice lies on the right one (behind).

Vyústění průplavu Havola–Odra u Hohensaaten. Snímek dokumentuje, že Odra je pod ústím Warty již velkou řekou, a zároveň ukazuje obě plavební komory: východní, spojující průplav s širokou Východní Odrou, a západní, zprostředkující přístup k podstatně užšímu průplavu Hohensaaten–Friedrichsthal a k Západní Odře.

A mouth of the Havel–Oder Canal at Hohensaaten. The photo shows the Oder, already a large river below the mouth of Warta, and two locks: the eastern one connecting the canal to the wide East Oder, the western one, accessing the much smaller canal Hohensaaten – Friedrichsthal and the West Oder.

Pohled na zdvihadlo Niederfinow a jeho dolní rejdu s řadou plavidel čekajících na proplavení. Vlevo je vidět dolní rejda dnes již zrušených spojitých plavebních komor, které zabezpečovaly provoz před výstavbou zdvihadla. Nové zdvihadlo bude tedy již zařízením „třetí generace“ a je budováno uprostřed. Kapacitní parkoviště a restaurační zařízení vedle zdvihadla svědčí o mimořádném zájmu turistů o tento objekt.

The boat lift Niederfinow and its lower approach with vessels in queue for locking. On the left, you can see the lower approach of an abolished flight of locks serving before the construction of the boat lift. The new boat lift will thus be a facility of "the third generation". It is being built in the middle. A high-capacity car park and a restaurant adjacent to the boat lift prove the fact that the place is particularly interesting for tourists.

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have the maximum depth of only 9.15 m, while Świnoujście offers the depth of 12,8 m. The whole port complex is the biggest port of the whole Baltic Sea and is used not only for the Polish economy, but also for other countries, because also goods from the Czech Republic, Germany and Slovakia transit it. Through the Szczecin bay also the route of river-going vessels runs to the Peene river and to the German ports in the Baltic Sea as far as Stralsund. Also the vessels of the costal navigation aiming to the ports of Sweden, lakes of Finland or fjords of Norway, or along the coast to the Baltic republics, Petersburg and along the Russian canal to the White Sea and then to the regions located far from Arctic Circle sail across this bay.

Pohled od města Gryfina na Východní Odře přes síť ramen v národním parku (Nationalpark Unteres Odertal) k obci Mescherin na Západní Odře.

A view of the town of Gryfin of the East Oder across a network of branches of the national park Unteres Odertal to the village Mescherin on the West Oder.

Pohled od Gartzu přes Západní Odru (v popředí), přes národní park (Nationalpark Unteres Odertal) k Východní Odře. Za korytem Východní Odry je elektrárna „Dolna Odra“, která odebírá z řeky chladicí vodu.

A view from Gartz across the West Oder (front) and Nationalpark Unteres Odertal to the East Oder. The power plant “Dolna Odra” behind the East Oder riverbed gets its cooling water from the river.

Průplav Hohensaaten–Friedrichsthal je většinou úzký, místy je však veden starými rameny, takže má charakter přirozeného toku. Poskytuje spolehlivě dostatečný ponor, a zhodnocuje tak západní trasu. Do přístavu Schwedt dokonce doplouvají říčně-námořní lodě.

The Hohensaaten–Friedrichsthal Canal is mostly narrow; when running through old branches, it has a character of a natural river, while it guarantees a sufficient draft and valorises the western route. The port of Schwedt admits even river-sea going vessels.

Východní Odra (na snímku o obce Ognica) je široká řeka. Plavební hloubky na ní se sice nevyrovnají hloubkám na západní trase, umožňuje však formování větších tlačných souprav.

The East Oder (photo at the village of Ognica) is a wide streamy river. While its navigable depths do not reach those of the western route, the river allows formation of larger pushed convoys.

Odra (přesněji Odra Szczecińska) v centru Štětína. V popředí Wały Chrobrego s budovami divadla a vojvodství. Štětín se může chlubit nejen přístavem, ale i četnými historickými památkami a také zajímavým urbanistickým konceptem, který paprskovitě se sbíhajícími ulicemi připomíná Haussmannovu Paříž.

The Oder (Odra Szczecińska) in the centre of Stettin. In front, Wały Chrobrego with the buildings of theatre and voivodeship. Stettin boasts with its port, as well as numerous historical monuments, and interesting urbanistic concepts – its radially designed streets resemble Haussmann's Paris.

Loděnice v severní části štětínského přístavu – v pozadí jezero Dąbie.

Docks of the northern part of Stettin port – Lake Dąbie at the back.

Polohy pro překlad sypkého zboží ve Štětíně – v pozadí kanál Parnica.

Transhipping sites for bulk cargo facilities in Stettin – the canal Parnica at the back.

Typickým objektem štětínského přístavu, který málokdy chybí na snímcích, je silo na poloostrově Ewa (elevator Ewa), s nímž sousedí překladní polohy pro kusové zboží.

Almost every picture of the port of Stettin shows the silo on the Ewa quay adjacent to the transhipping sites of piece goods.

Na trase mezi Štětínem a přístavem Świnoujście převládají již námořní lodi.

Sea-going vessels dominate the route between Stettin and the port of Świnoujście.

Přístav Świnoujście je na úplném konci oderské vodní cesty – dál už se rozprostírá hladina Baltského moře. Je nutno ovšem říci, že říční rameno, na kterém přístav vznikl, se nejmenuje Odra, nýbrž Świna.

The port of Świnoujście is at the very end of the Oder waterway – further on, there is the Baltic Sea. It is to be mentioned that the port lies on the river branch called the Świna, not the Oder.

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Down the Elbe to the North Sea

The last route aimed to the North Sea is offered by the Elbe. The D-O-E water corridor is connected to this river near Pardubice, with the background of Kunětická mountain. In this place, the Elbe is still a small river, although the width of its surface, thanks to the coherent cascade of dams, evokes an opposite impression – similarly as in the case of the canalized Oder. With respect to its discharge, by no means either the Elbe can be compared with the Danube – not only here but even in its estuary to the sea. If it is to excel the Danube, than it is only the above sea level of the spring that is located in the height of 1390 m above sea, which is a notable altitude given the conditions of the Central Europe, exceeding the height of the Danube stream (678 m above sea level) by two times. The spring located so high and a the high slopefollowing from that is not obvious on the Elbe from Pardubice down the river– definitely not on the river stream, which would not be high even if there were no dams. However, the dams were on the "small" Elbe above the meeting with the Vltava from the immemorial time. They concentrated the water power for driving mills and they formed calm pools with almost not varying surface and were bordered with full-grown cottonwoods, alders and other dense vegetation. These pools have been a typical element of the Elbe countryside created to the same extent by nature and by people's care. It is well observed in the calm region of Poděbrady or in the countryside around the Kladruby breeding stud with vast meadows, alleys, and woods similar to an English park. The breeding stud was established 400 years ago to assure parade horses for coaches of the Vienna court. It can boast by its results even today.

However, let us get back to the dams that co-formed the countryside. The dam in Veletov is one of the oldest ones, dating back to the 16th century; it is typical by its still rather "original" construction. The race from the Elbe to the Kaňk hill at Kutná Hora, where silver was mined, assured not only the drive for mills and sows but also timber floating. We would look for the historical dams in Týnec nad Labem, Kolín or Nymburk in vain today – they were replaced by modern movable weirs and their original location is indicated only by the mill buildings. It is true also about the dam under the Poděbrady chateau. In connection with this chateau it is interesting to remind also the historical events: The late king Jiří z Poděbrad, who tried to estab-

Křižovatka dálnice D 11 s Labem u Poděbrad může sloužit jako názorné srovnání, jaké plochy zabírá v území „široká" vodní cesta a „úzká" dálnice.

Motorway D 11 crossing the Elbe at Poděbrady: compare how much space of the area takes a "wide" waterway and a "narrow" motorway.

Soutok Labe s Vltavou u Mělníka – zámek a chrám sv. Petra a Pavla jsou dominantami města, od kterého je již možno hovořit o Labi jako o velké řece. Měřítko „velikosti" je samozřejmě velmi relativní.

Meeting of the Elbe and the Vltava at Mělník – the castle and Sts. Peter and Paul Cathedral dominate the town. Now, the Elbe is considered a large river; the criterion of "largeness" is indeed highly relative.

lish the European Peace Union more than 500 years ago, was born there. If the flat Elbe valley is not so "photogenic" for a land observer, it is not true for the views from the planes flying low. In Nymburk an oval medieval design of the fortified town with double moats – bulwarks from the past is easily visible. In other places, a birds-eye view shows the original stream of the river that was – before the regulation impacts – much longer and was running by a lot of ever-changing meanders. The lovers of unimpaired landscape will be sorry about the disappearance if the original zigzagging river bed, however, the inhabitants of the Elbe region towns and villages won't, in particular if they remember the annually repeated floods.

In Mělník, the Vltava mouths the Elbe as it is written in all textbooks. However, this is not quite true. The Vltava is at the meeting point longer and has got a richer discharge from bigger river basin than the Elbe, and that is why the flow arising from the connection of both rivers should be called not the Elbe but the Vltava. However, the historical usage is valid more than any hydrologists' arguments – it is same as in the event of the Oder. That is why the inhabitants of Hamburg do not live on the banks of the Vltava but on the banks of the Elbe. This international designation of the river called Labe in Czech seems to be an anagram. And it is not coincidence. The old Celtic designation most probably included phonems a, l, b, although in a different order than in the current names.

From Mělník down the river the Elbe is, thanks to its bigger branch (the Vltava), a much bigger river. It is a reason for more than a thousand years tradition of navigation in this section of the river. The preserved historical sources speak about the Elbe navigation most often in connection with the duty and toll collection, however, by far they do not reflect it real beginning. The Elbe cutting through the „Zemská brána" (Country Gate), a collar of mountains surrounding the Czech basin, was the most important and most busy way from Bohemia to the rest of Europe and actually to the whole world. The Elbe preserved its exclusivity for many hundreds of years. **Only a few people know that the sea port Terst was not the biggest port of former Austria at the break of the 19th and 20th centuries, but it was the Elbe port in Ústí nad Labem (Aussig).** Today, from the point of view of water transportation, Ústí nad Labem is rather known by the fact that under the romantic ruin of the castle Střekov the last of the coherent cascade of the Elbe locks and dams is located. From this point farther down the river, the Elbe is a "freely flowing" river, the navigation of which was improved in the past only by more or less radical regulation adjustments. From the current point of view, however, the navigation it is not satisfactory by far. The operation in the Elbe ports from Mělník almost to Hamburg is – with some exceptions – by far more modest than in the past and also the frequency of vessels that we can meet when travelling down the river evidences the fact that former importance of the Elbe water way has significantly decreased.

Present problems of the Elbe navigation do not harm the attractiveness of the river. Even under Ústí nad Labem the river countryside is typical by its deep and pictorial valley rimmed by high sandstone rocks starting at Děčín. The scenery of rocks inspired not only spreading of the romantic name of the Czech or Saxon Switzerland but also declaring this landscape region to be a protected area. Today, in the sandstone rocks it might hardly be possible to establish an extended engineering work as the fortress Königstein towering the Elbe surface against the

Prvním městem na Labi po proudu od české hranice je Bad Schandau. V pozadí uprostřed je vidět výrazná silueta Liliensteinu.

Bad Schandau is the first town on the Elbe downstream from the Czech border. A distinctive outline of Lilienstein shows behind in the centre.

Malebné město Königstein na levém břehu Labe, nad nímž (v pozadí) se bělají stěny skalní pevnosti. Vpravo se tyčí Lilienstein. V dobách, kdy nebyly labské lodi vybaveny radary a podobnou technikou, takže mlhy nad řekou představovaly nepřekonatelnou překážku, se vžilo úsloví: „Nevidíš-li Lilienstein, nepluj dál do Königsteinu" (v češtině se – bohužel – tento praktický pokyn pro plavce nerýmuje jako v originálním německém znění).

The picturesque town of Königstein on the left Elbe bank with white walls of the rock fortress above (behind); Lilienstein on the right. When the Elbe boats had no radars or other similar devices, the fog on the river meant an invincible difficulty. A practical saying thus came to life: When you see no Lilienstein, do not go on to Königstein.

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Down the Elbe to the North Sea

Labe nad ústím Vltavy se sice vyznačuje mírným proudem, v důsledku zkrácení toku a těžby písku ze dna však místy vznikly umělé peřeje, tradičně nazývané jako „hrčáky" – např. u Přelouče.

The Elbe above the mouth of the Vltava has a moderate stream; however, artificial rapids called "hrčáky" [rattlers] appeared due to shortening of the river and sand quarrying of the bottom (near Přelouč, for instance).

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Od Drážďan až k české hranici – ba i dále proti proudu – se provozuje velmi čilá osobní lodní doprava. Na řece můžeme potkat i velké a moderní kajutové lodi, dominují však historické parníky, které jsou stále udržovány v provozuschopném stavu a nabízejí nostalgické plavby. Stáří mnohých již překročilo hranici sta let.

