



Danube Facts and Figures

The Czech Republic

(July 2007)

General Overview

The Czech Republic is situated at the roof of Europe, and its waters are drained through rivers into three different seas. The major part of the territory is drained by the Elbe and Oder Rivers to the North and Baltic Seas. The Morava River drains 21,688 km² to the Danube River – almost 28 % of the Czech territory and 2.9 % of the Danube River Basin. Approximately 2.8 million inhabitants – around 3.46 % of the population in the Danube River Basin – live in this area.

The Czech Republic signed and ratified the Danube River Protection Convention in 1995.

Topography

The Czech Republic is largely a highland country formed in the northwest by the Bohemian Massif, in the east by a bend of the Beskyds and Carpathian Mountains and in the south by plateaus and the Pannonian Plain. Approximately 7 % of the Morava River Basin is formed by mountains, 35% by highlands, 51% by plains, plateaus and valleys, and lowlands cover 7% of the area.

The gradient of the upstream section of the Morava River is approximately 4 ‰, in the middle section around 0.2 ‰ and about 0.1‰ in the downstream reach.

Precipitation, climate and water flow

The average annual precipitation in the Czech part of the Morava River Basin is 635 mm, while in the mountainous areas it is higher – up to 1,200 mm per year. The climate of the Morava River Basin is continental, with the lowest temperatures occurring in January and the highest in July.

The average water flow in the Morava River above the confluence with its largest tributary - the Dyje River - is 65.0m³.s⁻¹; average flow below the confluence is 108.5 m³.s⁻¹. The average uninfluenced 100-year flow in the Morava River upstream from the confluence with the Dyje River is 792 m³.s⁻¹, while in the Dyje River upstream confluence with Morava it is 897 m³.s⁻¹.

Land use and settlements

The Morava River Basin in the Czech Republic has a high population density, 137 inhabitants per square kilometre, and land use is considerably determined by its topographical conditions. Agricultural land covers about 60 % of the area, forests 32 % and urbanised areas 1.5 %. Major cities in the area are the industrial and

trade fair town of Brno (390,000 inhabitants) and the historical town of Olomouc (160,000 inhabitants), both roughly situated in the central part of the basin on the confluence of rivers. Other important settlements are found near the Morava River (Sumperk, Kromeriz, Prostějov, Přerov, Otrokovice, Zlín, Uherské Hradiště, Hodonín), or along the lower run of the Dyje River (Znojmo, Breclav).

Selected natural highlights on rivers and lakes

The Morava River floodplain forms part of the ECONET European bio-corridor. Corridors in the floodplains along the Dyje and Jihlava Rivers and along the Svatka River upstream from Brno and the Trebuvka River valley also have a cross-regional character.

The most important protected area in the Czech part of the basin is the bilateral *Podyji-Thayatal National Park*. It represents an exceptionally well-preserved pattern of river valley countryside in the upland part of Europe. Together with the Austrian part they form a unique bilateral area of European importance. Though it is the smallest national park in the Czech Republic, the Dyje canyon creates a unique river phenomenon with deep meanders and high diversity of animal and plant species, including 18 kinds of orchids.

The national nature reserve *Lednické rybníky*, belonging to the oldest pond systems in the Morava Basin, is preserved as a bird sanctuary and is an important transboundary wetland. In the first half of the 19th century the pond banks (together with other arrangements) were altered, giving birth to the unique countryside park. This area of five large ponds, preserved since 1953 as breeding grounds, also serves as landing and crossroads areas for water birds in their yearly flights.

The protected landscape area *Litovelské Pomoraví*, situated in the upper part of the Morava River run, is an important preserved area of the river basin. Meanders created by the Morava River generate the typical nature of the countryside, where the mosaic of ecosystems of rivers, meanders, periodical pools, wetlands, fans, grass communities and different types of alluvial forests form a unique structure of an alluvial plain.

Human uses of water and water bodies

▪ Flood and torrent management, landslides

Issues of erosion and flooding over the past one hundred years have mostly affected local areas with little transboundary effect. These conditions and impacts have been significantly changed after severe flood events in 1997 and 2002, and flood protection now plays an important role in risk management. An area of about 1,000 km² is exposed to the hazard of 100-year floods in the Morava River Basin. More than 181,000 people in 625 municipalities live in this area, representing about 6.5 % of inhabitants living in the basin.