A busy passenger traffic thrives on the river from Dresden to the Czech border, and even further upstream. You can meet large modern cruisers, although historical steamers prevail. Carefully maintained they offer nostalgic cruises, while their age has often reached more than one hundred years.

Labe v centru Drážďan. Snímek zachycuje hlavní mosty, a to (zpředu dozadu, tj. po proudu) historický Albertův, most Caroly (zřízený po druhé světové válce jako náhrada zničeného starého mostu), a konečně historický Augustův most.

The Elbe in the centre of Dresden. The photo shows the main bridges (front to back, i.e. downstream): historical Albert Bridge, the Bridge of Carola (built after WWII to replace an old destroyed bridge) and historical August Bridge.

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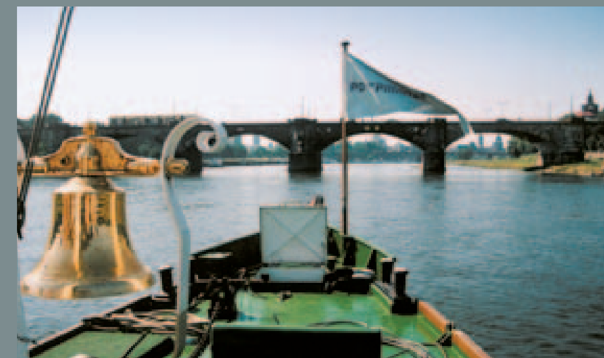
Mnohé mosty v Pirně a v Drážďanech jsou dnes cennými technickými památkami, současně však i nepříjemnými plavebními překážkami

Many bridges of Pirna and Dresden are as much valued technical monuments as they are unpleasant obstacles of navigation



V Pirně křižují Labe dva mosty, z nichž ten historický (v popředí) není pro plavbu právě příznivý. Je památkově chráněn, takže rozšíření jeho plavebních polí (jejichž šířka dosahuje sotva 20 m) nebude snadné ani v budoucnu. Podobným zkušebním kamenem labských kapitánů je drážďanský „Marienbrücke“.

In Pirna the Elbe is crossed with two bridges; the historical one (front) is not really navigation-friendly. As it is a listed historical sight, enlarging of its openings (mere 20 ms wide) will not be easy even in future. The Elbe captains encounter a similar test site at Marienbrücke in Dresden.

„Modrý zázrak“ překračuje Labe v drážďanském předměstí Loschwitz.

“The blue wonder” across the Elbe in the Dresden suburb of Loschwitz.

Osobní parník směřuje do poproudního plavebního otvoru Albertova mostu v Drážďanech.

A passenger steamer heading for a downstream opening of Albert Bridge in Dresden.

Na dvou snímcích Augustova mostu v Drážďanech je dobře vidět, jakých extrémů mohou průtoky na Labi dosahovat. Na levém snímku je stav za nízké vody v létě 1903, kdy vznikla na místě, kde přistávají osobní parníky, pěší promenáda. Extrémní (naštěstí ovšem velmi výjimečnou) situaci opačného rázu znázorňuje pravý snímek, pořízený za povodně dne 7. srpna 1890.

Two pictures of August Bridge in Dresden illustrate what extremes the Elbe discharges can reach. The first picture (left) shows a low-water stage in the summer 1903; the usual landing point of passenger steamers turned into a promenade. The second picture captured the other extreme situation (fortunately very rare) of the flood on August 7, 1890.

dominant hill with the poetic name Lilienstein and equipped with everything that might assure it its impregnability – including 152 m deep well. The first reference to a medieval citadel Königstein dates back to the 13th century and is included in a deed of the Czech king - Wenceslas I, according to whom the citadel was then the ownership of the Czech kingdom. The reconstruction to an impregnable fortress, cut in the sandstone row, started as late as at the end of the 16th century. In this place, the Elbe canyon can be compared with the Rhine „Mountain Track" (Gebirgsstrecke) and remotely reminds of the defiles of the Iron Gate on the Danube. Similarly it attracts also tourists to whom tens of passenger boats are intended.

After Königstein the slopes of the Elbe valley are getting lower and at Pirna the river enters almost open basin. The water stream passes by the chateau Pillnitz from the 15th century, the romantic appearance of which is a result of the reconstructions in the 18th century, and runs along the "Elbe Florence" how Dresden is often dubbed thanks to the generosity of the constructor and improver of the city, Saxon Elector and Polish king Augustus the Strong. The most beautiful Dresden historical bridge bears his name. However, the Elbe navigators do not like the bridges belonging among the protected monuments of Dresden, in particular the feared Marienbrücke with constrained spans the navigation through which requires from the leader of the vessel – in particular at bigger vessels or convoys – a certain virtuosity. However, in Dresden there are also more suitable bridges. The bridge in the suburbs in Loschwitz, the blue construction of which documents the beginnings of the construction of steel bridges, has arches without piers in between; it was then so unusual that it deserved a nickname „Blaues Wunder", or „Blue Miracle".

From Dresden down the river – to be more accurate – from the Dresden Albert's port – the problems with constrained bridges ends. Also the deep Elbe valleys end, although as far as to Meissen the Elbe is sometimes rimmed with higher slopes, but the landscape relief is lower and softer. On a small hill, also the Meissen Albrechtsburg is located. At the very beginning of the 18th century the alchemist Johann Böttger involuntarily stayed to manufacture for Augustus the Storng – not gold (the Saxon elector consider it to be foolish) but porcelain. Then porcelain was imported from far Japan and China and its price was not far from the price of gold. After many years of imprisonment the alchemist was successful. He became the founder of the manufacture of the famous Meissen porcelain, but he did not enjoy the freedom much. It was necessary to "guard" the secret of the manufacture – and also of that of its founder.

Drážďanský ústřední přístav se nazývá – podobně jako jeden z mostů – Albertův.

The central port of Dresden bears the same name as the bridge – Albert.

V rámci modernizace Albertova přístavu bylo v jeho oddělené části zřízeno malé muzeum, jehož hlavními exponáty jsou historický labský vlečný člun, staré železniční vagóny, a dokonce i přístavní jeřáb, který ovšem dosloužil teprve nedávno.

Modernization of the port added a small museum to a detached part of Albert Port. Its primary exhibits include a traditional Elbe barge, old railway cars, and even a harbour crane, until recently still in operation.

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Míšeň – město na Labi. V popředí vpravo Albrechtsburg.

Meißen – a town on the Elbe. Albrechtsburg in the right front.

Pohled proti proudu na zátočiny Labe u Nieschütz (vlevo) a Diesbaru (v popředí). Zde řeka již nenávratně opouští zvlněnou krajinu a na další pouti je lemována širokou rovinou.

An upstream view of an Elbe bend at Nieschütz (left) and Diesbar (front). The river leaves the undulating landscape for good. From now on, its route is surrounded by a vast flatland.

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Not far from Meissen – exactly at the village of Diesbar, where the Elbe turns sharply to the left, the landscape finally opens into a wide plane. The Elbe definitely becomes a lowland river. The abrupt bend – maybe the most abrupt on the whole Elbe – has got its traditional name: Diesbarer Winkel. When describing the route the ancient sailors preferred the accurate designation to the waterway kilometres specification, so in the old maps we can find also the bend called Armer Edelmann (Poor Aristocrat) or the fear causing Düstere Loch (Dark Hole). Leading pushed convoys by a zigzagging navigation line is not simple still at present and restricts their admissible length, i.e. their capacity. Old regulation measures for improving the directing conditions have not been very successful and even could not have been. Shortening the freely running river by radical corrections and cut-offs would impair the sediment regime, stability of the river bed and usable navigation depths. Therefore, the main objective of the modification was only the concentration of the stream into a relatively narrow navigation line. A non-informed observer might wonder that the common width of the river as far as Magdeburg is actually minor than at Mělník. This follows different laws that the discharge – that undoubtedly grows downstream. The manners how to concentrate water into the navigation trench are different. A very clear example is on the Elbe between the Riesa and Torgau under the municipality of Kreinitz, or more exactly at the village Gaitzschhäuser, where the Elbe is crossed by the border between the Saxony and Prussia.

The technical capacities of both countries had then a different approach to the regulation methods so as far as that place according to the Saxon (and also Czech) practise of longitudinal concentration dikes, i.e. long dams, parallel with natural banks (connected with them sometimes were used), while in Prussia the engineers preferred groins which we have already mentioned.

If the significant change of the nature of the river at Kreinitz inspires the return to the history, not a remote history, further sailing will inspire a younger history. In Torgava, on the Elbe bank before the chateau of Hartenfels, there is a decent monument in the place, where on April 25, 1945 the members of the 58th guard division of the Red Army with American troops met. That is exactly the place where the meeting on the Elbe took place. It was an incentive for the unification of Europe but it was also followed by violent division and dropping of the "iron curtain" which at some places was hanging exactly above the Elbe and resulted – apart from others – also in the tide of interest in the development of the Elbe waterway. The section where the Elbe was the border between two different worlds is located much farther downstream. Let us not jump forward – we are still flying above the laces of groins, of which thousands were constructed – we are passing the mouth of Black Elstera (Halštrava - the archaic Czech name) and we are flying over the bridges of Wittenberg. This town bears also the name Lutherstadt according to the famous reformer who was active here at the beginning of the 16th century. On October 31, 1517, i.e. 102 years after burning of Master Jan Huss the inheritance of whom Martin Luther appreciated, this reformer nailed on the gate of the chateau church his 95 theses inviting to public disputation about the basis of indulgencies. The tower of this church is well visible and impossible to be overlooked thanks to its special cylinder profile remind rather a accumulating pumping plant than a church tower which we are used to.

After Wittenberg the Elbe enters the region of preserved large alluvial forests in which a number of protected species live, including the original Elbe beaver. This area is strictly preserved as a biosphere

Na detailním snímku je dobře vidět funkce výhonů, které nejen zvyšují hloubku v plavební dráze, ale i podporují sedimentaci v mezilehlých polích, kde se vytvářejí písčiny a později i mokřadní polohy.

A detailed photo illustrates the function of groins: they increase the channel depth and encourage sedimentation in the intermediate openings, where sandbanks and later even wetland sites come to life.

Oblouk Labe nad Wittenbergem. Uprostřed ústí Černé Elstery.

A bend of the Elbe above Wittenberg. The mouth of the Black Elster in the centre.

reserve. In the territory of this reservation the river Saale mouths to the Elbe. It is after the Vltava the second left-hand navigable branch. In a lot of aspects it reminds the “small” Elbe – not only by its size but also by the fact that historical fixed dams created advantageous pools for navigation.

However, the difference is that these dams have not been replaced – similarly as on the “small” Elbe” – with movable constructions, so that they serve in their original form.

Not far downstream from the mouth of the Saale there is Magdeburg – the metropolis of the – Federal Land Saxon-Anhalt. The history and presence of Magdeburg is connected with the Elbe navigation more than of any other Elbe towns.

Protiproudní tlačná souprava právě míjí památník historického setkání armád na Labi.

An upstream pushed convoy passes the monument of historic meeting of the troops on the Elbe.

Detail památníku setkání armád na Labi.

A detail of the monument to the meeting of the allied troops.

Podporučík americké armády William Robertson a poručík Rudé armády Alexander Sylvaško si symbolicky podávají ruce na břehu Labe v Torgavě v dubnu 1945.

Second Lieutenant of the American combat troops William Robertson and Lieutenant Alexander Sylvashko of the Red Army shake hands on the Elbe bank at Torgau in April 1945.

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Protiproudní tlačná souprava uprostřed biosférické rezervace „Střední Labe“ pod Rosslau. Narušuje plavební provoz na široké řece bobry či jiné chráněné druhy?

An upstream pushed convoy amidst the biosphere reserve Middle Elbe below Rosslau. Does the river navigation disturb beavers or other protected species?

Stupeň Bernburg na Saale je zajímavým dokladem citlivého řešení. V rámci výstavby vodní cesty byl ponechán starý pevný jez. Plavební komora (za budovou mlýna) má (podobně jako další plavební komory na Saale) neobvyklý půdorys protáhlého kosočtverce a její osa je prakticky rovnoběžná s korunou pevného jezu.

The dam and lock Bernburg on the Saale is an example of a responsive solution: the waterway construction left the old fixed dam untouched; the lock (behind the mill) has (as other locks on the Saale) an unusual diamond layout. Its axis is practically parallel with the crown of the fixed dam.

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The first reason for the close interconnection between the city and the navigation cannot be assessed as a positive one. They are navigation obstacles that have always been represented by the city route of the river In Magdeburg the Elbe has got more branches, however the flow is concentrated into the left branch under common conditions, it is called Stromelbe, and thanks to that acceptable navigation depths are assured. Nevertheless, the Stromelbe is typical for its rock bars, in particular close to the city dome (this section is called Domfelsen), and for its extraordinarily fast current. The problems were to be solved by the construction of the lock and dam down the river from the centre. Already before the WW2 they succeeded in building necessary locks, the locks of record sizes at their time, and in complete equipment of them with steel constructions. However, the establishment of the necessary dam was interrupted by the war and then by the division of Germany; after the war the development of this visionary project was laid to rest. In the era of the former German Democratic Republic the steel constructions of the locks were dismantled as broken iron and their construction part has been deteriorating, as a non-functional ruin. The problem of critically low admissible drafts is solved by further deepening of the rock bars – i.e. half-measures. The radical measure that was actually commenced seventy years ago is still postponed.

The other aspect, in which the interests of navigation and the city are connected, is the Magdeburg port that is by far the most important river port on the Elbe and one of the driving motors of the development of the economy of the region. Transhipping in the large port that reached 3 mill. tons in 2005 does not suffer by stagnation that we can observe in other Elbe ports, at all. Contrary, its growth is admirably dynamical. However, it is not based on the Elbe navigation. It is established, in particular, on growing operation of the reliably navigable Central Canal that crosses the Elbe in Magdeburg. The Magdeburg junction of waterways should have been solved as an elevated crossing and with the construction of a big canal bridge that would transfer the Central Canal above the Elbe river-flood plain and also above the river bed, was commenced. However, the war interrupted the construction and the fate of the project was similar to that of the mentioned locks. In the era of the German "country of workers and farmers", the completed parts of the bridge were doomed to gradual destruction. Only after the reunification of Germany a hope for the completion of the bridge arose. Soon thereafter the construction work was renewed – first demolition of most of the parts having been constructed before,

Pohled na střední část mageburského přístavu. Vlevo dole je vidět chátrající torzo plavebních komor a v pozadí odbočení spojky z Labe ke Středozemnímu průplavu (jižní „rampu", na které je výstupní stupeň Rothensee).

The central part of the port of Magdeburg. Left below, deteriorating remains of locks, at the back, a branch connecting the Elbe with the Central Canal (the southern ascending ramp with the lock and lift Rothensee).

Plně naložená nákladní loď na průplavním mostu v Magdeburku. Až donedávna musela plavidla na trase mezi Berlínem a západní částí Německa křižovat Labe v úrovni a přizpůsobovat svůj ponor kolísajícím hloubkám řeky, takže plavba s plným nákladem byla spíše jen výjimkou.

A fully loaded cargo vessel on the canal bridge in Magdeburg. Until recently on the way between Berlin and the western part of Germany vessels had to cross the Elbe at a single level, having to adjust the draft to the varying river depths. A sail with full load was thus rather exceptional.

Osobní loď proplouvá inundační částí průplavního mostu u Magdeburku. Hladina na mostě se nachází 16 m nad terénem (zátopovým územím Labe).

A passenger vessel passes the inundation part of the canal bridge at Magdeburg. The canal water level is 16 ms above the terrain (the Elbe inundation area).

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Středozemní průplav na levém předmostí průplavního mostu přes Labe. Vlevo plavební komora a staré lodní zdvihadlo Rothensee na „jižní“ rampě, která zprostředkuje přístup k magdeburskému přístavu a k protiproudnímu úseku Labe.

The Central Canal on the left head of a canal bridge across the Elbe. Left, a lock and the old Rothensee lift on the southern ramp, which allows an access to the Magdeburg port and to the upstream section of the Elbe.

Pravé předmostí průplavního mostu přes Labe. Trochu neobvyklá je skutečnost, že Středozemní průplav klesá na pravém břehu Labe nedaleko od mostu u Hohenwarthe 18,55 m vysokým stupněm, vybaveným dvojitými plavebními komorami s úspornými nádržemi (vlevo). Tak se dostává průplav prakticky na úroveň střední hladiny v Labi. Dalo by se tedy jistě namítnout, že tento stupeň mohl být zřízen již na levém břehu Labe, takže by plavidla mohla křižovat Labe v úrovni. To by si však vyžádalo vybudování jezu, který by v Labi zajistil trvale vyhovující hloubky. Takové řešení by vyšlo levněji, vyvolávalo však námitky ekologů. Za plavebními komorami mohou lodi pokračovat dále k Berlínu, nebo využít „severní“ rampy s plavební komorou Niegripp (uprostřed) a pokračovat po proudu Labe.

The right head of the canal bridge across the Elbe. Quite unusually, the Central Canal descends on the right Elbe bank close to the bridge at Hohenwarthe with 18.55 ms high double locks with saving basins (left). Thus, the canal practically reaches the mid-range water level of the Elbe. The lock could have been set up on the left bank of the Elbe, and vessels would have crossed the Elbe on the same level. Such solution would also call for a dam to guarantee the invariably accommodating depths of the river. This cheaper solution caused protests among conservationists. After the locks, vessels can continue towards Berlin, or use the northern ramp with the lock Niegripp (centre) and go on downstream the Elbe.

Plavební komora Niegripp odděluje stabilní hladinu v průplavu od kolísajících hladin v Labi, které bývají níže, někdy však i výše než průplavní hladina. Musí být proto schopna se vyrovnat s „kladným“ i „záporným“ spádem.

The lock Niegripp separates the stable water level in the canal from the varying waters of the Elbe, which are usually lower, sometimes even higher than the canal level. Thus, it has to deal with both positive and negative falls.

Tlačná souprava s nákladem kontejnerů na Labi pod Wittenberge dokumentuje, že kontejnery již přestávají být na Labi vzácností.

A pushed convoy with a load of containers on the Elbe below Wittenberg; containers on the Elbe are no rarity any more.

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because the current stricter requirements for the parameters of the bridge were not met anymore. In 2003 the whole elevated crossing with the navigable bridge long more than 900 m was finished. It reminds of the junction of motorways not only by the fact that the main transportation currents cross thoroughly on two levels, but it is also by the fact that they are equipped with two ramps thanks to which the vessels can transfer from the Central Canal to the downstream section of the Elbe – through the lock Niegripp – or to the section of against the stream and to the Magdeburg port through the Rothensee branche. This was equipped by a boat lift and additionally by a lock with saving basins.

Thanks to the Central Canal and the Elbe Lateral Canal connected to it, two parallel waterways are available for further navigation from Magdeburg to Hamburg. The classic way down the Elbe is less suitable, from the point of view of admissible draft, in the period of low water, however it has got some benefits that the captains of the vessels sailing down the river with lighter or minor load or with the load of containers in three layers with which they would not pass under the low canal bridges appreciate. As a rule, the frequency of the vessels on the Elbe under Magdeburg is significantly lower than on the parallel canals offering permanently sufficient admissible draft, however also lower bridges than the Elbe before Magdeburg. When sailing down the Elbe the vessels pass the town of Tangermünde first in the place of the castle constructed by the Czech monarch – Charles IV, and then the mouth of the navigable Havel that is connected to the Elbe by several branches. Furthest down the river there is a mouth of the artificially constructed canal that runs several kilometres concurrently with the Elbe. The purpose of this canal is doing away with the floods on the lower course of the Havel by backwater from the Elbe. Next towns, are Wittenberge and Dömitz. The latter town is located at the mouth of the river Elde, which is navigable for small vessels and being important only for a recreation and sport boats. Downstream from Dömitz a difficult section from the navigation point of view follows at Hitzacker with the channel that frequently changes according to the movements of the bars of sand. A radical improvement of the navigation comes at picturesque Lauenburg, from which full admissible draft is assured under any circumstances. Lauenburg is simultaneously a junction of water ways waterways. In the town, a canal to Lübeck, i.e. to the Baltic Sea, branches away. This canal is progressively modernised and not far downstream the Elbe Lateral Canal, i.e. the parallel way from Magdeburg, joins this river.

Těsně před ústím řeky Elde do Labe se na této řece nachází přístav Dömitz.

The port of Dömitz lies just before the meeting of the Elde with the Elbe.

Starobylé město Tangermünde s málo využívaným přístavem.

The historical town of Tangermünde with a scarcely used port.

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Říční přístavy na Labi mají tradici, jejich rozvoj však brzdí stav labské vodní cesty

The Elbe river ports have a long tradition; the situation on the Elbe waterway is a setback of their development

Přístav Mělník byl navržen velkoryse, jeden z jeho bazénů je však využíván pouze loděnicí. V blízkosti druhého vznikl výkonný kontejnerový terminál, jenž však stále postrádá adekvátní vazbu na vodní dopravu.

The port of Mělník was designed grandly, one of its basins, however, is only used as a shipyard. Close to the other one, there is a powerful container terminal, unfortunately lacking an adequate connection to water transport.

Ústecké přístavy, tj. ústřední přístav v popředí a západní přístav uprostřed snímku, předčily v době Rakousko-Uherska velikostí překladu i hlavní rakouský námořní přístav v Terstu. Dnes jejich význam – bohužel – značně poklesl.

In the times of Austria-Hungary, the ports of Ústí nad Labem, the central port in front and the west port in the centre, beat in size even the main Austrian seaport in Trieste. Today, their importance has declined.

Přístav Děčín-Rozbělesy má sice rozsáhlou plochu i jisté průmyslové zázemí, je však využíván vlastně jen jako ochranný přístav.

The port Děčín-Rozbělesy has ample premises and a certain industrial background; however, it is used as a shelter port only.

Přístav Riesa-Gröba může profitovat z blízkosti ocelářského průmyslu, vykazuje však jen skromný překlad.

The port Riesa-Gröba could benefit from nearby steel industry. Nevertheless, its tranship rate is only minor.

Malé využívání a nevelké modernizační impulsy charakterizují také přístav Torgau...

Little use and petty modernization stimuli characterize the port of Torgau…

...totéž je možno konstatovat u přístavu Rosslau.

…as well as the port in Rosslau.

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V ústí řeky Ilmenau do Labe se nachází přístav Hoopte, ve kterém zůstala jen malá loděnice. Stále intenzivněji je však využíván jako „marina“ pro sportovní lodě.

In the mouth of the Ilmenau to the Elbe, there is the port Hoopte with only a small remaining shipyard, which is increasingly used as a marina for pleasure boats.

Lauenburg, město, jehož historie je nerozlučně svázána s historií labské plavby. Vlevo na snímku je vyústění průplavu vedoucího do Lübecku na Baltském moři.

Lauenburg's history is closely entwined with the Elbe navigation. The picture left shows an opening of the canal running to Lübeck on the Baltic Sea.

Vyústění Labského laterálního průplavu do Labe pod Lauenburgem. Trasa průplavu protíná levobřežní ochrannou hráz. Proto bylo nutno zřídit na průplavu povodňový uzávěr, kombinovaný se silničním mostem.

The Elbe Lateral Canal empties to the Elbe below Lauenburg. As the canal route cuts the left-bank dyke, the canal had to be fitted with a flood gate combined with a road bridge.

V rámci modernizace Středozemního průplavu bylo kompletně přestavěno asi 300 mostů. Tam, kde je hladina v průplavu příliš vysoko nad terénem, by byla výstavba mostů komplikovaná. Vzácností tedy nejsou podjezdy pod průplavem, jako např. podjezd čtyřpruhové silnice u Elbeu.

Over 300 bridges were rebuilt within modernization of the Central Canal. Whereever the canal water level reaches too high above terrain, bridge construction became too complicated. The canal underpasses are thus not rare, e.g. an underpass of a four-lane road at Elbeu.

Součástí modernizace Středozemního průplavu je i postupná přestavba plavebních komor, a to především proto, aby vyhověly lodím a soupravám s vyšším ponorem. Na snímku jsou dvojité plavební komory u Sülfeldu se zajímavě (vějířovitě) uspořádanými úspornými nádržemi. Severní z komor zůstává zatím v provozu ve svém původním stavu, na místě jižní se již buduje zcela nová plavební komora.

Modernization of the Central Canal includes gradual reconstruction of locks especially in order to accommodate vessels and convoys with larger draft. The double locks at Sülfeld (in the picture) have an interesting fingery layout of saving basins. The northern lock remains in operation in its original shape, while the southern one will be replaced with a completely new lock.

Modernizovaný úsek Středozemního průplavu u Mannhausenu. Obrázek dokumentuje, že rozšíření hladiny se realizovalo zásadně jen na jedné straně (v daném případě vlevo), aby byly zachovány desítky let staré porosty stromů a keřů alespoň na jedné straně.

A modernized section of the Central Canal at Mannhausen. The photo illustrates that the water surface broadened strictly to one side only (left here) to preserve a decades-old stand of trees and shrubs at least on one bank.

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Na snímku Labského laterálního průplavu je dobře vidět, že v rámci výstavby mostů byla též zkvalitněna silniční infrastruktura, například zřizováním mimoúrovňových křižovatek.

A picture of the Elbe Lateral Canal illustrates how construction of bridges improved the road infrastructure, e.g. by creating multilevel junctions.

Labský laterální průplav křižuje údolí řeky Aller vysokým náspem, jehož celková délka dosahuje 7 km a výška cca 10 m. Samotnou řeku překračuje průplavním mostem.

The Elbe Lateral Canal crosses the river Aller valley with a tall embankment 7 kms long and approximately 10 ms high. It crosses the actual river with a canal bridge.

That is why we will have a look also at the whole parallel canal way from the Magdeburg junction. The constructors of the Central Canal designed its route so that it does not deviate from one contour line very much, so they used a minimum number of locks. The canal offers exceptionally long pools and easy curves that is why it offers fast traffic and gathering of the boats into long convoys. However, the cross section does not comply with today conditions. That is why work on its extension and deepening has been commenced. The construction is in its final stage. Where it cuts the landscape-protected areas, the canal has acquired more "natural character" within the modernisation and has been completed with shallow bank zones, often quite extensive. Contrary, in Wolfsburg, where it touches the centre and the compound of the automobile plant VW, it has become an element that is able to bring a similar atmosphere to the busy industrial centre like a quiet city park. To the east of Wolfsburg, we will turn to the North to the Elbe Lateral Canal that is characteristic also of long pools. Its length exceeds 100 kms. In spite of it, the canal is equipped only with two "stirs" – the lock Uelzen and lift at Scharnebeck.

The difference between the frequency of vessels and convoys on the Elbe and parallel canals is obvious at first sight. After having considered the fact that it is not necessary to restrict the admissible draft and thus also the carrying capacity of the vessels on the canals – in contrast to the Elbe – it is easy to explain the obvious difference in the transportation performance of these two waterways, as documented by the statistics.

Thus down the parallel route we will get back close to Lauenburg, and thus also to the pool of the Geesthacht lock and dam that is actually the only navigation lock and dam on the German Elbe. Its construction originates from the necessity to compensate the gradual deepening of the Hamburg port that might affect the subsequent river bed erosion and deepening of the Elbe also in the counter-flow the river section. The lock and dam is equipped with double locks of formidable sizes (230 x 25 ms). After this lock you can "feel" the sea so much that the tide reaches as far as the dam and the lower approach of the locks. The fork of the Elbe into two branches – i.e. the northern branch (Norderelbe) and the southern branch (Süder-Elbe further called Köhlbrand) lying down the river is deemed to be a traditional border of the Hamburg seaport. A freshman crossing as a apprentice this imaginary border for the first time must undergo a similar baptism as is traditionally performed on the sea when crossing the equator. However, not Neptune comes to the deck because the Elbe ceremony is let say more intimate, but very characteristic. Not baptised apprentice must bite the anchor-chain. It is available on the bow and usually is mudded from the Elbe. The candidate of baptism is ordered to clean and furbish one of the anchor chain link into the gloss of mirror many kilometres before Hamburg – this work is not easy and is quite special. Only then – when entering Hamburg – the candidate can fall on his kneels and in forward bend he bites the cleaned chain. If he does not know that the dedicated members of the crew have got a full bucket of the Elbe water ready for this occasion and moment, he can look forward to this official baptism.

Assuming that we have enjoyed biting of the chain and finally we are entering the seaport. The first thing that astonishes a new visitor is a huge area of the complex that is

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Na Labském laterálním a Středozemním průplavu vznikají přístavy moderní koncepce

Modern concept ports spring up on the Central and the Elbe Lateral Canals

Přístav Lüneburg na Labském laterálním průplavu. Na pozemcích, situovaných kolmo k přístavním hranám, jsou plánovitě umísťovány průmyslové podniky, využívající přímo služeb vodní dopravy.

Port Lüneburg on the Elbe Lateral Canal. The lots right-angled to the canal are purposefully allocated to industrial plants using water transport.

Přístav Wittingen na Labském laterálním průplavu je příkladem podobného moderního přístupu. V popředí je oddělený sportovní přístav (marina).

Port Wittingen on the Elbe Lateral Canal is a similar example of the modern concept. A detached marina in the picture front.

Přístav automobilky Volkswagen na Středozemním průplavu je důsledně zakomponován do areálu závodu.

The port of Volkswagen's plant on the Central Canal is thoroughly inbuilt into the premises of the car factory.

Nedávno zřízený přístav Vahlsdorf na Středozemním průplavu je vzorným příkladem „čistého“ a moderního pojetí. Srovnání tohoto přístavu – a dalších přístavů na průplavní síti – s labskými tradičními přístavy může být jistě poučné.

The recently established port Vahlsdorf on the Central Canal is a perfect example of the "clean" and modern concept. Comparison of this port and other ports of the canal network with the traditional Elbe ones could be truly edifying.

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Na Labském laterálním průplavu se dynamicky rozvíjí přeprava kontejnerů. Existující mosty – bohužel – neumožňují jejich nakládku ve více než dvou vrstvách. Tento handicap se do jisté míry kompenzuje nasazením dlouhých tlačných souprav.

Container transport on the Elbe Lateral Canal has been on rise. Unfortunately, the existing bridges do not allow more than two-tier loading. The handicap is partially compensated with long pushed convoys.

Plavební komora Uelzen na Labském laterálním průplavu. Vedle původní komory se buduje druhá.

The lock Uelzen on the Elbe Lateral Canal. Next to the original one, another lock is to be added.

divided among tens of port basins rimmed with a hundred kilometres of loading quays. It was influenced by the traditional function of Hamburg, the core of which was in the laborious manipulation with cargo in packets than in the transhipping of bulk or liquid substrates. The staff necessary for that was counted in thousands, the number of cranes and barges transporting the goods between bigger vessels and stores were counted in hundreds.

Today, labour productivity is much higher thanks to containersation and all manipulation can be managed in a relatively smaller space. However, on the other hand the performance of the port is increasing. That is why most areas are still used. The other thing that attracts one's attention is the international atmosphere. The free zone of the port is completely divided from the Federal Republic by a customs frontier. Although all big sea ports have similar nature, Hamburg has one special characteristic for the visitors from the inland Czech Republic – i.e. the Czech (former Czechoslovakian) port zone, where it is possible (– or it was possible up to recent past) to hear Czech more than German or other languages.

Although Hamburg is a seaport, it is not located directly at the sea but still on the Elbe. From the centre of the port – from the place where both branches of the Elbe are joined together i.e. Norderelbe and Köhlbrand – it is necessary to navigate approximately about 70 km to the port of Brunsbüttel and to the diversion of the canal between the North Sea and Baltic Sea. Only at this place the Elbe looses its banks and its waters are dissolved in the sea on the bottom of which the Elbe stream, strongly assisted by dredges, form a access channel in the length of about another 70 km, through which sea-going ships with the admissible draft that may be, upon a favourable tide, as much as 15 m sail to Hamburg. Thus at the North Sea, third of waterways that diverge from the Přerov junction to the sea ends. However, should not we talk rather about the ways that converge here? They rather associate the continent – that is still rather small from the sea to the sea. Its division and disintegration has never done good to it. Is not there, at Přerov, in the middle of Europe, one of the junctions where not only waterways can converge?

Dvojité plavební komory stupně Geesthacht na Labi. V tomto místě – po proudu od vyústění Labského laterálního průplavu – se již dá o Labi hovořit jako o frekventované vodní cestě.

Double locks of the Elbe lock and dam Geesthacht. From this place, downstream from the mouth of the Elbe Lateral Canal, the Elbe is a truly busy waterway.

Labe se nad Hamburkem větví do dvou ramen a blízkost moře je stále více patrná, neboť hladinu Labe již ovládá příliv a odliv.

Above Hamburg, the Elbe splits into two branches, the vicinity of the sea is obvious as the water level changes according to the tide.

Přístav Hamburk – svobodný přístav ve svobodném městě

The port of Hamburg – Freeport in a free city

Celkový pohled na jihovýchodní část přístavu. Uprostřed snímku je přístavní bazén Peute, na jehož břehu je část přístavního pásma, které bylo na základě smlouvy z Versailles pronajato na 99 let Československé republice.

A general view of the southwest part of the port. The port basin Peute in the middle; according to the Treaty of Versailles, part of its bank was rented to Czechoslovakia for 99 years.

V přístavním bazénu Peute kotví převážně plavidla českých rejdařů. Hlavní aktivity českých rejdařů se však odehrávají v Saaleském přístavu.

The port basin Peute anchors vessels of most Czech ship-owners. Main activities of Czech ship-owners concentrate to the Saale port.

Poslední nízké mosty, křižující Labe, jsou jednak hranicí dosahu plavby námořních lodí, jednak hranicí svobodné části přístavu, která probíhá mezi železničním mostem a silničním mostem „Freihafenbrücke", ležícím již ve svobodném pásmu.

The last of low bridges crossing the Elbe mark the access line of sea-going vessels as well as the borders of the Freeport running between the railway bridge and the road bridge Freihafenbrücke, which is already in the free zone.

Jihovýchodní část svobodného pásma. Velká hala v popředí je Zámořské centrum. Přilehlý přístavní bazén se nazývá Vltavský přístav (Moldauhafen), vlevo Saalský přístav (Saalehafen).

The southeast part of the free zone. A large hall in the front houses the Overseas Centre. The adjacent port basin is called the Vltava port (Moldauhafen), the Saale port (Saalehafen) is to the left.

V hamburském přístavu jsou i loděnice, nabízející pohotové opravy námořních lodí ve velkých plovoucích docích.

Shipyards of Port Hamburg offer even emergency repairs of sea-going vessels in large swimming docks.

Lokality při vodní cestě přinášejí výhody i leteckému průmyslu – příkladem může být závod v předměstí Finkenwerder, jehož další rozvoj je spojen s konečnou montáží airbusů.

Locations on the waterway bring advantages to the airplane industry – the plant in the suburb Finkenwerder links its development to the final assembly of Airbuses.

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Jedním z četných kontejnerových překladišť v hamburském přístavu je Burchardkai západně od ramene Köhlbrand. Kolem překladiště je vedena dálnice č. 7 do Kielu (v pozadí), která postupně klesá a prochází tunelem pod Labem.

One of numerous container-transhipping terminals of Hamburg – Burchardkai – lies to the left from the branch Köhlbrand. Motorway 7 for Kiel runs along its premises (at the back) and gradually falls towards a tunnel under the Elbe.

Sandauerhafen je specializován na překlad uhlí, rud a dalších hromadných substrátů. V pozadí Köhlbrandbrücke.

Sandauerhafen specializes in transhipping of coal, ores and other massive substrates. Köhlbrandbrücke at the back.

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Visutý most Köhlbrandbrücke patří k dominantám hamburského přístavu. Vykazuje podjezdnou výšku 55 m, takže nebrání průjezdu velkých námořních lodí. Jeho pylony jsou 135 m vysoké.

The suspension bridge Köhlbrandbrücke is one of the port dominants. With the clearance of 55 ms, it admits even large sea-going vessels. Its pylons are 135 ms high.

Centrální část Svobodného přístavu (Freihafen). Vpravo rameno Reiherstieg, propojující celé území mezi Severním Labem a ramenem Köhlbrand.

The central part of the Freeport (Freihafen). The branch Reiherstieg, in the right, connects the whole area with the North Elbe and the branch Köhlbrand.

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Kontejnerové terminály zabírají v hamburském přístavu stále více místa.

Container terminals have occupied ever more space of the Port of Hamburg.

Od Hamburku k moři dominují již na Labi námořní lodi.

From Hamburg to the sea, sea-going vessels rule the Elbe.

Přístav Stade-Blützfleth na Labi pod Hamburkem s rozsáhlou průmyslovou zónou, které vévodí závod na zpracování bauxitu.

The port Stade-Blützfleth on the Elbe below Hamburg with a vast industrial zone dominated by a bauxite plant.

Město Brunsbüttel při ústí Labe do moře je i výchozím bodem Kielského průplavu (Nord-Ostsee-Kanal), který představuje druhé spojení mezi Labem a Baltským mořem.

The city of Brunsbüttel at the Elbe estuary is also a starting point of the Kiel Canal (Nord–Ostsee Kanal), the second connectin of the Elbe to the Baltic Sea.

Na Kielském průplavu panuje čilý plavební ruch. Setkávají se tam nejen námořní lodi, ale i coastery (lodě pobřežní plavby) a běžné říční lodě. Na březích průplavu je řada výkonných překladišť.

The Kiel Canal is busy with navigation: not only sea-going vessels, but also coasters and regular riverboats meet here. The canal banks offer a number of efficient berths.

Silniční most přes Kielský průplav u Brunsbüttelu poskytuje námořním lodím podjezdnou výšku 40 m, takže si vyžádal vybudování dlouhých nájezdových ramp. Vpravo přístav Ostermoor.

As the road bridge across the Kiel Canal at Brunsbüttel offers sea-going vessels the clearance of 40 ms, it has long drive-up ramps. Port Ostermoor to the right.

Vstup do Kielského průplavu zprostředkují čtyři paralelní plavební komory.

The Kiel Canal enters through four parallel locks.

Pohled na široké nálevkovité ústí Labe. Vpravo je přístav a město Brunsbüttel, na protějším břehu se dají více tušit než v lehkém oparu vidět města Ottendorf a Cuxhaven. Celý obzor patří již hladině Severního moře.

A view of the wide Elbe estuary. Right, the port and town of Brunsbüttel; on the opposite bank, hazed towns of Ottendorf and Cuxhaven… The horizon belongs to the North Sea.

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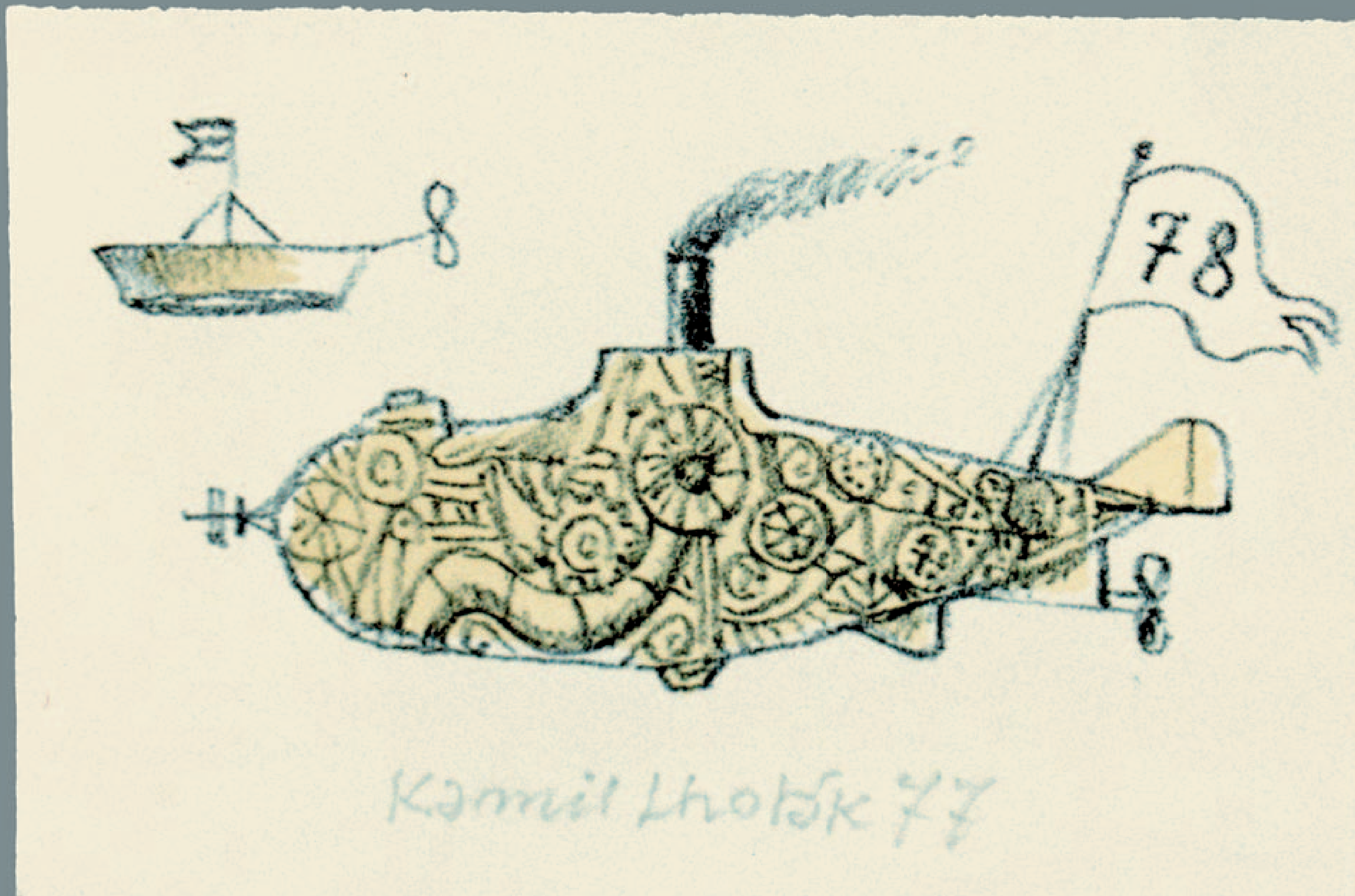

Kamil Lhoták

Do not be afraid
of mowing forward slowly.
Be afraid of standing still.

(old Dutch proverb)

Co dlužíme Evropě a co Evropa dluží nám?

What do we owe Europe? What does Europe owe us?

IX

V úvodu jsme slíbili, že se pokusíme odpovědět na otázky, které jsou spojeny se záměrem výstavby vodního koridoru D-O-L, nebo čtenářům alespoň pomůžeme, aby odpovědi – pomocí shromážděných informací – hledali a nalézali sami. Přesto tušíme, že nám někteří budou vytýkat nedostatek přesvědčivých argumentů pro hledání odpovědi na otázku začínající slůvkem „kdy“.

In the beginning we promised to provide answers to questions connected with purpose of the D-O-E water corridor development; or at least to help the reader to find answers on their own with the help of the gathered information. Nevertheless, we suspect, some might criticize lack of convincing arguments for finding the answer on the question starting with the word “when”.

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Before answering this question, let's bring back some concrete steps leading to building a water corridor in more than 100 years. The most recent 23 years are not the best example of the right attitude to it. .

Survey of new or modernized locks and dams in connection with the D-O-E water corridor over the past 113 years					
1902–1918	1918–1939	1939–1945	1945–1948	1948–1989	1989–2015
16 years	21 years	6 years	3 years	41 years	26 years
6 locks and dams	16 (30)*	2 locks and dams	2 locks and dams	13 locks and dams	0 locks and dams

* including 14 locks on the Baťa Canal (1934–1938)

If we are to characterize also the short period after 2004, the progress has been "negative" rather than just zero. Preparing the construction of the new Přelouč lock and dam on the Elbe, which should finalize building the Elbe waterway, make the planned Pardubice port accessible and close the continual cascade of locks up to the point where the D-O-E water corridor should be connected, was halted without any adequate reason and unprecedentedly, literally a few days before launching its implementation. The Elbe is supposed to remain a torso, on which no transport development will be possible without that vital ending. The Elbe transport is not just stagnating now, but even decreasing rapidly. It attains a fraction of outputs of the times when the Elbe transport was at its peak. The waterway had to offload overloaded parallel railway tracks at any cost for dozens of years as it had to help the railway, which could not cope with the load. If we are to personify the issue, we could say that the railway shows a truly remarkable gratitude to the water transport after getting out of capacity crisis: the investments "saved" by blocking the construction of the Přelouč lock and dam will be used for development of railways and, of course, highways. If we remain objective, though, we have to admit the Elbe problems are deeper and are connected with the debatable state of the whole Elbe waterway – it is impossible to base any future development on it and the only firm basis can be a gradual implementation of the D-O-E water corridor. This is where we should rightfully expect the core of efforts of "responsible authorities".

Should we treat the D-O-E water corridor as something belonging to a distant and not exactly defined future and remain not "entitled" to care about vain spending of billions on flood measures, for example? This is exactly what the D-O-E water corridor would solve more efficiently and at lower costs. Do we believe the impacts of possible climate changes on the landscape and agriculture is a topic of theoretical debates and are we not "entitled" to prevent the looming threat in time? Will we solve choking roads and highways by trucks only by facilitating their invasion by asymmetrical development of infrastructure? Should we get used to disastrous impacts of growing automobile traffic on the environment and the landscape and consider everyday reports of accidents a necessary toll of transport development? Should we be content with the fact the water transport development is becoming an interesting rarity? Should we still spread an absolutely fabricated fear about some "disastrous" impacts of the D-O-E water corridor on the environment and the landscape and close our eyes before the real disaster of looming water balance collapse as a result of global climate changes? Should we still believe that the unfavorable development of road transport with extreme occurrence of greenhouse gases could be solved just by transferring some of the freight to railways – without even mentioning that there is high-capacity water trans-

The decree of the Government of the CR of 11th December 1996 placed a duty on the Minister of Regional Development in cooperation with the Minister of Transport to ensure the prevention of the area necessary for prospective making the rivers Morava, and Oder navigable and for the realization of the considered Danube – Oder – Elbe canal connection in the guiding part of regional development plans. This task is being fulfilled by both ministries. The Ministry of Transport is currently not entitled to prepare the construction of this canal connection.

From the letter of Deputy Minister of Transport of CR, in which he rejected the proposal of submitting a document elaborating the influence of the implementation of the D-O-E connection on the environment from the EU funds, No. 263/2003 230-VPL/2 of 7th October 2003

I have never seen a problem so complicated
Not to become even more complicated
If you look at it in a right way.

Hans Christian Andersen

There's is no time like the present
For postponing what you don't want to do.

Hecht's Law

port available, often led parallelly with the railway network in store? Is it not weird that we are slowly becoming afraid of the term "water transport"? Is it not about time to admit that the water transport is the most ecological kind of transport and that it can, together with railway transport, halt the looming ecological collapse caused by growing road transport?

We are proud of being the heart of Europe. Well, the problem is there are no blue arteries of interconnected network of European waterways leading to this heart. We are the only EU country not lying on a sea coast or even without a connection to the sea by a modern waterway. Should we just accept this major economic handicap passively? Moreover, this handicap is absolutely needless as we cannot see – or do not want to see – the "treasure" in the form of the Moravian Gate. This is the lowest spot in the European watershed and the most feasible, shortest, and operationally most beneficial integrating axis of the whole waterway network of uniting Europe can lead through it. The fact that the Moravian Gate is located in our territory means the prospective core of the network reaching as far as the North Sea, Baltic Sea and Black Sea lies in our country. Let's make use of this enormous asset to the EU.

Due to our geographical location, we owe Europe the construction of the D-O-E canal. The fact that we will build it will only confirm the prestige of our country and will prove our maturity we like to boast, but have not proven by any imposing feat so far…

Jan Šeda,
plenipotentiary minister of Czechoslovakia
7th March 1923 in Brno

It is not just the transport issue what is at stake – another infamous "primacy" of the Czech Republic rests in its limited and decreasing water resources, which flow out of the country via the Elbe, Oder and Morava, while no river heads to our territory – even the mighty Danube passes us by, although it is not far away from our border.

Don't pride yourselves, patriots,
It's not an ordinary matter,
That the water doesn't flow
To Bohemia from anywhere.

Karel Havlíček Borovský

Therefore the question WHEN? has the only answer: IMMEDIATELY!

It does not mean we have to start the construction immediately, but rather to begin an intensive work on optimation of the route of the D-O-E water corridor and on applications for its cofinancing from the EU funds. After all, this decade will see the construction of the new European canal Seine–North finished, and it is the right time to start with the actual construction of D–O–E. Both constructions are approximately of the same size as for the investment costs and therefore the French project can be inspiring in the spheres of technical solution, economics, social policies, emphasis on protection of the nature and the environment and also from the point of view of financing. A part of the costs is financed from EU funds and tolls gathered on the French highway network cover a part of the costs as well. The logic behind this solution is quite deep and it reflects the fact that the new canal should take over a part of cargo transport from the highway connection between Paris and Brussels, i.e. it corresponds with the main aim of the EU transport policy – transferring the load from highways to railways and waterways. The D-O-E water corridor should serve the same purpose. Therefore its building deserves to follow hot on the heels of finishing the Seine – North canal and to be financed similarly, including using the EU resources.

We, Czechs, cannot afford any more delays of the construction of the Danube – Oder – Elbe water corridor and so lose any chance of immediate influence on economical growth and healthy environment of the Czech Republic and the whole of Europe. Well, a new Tomáš Baťa might be born. He knew that…

DELAY IS A THIEF OF TIME

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Epilogue of the third edition of the "Meeting of Three Seas".

The third edition of the "Josef Podzimek and collective: Meeting of Three Seas" speaks for itself and proves that the intention of the Danube–Oder–Elbe water corridor is still "alive".

A lot of experts and laymen state that it is a megalomaniac idea, but let's remember that the water management pride of South Bohemia – the ponds and watercourse modifications – was most probably also megalomaniac in its time, i.e. in the late 16th century. Today, water management experts as well as laymen and ecological activists show this creation of Jakub Krčín of Jelčany and Sedlčany off.

Well, is the Danube–Oder–Elbe water corridor a mere dream? It would be a daring idea to say that Czech King and Roman Emperor Charles IV was a dreamer – and yet, he was one of the first promoters of this connection of three seas – the North Sea, the Baltic Sea, and the Black Sea. It would also be out of question to label Professor Antonín Smrček, rector of the Brno University of Technology, entrepreneur Tomáš Baťa, and even the current President of the Czech Republic – Miloš Zeman – as dreamers.

Extreme opponents of this idea often claim that outdated documents are quoted to support the idea. We would like to point out that the quoted Waterway Act from 1901 was included in the Czech legislation on 1st January 1970 as the Act on the construction of waterway and modifying rivers, with the amendments from the 1930s and 1950s taken into account.

Another argument of those opposing the idea of the Danube–Oder–Elbe water corridor is focused on quoting the Danube–Oder–Elbe water corridor economic study that was adopted by the UN Economic Commission for Europe ("UNECE" further on) in the early 1980s, stating that this study is outdated now. We feel it appropriate to remind readers that another UNECE-commissioned study of the Danube–Oder–Elbe connection was made in the early 1990s, i.e. at the time when political and economic barriers in Europe were removed, particularly the ones between the Central and West Europe. This study was based on new technological, economic, and ecological facts, and as such was adopted on the 56th meeting of the UNECE Committee for Inland Transportation in January 1994. Even later documents from the late 2000s state the idea of interconnecting the Danube with the Oder and the Elbe in the forecast for the Czech Republic, and also Slovakia, Poland, and Austria.

Let's return to the book itself. Similarly to previous editions, this one does not concentrate on a mere justification of the water corridor, but also offers a very interesting, partly popularizing, partly technical description of the project that is completed by extensive photographic documentation. And the water corridor is not the only matter to discuss because there are also connecting ways of the Elbe, the Oder, and the Danube to the North Sea, the Baltic Sea, and the Black Sea. The book also describes technological and economic principles of waterways development.

The idea of the water corridor is not "dead" and it deserves not only responsible preparation, but also strict territorial protection of the project's route, similarly to other transport corridors, for example the railway ones, so that no permanent buildings are built on it and it does not depend on the will of greedy developers.

However, the project is not in the way of developers' plans and activities only. One cannot ignore the hesitation by most government officials for whom the project is probably too complicated – its complex nature means that it does not fit into the "realm" of a single ministry. It also cannot be finished within a single election cycle so it cannot offer a festive opening for the same officials who would give it the green light. As last but not least, the Danube–Oder–Elbe water corridor has become a kind of exclusive intention serving the demonstration of environmental activists' stance. Who cares that EU transportation documents call for more intensive utilization of economically and ecologically more beneficial water transport? Who cares that probably this was the reason why it was included into the accession agreement when we were joining the EU?

The value of this book rests also in the fact that it gives complex answers to all those concerns. It also shows real scientific efforts – and their results – of modern waterways development in the form that is close to the nature. It documents the viability and purposefulness of modern waterways as well as the progress in their utilization.

One can welcome rising activity of entrepreneurs as well as regions to support the idea of the water corridor both domestically and abroad. The voice of these initiatives begins to sound in the European Parliament, too, and its echo will hopefully reach national parliaments and governments.

The "Meeting of Three Seas" book is a uniquely complex publication that will serve those who decide to support the development of the Danube–Oder–Elbe or try to get as much information as possible about the project at least.

We can just wish that the next edition of the book can be distributed on the first fully completed parts of the project.

Ing. Petr Forman,
Vice-President, Transport section
of the Czech Chamber of Commerce

Doc. Ing. Pavel Jurášek, CSc.,
President, Czech Navigation
and Waterways Association

Acknowledgement

To all who recognize the importance of the water transport development in order to guarantee healthy and prosperous future of the Czech Republic. Special thanks to those who understand the rare position of this country as "a heart of Europe", cut off from the blue arteries of the continent.

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List of literature, authors of photographs and drawings, films

Quite understandably, in the course of the centuries, when the D-O-E water corridor have been disputed and prepared, many books have been written and thousands of articles published in professional magazines. Their summary would go on for tens, perhaps even for hundreds of pages. However, the authors do not aspire to treat the resources in such a comprehensive way. They have preferred a selection of truly inspiring books and publications of a larger scope, which today's reader will find topical enough. The same rule has been applied to the selection of contemporary studies, international agreements or documents and internal legal regulations, concerning either the former Czechoslovakia, or the Czech and Slovak Republics of today. An index of individual magazine contributions, on the other hand, they have decided not to include at all. Instead, they have chosen to list titles of those periodicals, where some valuable contributions on the topic can be found, as well as the films dedicated to the problematic.

Books and larger publications:

Bartovský Josef: Úprava Vltavy a Labe v Československé republice, Praha 1927

Bartovský Josef: Stav vodních cest spojujících Československou republiku se Severním, Baltickým a Černým mořem, Praha 1937

Bartovský Josef: Průplav Labe–Dunaj–Odra v soustavě středoevropských vodních cest, Praha 1937

Bartovský Josef: Vodní cesty a vodohospodářské plánování v Čechách a na Moravě, Praha 1946

Baťa Jan A.: Budujme stát pro 40 000 000 lidí, Zlín 1938

Baťa Tomáš: Základ pro úpravu vodního hospodářství na Moravě, Zlín 1930

Bažant Jan: Splavnění Moravy od Hodonína po Devín, zvláštní otisk ze Sborníku MAP, ročník IX., 1935

Binder Július: Prečo nemá Gabčíkovo Nagymaros, Bratislava 1998

Blažek Vladimír, Vergner Zdeněk, Záruba Libor: Průplavní spojení Dunaj–Odra–Labe, Praha 1970

Broža Vojtěch a kolektiv: Přehrady Čech, Moravy a Slezska, Liberec 2005

Čábelka Jaroslav: Vodní cesty a plavba, Praha 1976

Čáp Alois a kol.: Průplav Dunaj–Odra–Labe, naše moře, Přerov 1949

Čmelík P., Fiala P., Karkošková A., Menšík R., Ondračka I., Tomaštík M.: Přírodní technická památka, Baťův kanál, 2003

Chmelár Vladimír: Dunajská plavba, Bratislava 1992

Chmelár Vladimír: Dunajské úpravy, Žilina 1993

Klír Antonín: Komise pro kanalizování řek Vltavy a Labe v Čechách, 1903

Klír Antonín: Stavby komise pro kanalizování řek Vltavy a Labe v Čechách, 1907

Collective of authors: Město Moravská Ostrava a průplav Odersko-dunajský, Praha 1940

Collective of authors: Moravské Slovácko a Dunajsko-oderský průplav, Praha 1941

Collective of authors: Průplav Labe–Odra–Dunaj, Hospodářské předpoklady jeho uskutečnění, Praha 1949

Collective of authors: Splavněné střední Labe v soustavě středoevropských vodních cest – trať Mělník–Pardubice, Praha 1941

Collective of authors: Spojení Labe s průplavem Dunajsko-oderským, díl I a II, Praha 1941

Collective of authors: Vodní cesta D-O-L, Ano nebo Ne?, ETM 1991

Kubec Jaroslav, Podzimek Josef: Svět vodních cest, Praha 1988

Kubec Jaroslav, Podzimek Josef: Vodní cesty světa, Praha 1996

Kubec Jaroslav, Podzimek Josef: Křižovatka tří moří – vodní koridor Dunaj–Odra–Labe, první a druhé vydání, Praha 2007

Lahoda František: Vodné dielo Gabčíkovo, História a riešenie, Bratislava 1993

Landrus Matthew: Leonardo da Vinci, 2006

Langer Josef: Vodní cesty v mocnářství Rakousko-Uherském, 1901

Lorenz Vladimír: Dopravní význam projektovaného průplavu labsko-odersko-dunajského, Praha 1928

Patočka Antonín: Průplav Odersko-Dunajský, Brno 1937

Podzimek Josef a kol.: Povodí Vltavy I, II, III, Praha 1970, 1971, 1973

Podzimek Josef: Modernizujeme labsko-vltavskou vodní cestu I, II, Praha 1975, 1976

Podzimek Josef a kol.: Dolní Labe, Praha 1976

Podzimek Josef a kol.: Praha stověžatá, věž Jindřišská, Praha 2003

Schwarz Zdeněk: Plavební dráha Vltavy a Labe z Prahy na hranici, Praha 1925

Smetana Jan: Průplavní spojení a splavnost řek Labe, Odry a Dunaje, Praha 1948

Smrček Antonín: Průplav Pardubice–Přerov–Krakov, 1904

Smrček Antonín: Slavnostní projev ve vídeňském parlamentu na podporu stavby vodních cest podle vodocestného zákona z roku 1901, 1912

Smrček Antonín: Splavnění řeky Moravy od Olomouce k ústí do Dunaje se souběžným řešením průplavu, zvláštní otisk z Věstníku pro vodní hospodářství, 1933

Smrček Antonín: Der Stand der wichtigeren Kanalprojekte Donau–Elbe, Donau–Oder und Donau–Weichsel, 1916

Smrček Antonín: O přístupu Republiky Československé k moři, 1919

Spáčil Bedřich a kol.: Dunajsko-oderský průplav, SNTL, Praha 1953

Šeda Jan: Významný projev na vodocestném sjezdu, na podporu D-O-L, 1923

Trejtnar Jiří: Střední Labe, 1976

Velkoborský Kliment: Plavba a vodní cesty II, Praha 1958

Vogemont Lothar: Dissertatio de utilitate, possibilitate et modo conjuctionis Danubii cum Odera, Vistula & Albi fluviis, per canalem navigabilem (Pojednání o užitečnosti, možnosti a způsobu spojení Dunaje s Odrou, Vislou a Labem plavebním kanálem), 1700

Zelinka J.: Problematika kanálu dunajsko-oderského, Ústřední svaz čs. průmyslu, Praha 1948

Professional periodicals, collective volumes:

- Povodí Vltavy, years 1976–1981
- Ekotrans Moravia, years 1989–1992
- Plavební cesty Dunaj-Odra-Labe, years 1940–1950
- Conference Porta Moravica proceedings for years 2002–2007
- Conference proceedings from Plavební dny for years 1971–2014
- Střední Labe upravené a splavněné, years 1902–1910
- Annual report of the Committee for making the Vltava and the Elbe Rivers navigable in Bohemia, years 1896–1926
- Vodní cesty a plavba – years 1993–2015
- Vodní hospodářství – years 1971–2015

Films

- Přístav v srdci Evropy, filmové ateliéry firmy Baťa 1945
- Vltavská cesta, Československá televize 1987
- Přístav Ostrava, Československá televize 1989
- Aktivní ekologická páteř, Československá televize 1989
- Vodní cesta ANO či NE?, Česká televize 1990
- **Nepil František:** Jak si lidé plují, a film in three parts (I. Pánbůh nás má rád, II. Plouti je nutné, III. Cesty pro lodě), Praha 1992, Krátký film, a. s., Studio 52 1992, 1993

• Na palubě Andromedy, film o třech dílech (I. Z Prahy do Rotterdamu, II. Rýn – Mohan, III. Průplav Mohan – Dunaj), Česká televize 1993

Contemporary study and design materials:

- Státní vodohospodářský plán, Praha 1953
- Studie plavebního spojení Dunaje s Odrou, Vislou a průplavy NDR, Hydroprojekt Praha 1958
- Generální řešení průplavního spojení Dunaj–Odra–Labe, Hydroprojekt Praha 1968
- Economic Study on a Navigable Waterway Danube–Oder–Elbe (Ekonomická studie vodní cesty Dunaj–Odra–Labe), skupina zpravodajů EHK/OSN (Dokument TRANS/SC3/AC2/R1), 1981
- Novelizace generálního řešení D–O–L, ETM 1993
- Gutachten zur Verkehrsbedeutung der Wasserstraße Donau–Oder–Elbe (Dobrozdání o dopravním významu vodní cesty D–O–L), ÖIR Wien, 1994
- Studie projektu výstavby vodního koridoru Dunaj–Odra–Labe, o. p. s. Plavba a vodní cesty pro Ministerstvo průmyslu a obchodu ČR, Praha 2006
- Studie napojení jižní Moravy na Dunaj ve variantě D, Jihomoravský kraj, 2006
- Generel vodních cest ČR (dokument zadávaný MD ČR, který postupně zpracovává jednotlivé úseky vodního koridoru D–O–L na digitalizovaných podkladech)
- Územní studie reálnosti a účelnosti územní ochrany průplavního spojení Dunaj–Odra–Labe, Atelier T-plan, s. r. o., pro Ministerstvo pro místní rozvoj, 2007
- Hodnocení efektivnosti projektu výstavby vodního koridoru Dunaj–Odra–Labe, CONFIMA, Consulting Finance Management, Praha 2007

International agreements and documents:

- Outline Plan of European Inland Waterways Network (Základní plán sítě evropských vodních cest), Evropská unie 1993
- European Agreement on Main Inland Waterways of International Importance (Evropská dohoda o hlavních vnitrozemských cestách mezinárodního významu – AGN), EHK/OSN 1996
- Memorandum o spolupráci na přípravě realizace Oderské vodní cesty na úseku Kožle – Ostrava ze dne 12. 4. 2000
- Smlouva o přistoupení k EU podepsaná dne 16. 4. 2003 včetně transevropské sítě vnitrozemských vodních cest na území ČR
- Resolution 1473–2005 – European Waterways: Focus on the Danube–Oder–Elbe Canal Project (Evropské vodní cesty – soustředění ponornosti na projekt průplavu Dunaj–Odra–Labe), Parlamentní shromáždění Rady Evropy 2005
- Dokument č. 11827 Parlamentního shromáždění Rady Evropy z 3. 2. 2009 – Doprava zkapalněného zemního plynu říčními a říčně-námořními plavidly jako účinný prostředek pro řešení současné plynové krize

Legal regulations and government decrees:

- The act: Zákon č. 66 ze dne 11. června 1901 o stavbě vodních drah a provedení úpravy řek
- The act: Zákon č. 50 ze dne 24. března 1931 o státním fondu pro splavnění řek, vybudování přístavů, výstavbu údolních přehrad a pro využití vodních sil, 1931
- The act: Zákon č. 114/1995 z 21. května 1995 o vnitrozemské plavbě
- The government decree: Usnesení vlády ČR ze dne 11. prosince 1996 č. 635 k financování programu podpory rozvoje vodní dopravy v České republice do roku 2005
- Rozhodnutí ministra dopravy a spojů ČR o zřízení Ředitelství vodních cest ČR ze dne 12. 3. 1998
- The government decree: Usnesení vlády ČR č. 741 ze dne 21. 7. 1999 – rozvoj dopravních sítí v ČR do roku 2010
- The public notice: Vyhláška Ministerstva dopravy, pošt a telekomunikácií Slovenskej republiky č. 22/2001 Z. z. z 20. prosince 2000 (vydaná jako doplněk Zákona č. 338/2000 Z. z. o vnútrozemskej plavbe)
- The government decree: Usnesení vlády ČR č. 337 ze dne 23. 3. 2005 ke zlepšení plavebních podmínek na dolním Labi
- The government decree: Usnesení vlády ČR č. 561 ze dne 17. 5. 2006 o Politice územního rozvoje ČR
- The government decree: Usnesení vlády ČR č. 49 ze dne 16. 1. 2008 – Prověření reálnosti a účelnosti územní ochrany D–O–L
- The government decree: Usnesení vlády ČR č. 929 ze dne 20. 7. 2009 – Politika územního rozvoje ČR 2008
- The government decree: Usnesení vlády ČR č. 368 ze dne 24. 5. 2010 k návrhu způsobu další územní ochrany koridoru průplavního spojení D–O–L
- The government decree: Usnesení vlády ČR č. 49 ze dne 19. 1. 2011 k prověření potřebnosti průplavního spojení D–O–L
- The government decree: Usnesení vlády ČR ze dne 14. března 2012 č. 155 ke Zprávě o stavu vnitrozemské vodní dopravy v České republice a možnostech jejího rozvoje

Further studies connected with the D–O–E

- The feasibility study served as a basis for the negotiations of the Work group of experts stablished following the negotiations between the Ministry of Transport of the Czech Republic and the Federal Ministry for Transport, Innovation and Technology of Austria (from the 4th April 2003 in Vienna), and also the Ministry of Transport, postal services and telecommunications of the Slovak Republic (from the 26th June 2003 in Bratislava). Both negotiations were led on the level of deputies of ministers.
- The South Moravian Region commissioned a study called “The Study of Connecting South Moravia to the Danube in the D Alternative. The study was finished in Novemeber 2006.

Authors of photographs:

Dick D’Arnaud, Patrick Amathien, Luděk Cidlina, Martin Čižmárik, Vladimír Holčík, Tomáš Kolařík, Jaroslav Kubec, Michal Málek, Libor Mařík, Ján Najšel, Jan Nárovec, Josef Podzimek, Petr Randák, Miroslav Raudenský, David Stein, Štefan Špic, Hans-Joachim Uhlemann, Jindřich Zídek.

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Drawings introducing the main chapters:

Lhoták Kamil *1912 †1990, an excellent Czech painter, graphic and illustrator. Originals were drawn by the author at the age of 7 to 8 (with the exception of the last one which was completed 60 years later).

Charts, schemes and technical drawings:

Schematic drawings of locks and boatlifts: ing. Jan Nárovec;
others: Rastislav Horváth.

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Autoři prvního vydání

Ing. Jaroslav Kubec, CSc.,

se narodil 9. 8. 1931 v Nymburce. Absolvoval Obchodní akademii v Kolíně a poté Fakultu inženýrského stavitelství ČVUT, kde již v průběhu studia pracoval jako asistent na Ústavu stavební geologie. Svou praxi zahájil na staveništích energetických vodních děl na Váhu, kde vykonával dozor při zakládání objektů v obtížných geologických podmínkách. Postupně však přešel do sféry projekce a přípravy investičních záměrů. V roce 1963 nastoupil do Výzkumného ústavu dopravního, kde působil téměř 30 let a stal se vedoucím oddělení vodní dopravy. V roce 1970 obhájil na Vysoké škole dopravní v Žilině kandidátskou disertační práci, zaměřenou na efektivnost investic ve vodní dopravě. Od roku 1993 pracuje jako samostatný konzultant a věnuje se hlavně studiím, jež se týkají koncepce etapové výstavby vodního koridoru D-O-L, možností zlepšení plavebních podmínek na Labi a dalších problémů, a to pro české i zahraniční zadavatele.

Své aktivity soustřeďoval především na rozvoj evropských vodních cest. Stal se členem, případně předsedou několika mezinárodních pracovních komisí při Evropské hospodářské komisi OSN (EHK/OSN) v Ženevě. To mu umožnilo, aby významnou měrou přispěl ke zpracování a vyhlášení klasifikace evropských vodních cest a k sestavení Evropské dohody o hlavních vnitrozemských vodních cestách mezinárodního významu (AGN), jejíž první koncept na žádost orgánů EHK/OSN připravil. Byl také členem pracovního týmu OSN pro studium řeky Sávy v bývalé Jugoslávii a výkonným ředitelem česko-rakouského Sdružení Dunaj–Odra–Labe. Aktivně se zúčastnil řady odborných konferencí nejen v ČR, ale i v Německu, Polsku, Maďarsku, Slovensku, Bulharsku, býv. Jugoslávii, Španělsku, Itálii, Rakousku, Venezuele, Číně a jinde. Uveřejnil více než 100 odborných prací v odborných českých i zahraničních časopisech či konferenčních sbornících a je spoluautorem knih Svět vodních cest (1988) a Vodní cesty světa (1994). Pro Fakultu provozu a ekonomiky dopravy a spojů Vysoké školy dopravní v Žilině zpracoval skripta „Vodní cesty a přístavy“. Další vysokoškolská skripta připravil pro Dopravní fakultu Jana Pernera pardubické univerzity. Na obou těchto fakultách byl pověřen přednáškami jako externista.

V posledních letech zpracoval téměř samostatně nebo zcela samostatně celou řadu technicko-ekonomických elaborátů z nichž nejdůležitější jsou: Vorschlag für eine voll schiffbare Wasserstraße Elbe zwisch Magdeburg und Ústí nad Labem, zadavatel Verein zur Förderung des Elbestromgebietes e. V., Hamburg, říjen 2000. Nejnovější je studie projektu výstavby vodního koridoru Dunaj–Odra–Labe (ve spolupráci s Ing. Josefem Podzimkem a Plavba a vodní cesty, o. p. s.), zadavatel Ministerstvo průmyslu a obchodu ČR, červen 2006.

Ing. Josef Podzimek

se narodil 28. 5. 1937 v Brně. Vystudoval Průmyslovou školu stavební a Fakultu inženýrského stavitelství – obor vodohospodářský. V průběhu studia pracoval jako asistent na katedře hydrauliky a hydrologie Stavební fakulty ČVUT. Po ukončení vysoké školy (1962) nastoupil do organizace Labe – Vltava v Praze jako úsekový technik na Středním Labi. Po vzniku podniků Povodí se stal v roce 1965 ředitelem závodu Dolní Vltava, po roce 1968 byl odvolán z funkce ředitele a pracoval až do roku 1990 jako vedoucí vodohospodářského a technického rozvoje Povodí Vltavy s. p. V roce 1989 byl spoluzakladatelem akciové společnosti Ekotrans Moravia. Tato společnost byla založena pro propagaci a postupnou realizaci vodní cesty Dunaj–Odra–Labe. Zde byl v letech 1990–1994 jejím generálním ředitelem.

V roce 1994 převzal v rámci restituce rodinnou stavební firmu v Třešti na Moravě. V nynější době je společníkem seskupení firem PODZIMEK, které operují v oblasti stavebnictví, strojírenství, dřevovýroby, obchodu a vodních cest na území České republiky (Podzimek a synové, s. r. o., Strojírny Podzimek, s. r. o., Dřevovýroba Podzimek, s. r. o., P&S, a. s., Vodní cesty, a. s., Podzimek reality, a. s. a Jindřišská věž s. r. o.).

Je autorem nebo spoluautorem celé řady patentů a autorských osvědčení ocelových konstrukcí a technologií v oblasti vodohospodářských staveb, malých vodních elektráren a speciálních plavidel.

V průběhu let se specializoval na odbornou literaturu a fotografie se zaměřením na vodní cesty. Fotografie a články Josefa Podzimka s vodohospodářskou tematikou byly pravidelně uveřejňovány v časopisech Vodní hospodářství (1971–1979 a 2014), Povodí Vltavy (1976–1981), ETM (1991–1992) a Vodní cesty a plavba (1993–2015).

Postupně napsal sám nebo se spoluautory následující publikace: Povodí Vltavy I., II., III. (1970, 1971, 1973), Dolní Labe (1976), Modernizujeme labsko-vltavskou vodní cestu I., II. (1975, 1976), Povodí Berounky (1980), Svět vodních cest (1988), Vodní cesty světa (1994).

V posledních letech vyšly tři publikace s jiným zaměřením: Praha stověžatá, věž Jindřišská, věž ve věži (2003), Pět generací stavařů – Život ve třech stoletích (2006) a Pět generací stavařů – Na přelomu tisíciletí (2011), které pojednávají o historii a současnosti nejstarší stavební firmy v České republice.

V roce 2008 obdržel z rukou prezidenta ČR Václava Klause státní vyznamenání Za zásluhy o stát v oblasti hospodářské.

Authors of the first edition

Jaroslav Kubec

Born August 9, 1931 in Nymburk, he studied at the Faculty of Civil Engineering CTU, while already working as a junior tutor at its Department of Construction Geology. His career started at the building sites of hydropower projects on the Váh, supervising foundation-engineering procedures in the most demanding geological conditions. Gradually he had moved to the field of design and preparation of the investment projects. For thirty years since 1963, he worked for the Transportation Research Institute, and became the head of its water transport department. In 1970, at the University of Transport in Žilina he successfully defended his dissertation thesis on investment efficiency of water transport. Since 1993, he has worked as an independent consultant and concentrates chiefly on studies concerning the stage realization of the D–O–E water corridor, navigability improvements on the Elbe, and other tasks for both domestic and foreign submitters. His activities focus mainly on development of European waterways; he has become a member or chair of several international working committees at the United Nations Economic Commission for Europe in Geneva, which has allowed him to contribute significantly to establishing of the European Waterway Classification and design of the Agreement on Main Inland Waterways of International Importance (AGN). He was on the UN research team of the Sava River, and an executive director to the Danube–Oder–Elbe Association. He has taken an active part in a number of professional conferences both in CR, as well as in Germany, Poland, Hungary, Slovakia, Bulgaria, former Yugoslavia, Spain, Italy, Austria, Venezuela, China etc. He has published over 100 professional studies in Czech and foreign magazines or conference proceedings. He has co-authored the Czech publications of World of Waterways (1988) and Waterways of the World (1994). For the Faculty of Operations and Economics of Transport of the University of Transport in Žilina he prepared the textbook Waterways and Ports and authored other university textbooks for the Faculty of Transport of the University of Pardubice. He has lectured externally at both the universities.

In recent years he wrote independently or with a select group of specialists the following papers and studies of note: Vorschlag für eine voll schiffbare Wasserstraße Elbe zwisch Magdeburg und Ústí nad Labem (client Verein zur Förderung des Elbestromgebietes e. V., Hamburg, October 2000). Most recently, he put together a study of the project of building the Danube–Oder–Elbe water corridor (together with Josef Podzimek and the Plavba a vodní cesty, o. p. s., company, client: the Ministry of Industry and Trade of the Czech Republic, June 2006).

Josef Podzimek

Born May 28, 1937 in Brno, he studied the water management at the Faculty of Civil Engineering. During his studies, he worked as a junior tutor at the Department of Hydraulics and Hydrology of the Faculty of Civil Engineering CTU in Prague. After graduation, he took a position of the Middle Elbe section engineer with the organization Labe–Vltava [Elbe–Vltava] in Prague. When the entities of Povodí [River Administrations] had been established, he was appointed the director of the Lower Vltava in 1965. After 1968, he was withdrawn from the position and worked as a water management and technical deve-lopment manager at Povodí Vltavy s.p. In 1989, he co-founded the joint-stock company Ekotrans Moravia, which was established to promote and carry out the project of the Danube–Oder–Elbe waterway. In 1990–1994, he led the company as its director general. In 1994, he took over the restituted family construction company in Třešť, Moravia. Currently he is a partner of Podzimek companies, which operate in fields of civil and machine engineering, woodworking, and trade in the Czech Republic (Podzimek a synové, s. r. o., Strojírny Podzimek, s. r. o., Dřevovýroba Podzimek, s. r. o., P&S, a. s., Vodní cesty, a. s., Podzimek reality, a. s. a Jindřišská věž s. r. o.). He holds or co-holds a number of patents and authorship certificates of steel constructions and technologies in the area of water management engineering, small hydropower stations, and speciality vessels. Josef Podzimek's photographs and articles on water management have regularly appeared in the magazines Vodní hospodářství [Water Management] (1971–1979 and 2014), Povodí Vltavy [The Vltava Basin] (1976–1981), ETM (1991–1992) and Vodní cesty a Plavba [Waterways and Navigation] (1993–2015). He has authored or co-authored the following publications in Czech: The Vltava Basin I, II, III (1970, 1971, 1973), The Lower Elbe (1976), Modernization of the Elbe–Vltava Waterway I, II (1975, 1976), The Berounka Basin (1980), World of Waterways (1988), and Waterways of the World (1994). In recent years, he published the following books on different topics: Praha stověžatá, věž Jindřišská, věž ve věži (Prague of 100 Spires, St Henry's Tower, Tower in Tower, 2003), Pět generací stavařů – Život ve třech stoletích (Five Generations of Builders – At the Turn of the Century, 2006), and Pět generací stavařů – Na přelomu tisíciletí (Five Generations of Builders – At the Turn of the Millennium, 2011). They cover the history and current state of affairs in the oldest construction company in the Czech Republic. In 2008, he was awarded the Medal of Merit (for notable economic achievements) by Václav Klaus, the President of the Czech Republic.

Více než stoletá vodocestná historie naší země

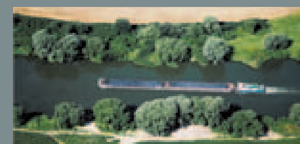
Počet nových nebo modernizovaných plavebních stupňů na vodním koridoru Dunaj–Odra–Labe a na Vltavě

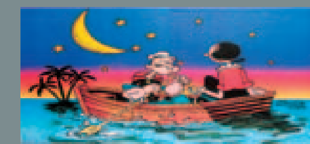
More than a hundred years long waterway history of our country

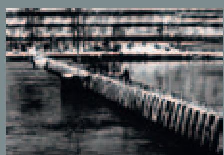
The number of new or modernized locks and dams in connection to the D–O–E water corridor and on the Vltava River

D–O–L / D–O–E 1900–2015





6
- 1907 – Vodní dílo Dolní Beřkovice na Labi
- 1909 – VD Štětí na Labi
- 1911 – VD Hadík na středním Labi
- 1912 – VD Roudnice nad Labem
- 1912 – VD Obříství na středním Labi
- 1914 – VD České Kopisty

16
- 1919 – VD Poděbrady na Labi
- 1924 – VD Nymburk na Labi
- 1925 – VD Kolín na Labi
- 1925 – VD Kroměříž na řece Moravě
- 1926 – VD Kostelec na Labi
- 1926 – VD Kostomlátky na Labi
- 1927 – VD Přelouč na Labi
- 1932 – VD Lobkovice na Labi
- 1936 – VD Střekov na Labi
- 1935 – VD Lysá nad Labem
- 1936 – VD Brandýs nad Labem
- 1937 – VD Čelákovice na Labi
- 1937 – VD Koblov na Odře
- 1937 – VD Srnojedy na Labi
- 1937 – VD Spytihněv na řece Moravě
- 1938 – VD Nedakonice na řece Moravě

2
- 1939 – VD Klavary na Labi
- 1944 – VD Hradištko na Labi

2
- 1947 – VD Velký Osek na Labi
- 1948 – VD Hodonín na řece Moravě

13
- 1963 – VD Ostrava – Přívoz na Odře
- 1966 – VD Bělov na řece Moravě
- 1966 – VD Lhotka na Odře
- 1969 – VD Pardubice na Labi
- 1970 – Modernizace VD Štětí nad Labem
- 1974 – Modernizace VD Dolní Beřk ovice na Labi
- 1975 – Modernizace VD Roudnice nad Labem
- 1976 – Modernizace VD České Kopisty na Labi
- 1977 – Modernizace VD Lovosice na Labi
- 1974 – Modernizace VD Obříství na Labi
- 1975 – VD Veletov na Labi
- 1975 – VD Týnec nad Labem
- 1978 – Výstavba VD Gabčíkovo na Dunaji

0

Počet nových nebo modernizovaných plavebních stupňů na vodním koridoru D–O–L / Number of new or modernized locks and dams on the D–O–E water corridor (0–16)

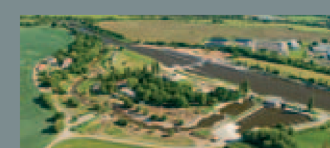
1900 | 1910 | 1918 | 1930 | 1938 | 1945 | 1948 | 1960 | 1968 | 1980 | 1989 | 1993 | 2000 | 2015

- Rakousko-Uhersko – *Monarchie / Monarchy* – Austria-Hungary
- Československá republika – *Demokracie / Democracy* – Czechoslovak Republic
- Protektorát Čechy a Morava – *Tisíciletá říše* – Protectorate of Bohemia and Moravia / *Thousand Years' Empire*
- ČSR – Czechoslovak Republic
- Československá republika – Czech Republic
- Československá socialistická republika – *Se Sovětským svazem na věčné časy a nikdy jinak / With the Soviet Union forever and ever* – Czechoslovak Socialist Republic
- ČSFR – Czech and Slovak Federal Republic
- Česká republika – *Demokracie / Democracy* – Czech Republic

Vltava 1899–2015





5
- 1899 – VD Klecany - Roztoky
- 1901 – VD Libčice - Dolánky
- 1902 – VD Troja - Podbaba
- 1905 – VD Vraňany - Hořín
- 1914 – VD Štvanice

6
- 1922 – VD Smíchov
- 1929 – VD Miřejovice
- 1932 – VD České Budějovice
- 1935 – Jez Hluboká nad Vltavou
- 1936 – VD Vrané nad Vltavou
- 1937 – VD České Budějovice II

1
- 1944 – VD Štěchovice

0

4
- 1955 – VD Slapy bez plavebního zařízení
- 1966 – VD Kamýk vč. PK
- 1968 – VD Orlík vč. malého lodního zdvihadla
- 1968 – Jez České Vrbné

6
- 1976 – Modernizace VD Praha - Štvanice
- 1978 – Modernizace VD Praha - Troja
- 1978 – Modernizace VD Klecany - Roztoky
- 1978 – Modernizace VD Vraňany
- 1984 – VD Praha - Modřany
- 1988 – Modernizace VD Libčice - Dolánky

6
- 1991 – VD Kořensko vč. PK
- 1991 – Hněvkovice – přehrada
- 2011 – Modernizace jezu + PK České Vrbné
- 2011 – PK Hněvkovice – přehrada
- 2012 – PK Hluboká nad Vltavou
- 2015 – PK Hněvkovice – jez

Počet nových nebo modernizovaných plavebních stupňů na Vltavě / Number of new or modernized locks and dams on the Vltava River (0–6)

1899 | 1910 | 1918 | 1930 | 1938 | 1945 | 1948 | 1960 | 1968 | 1980 | 1989 | 1993 | 2000 | 2015

- Rakousko-Uhersko – *Monarchie / Monarchy* – Austria-Hungary
- Československá republika – *Demokracie / Democracy* – Czechoslovak Republic
- Protektorát Čechy a Morava – *Tisíciletá říše* – Protectorate of Bohemia and Moravia / *Thousand Years' Empire*
- ČSR – Czechoslovak Republic
- Československá republika – Czech Republic
- Československá socialistická republika – *Se Sovětským svazem na věčné časy a nikdy jinak / With the Soviet Union forever and ever* – Czechoslovak Socialist Republic
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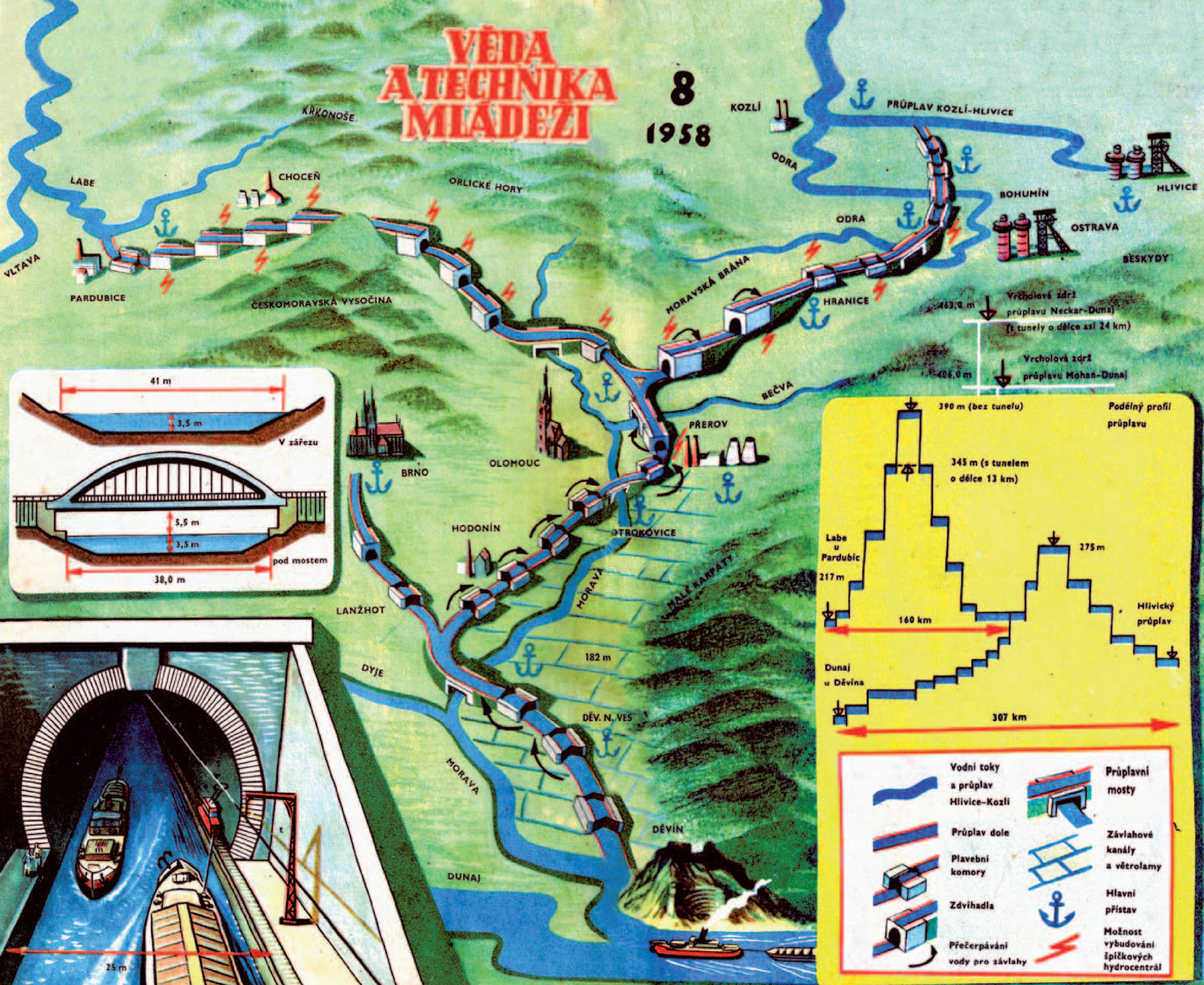

VĚDA
A TECHNIKA
MLÁDEŽI
8
1958
KRKONOŠE
LABE
VLTAVA
CHOCEŇ
PARDUBICE
ORLICKÉ HORY
ČESKOMORAVSKÁ VYSOČINA
KOZLÍ
PRŮPLAV KOZLÍ-HLIVICE
ODRA
HLIVICE
BOHUMÍN
OSTRAVA
BESKYDY
MORAVSKÁ BRÁNA
HRANICE
463,0 m
Vrcholová zdrž
průplavu Neckar-Dunaj
(s tunely o délce asi 24 km)
406,0 m
Vrcholová zdrž
průplavu Mohan-Dunaj
BEČVA
PŘEROV
OLOMOUC
BRNO
HODONÍN
OTROKOVICE
MORAVA
MALÉ KARPATY
LANŽHOT
182 m
DYJE
DĚV. N. VES
DĚVÍN
DUNAJ
41 m
3,5 m
V zářezu
5,5 m
3,5 m
pod mostem
38,0 m
25 m
Podélný profil
průplavu
390 m (bez tunelu)
345 m (s tunelem
o délce 13 km)
Labe
u
Pardubic
217 m
275 m
Hlivický
průplav
160 km
Dunaj
u Děvína
307 km
Vodní toky
a průplav
Hlivice-Kozlí
Průplavní
mosty
Průplav dole
Závlahové
kanály
a větrolamy
Plavební
komory
Hlavní
přístav
Zdvihadla
Možnost
vybudování
špičkových
hydrocentrál
Přečerpávání
vody pro závlahy

MEETING OF THREE SEAS

WATER CORRIDOR DANUBE–ODER–ELBE

KŘIŽOVATKA TŘÍ MOŘÍ

VODNÍ KORIDOR DUNAJ–ODRA–LABE

Josef Podzimek and team

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