▪ Use of hydroelectric power

Due to the prevailing low gradient and flow in rivers, the Czech Republic has a low hydro energy potential and therefore only about 4% of energy production is generated by hydro-power plants. There are two larger pumped storage hydro-power plants in the Morava River Basin (Dlouhé Stráně, Dalešice) and about 25 constant load hydro-power plants. Energy production potential is exhausted in this area; its further development requires investment into more efficient technologies.

▪ Navigation

Waterways in the Morava River Basin do not meet the requirements for international navigation in the Danube River Basin. There are only small navigation activities in the area of the Brno and Vranov Reservoirs and the Bata Channel along the Morava River intended for recreational purposes.

▪ Rivers as receiving waters for effluents

Due to the highly developed industry and agriculture in the Czech part of the Morava River basin, rivers in the region serve as recipients of both urban and industrial waste water effluents. They also transport diffuse pollution loads, containing organic matters and nutrients originating chiefly in agriculture. Together with low flows in rivers, this poses higher requirements on the quality of discharged waste water, and the whole basin has been declared as a sensitive area.

▪ Use of groundwater bodies: drinking water supply

Due to the geological structure, the groundwater capacity of the Morava River Basin is low and the water-bearing Quaternary Sediments cover only a small part of the territory along the main watercourses. Approximately 90 % of groundwater is used for drinking water supplies. About 78 % of the total groundwater reserves have already been utilised and for their protection, 36% of the Morava River Basin has been designated a vulnerable area.

Pressures on surface and groundwater bodies

▪ Sewerage and organic pollution

Most of the organic pollution is discharged from municipalities. In the Czech part of the Danube River Basin there are about 1,800 municipalities and approximately 79 % of inhabitants are connected to wastewater treatment plants. All municipalities with a wastewater treatment plant capacity of more than 5,000 population equivalents have been equipped with effective reduction of organic pollution. Municipal sources account for almost 87 % of 1,002 registered sources of organic pollution. As the Czech Republic has undertaken obligations to meet the EU Urban Wastewater Treatment Directive by the end of 2010, measures aimed at improving the efficiency of wastewater treatment plants are underway.

▪ **Nutrient discharge**

i) *Point source discharges*: Present attention is focused on implementing the EU Urban Wastewater Treatment Directive. The scheduled intensification of wastewater treatment plants with a capacity of more than ten thousand population equivalents have been almost realised, and some plants are already in trial operation processes. In recent years, efforts were concentrated on agglomerations with a capacity of more than two thousand population equivalents. Reconstruction or completion of collection systems has begun in many agglomerations. Emissions estimated from registered point sources represent 2.7 kt/y of inorganic nitrogen and 0.3 kt/y of total phosphorus and is continuing to decrease slightly. Problems caused by the wide use of phosphate detergents were addressed by the Detergent Regulation, which specified two deadlines in 2006. According to expert estimates, the percentage of phosphorus discharged into surface waters could be reduced by 12-15 % in comparison with 2007.

ii) *Diffuse discharges*: Agriculture is the biggest source of nutrients and contributes more than 65 % of the total load of nitrogen emissions into surface waters. Agriculture also contributes 30 % of the total rate for phosphorus. Several important measures have been implemented to improve the situation: rehabilitating watercourses, increasing protection of existing waters and wetlands and ending unfavourable agricultural practices.

▪ **Priority substances**

Among other requirements, the new legal obligation set emission standards for industrial wastewater discharges based on the recommendations of best available techniques. In the basin there are approximately 300 industrial units registered as discharging into surface waters, about 100 of these handle priority substances. Heavy metals from engineering industrial plants are the most significant pollution concerns. A list of dangerous chemical pollutants prohibited on the market or with limited use in the Czech Republic is defined by updated legislative tools. The actual occurrence and discharge of priority pollutants is currently monitored.

Impacts on surface and groundwater bodies

▪ **Impacts from organic pollution, nutrients and hazardous substances (based on the Year 2004 National Analysis for Water Framework Directive implementation).**

i) *Surface water bodies*: 301 water bodies identified in the Morava River basin in categories of rivers and lakes were assessed ecologically and chemically. A summary of the assessment results are given in the following table:

Assessment		At risk	Possibly at risk	Without risk
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**Danube Facts and Figures:
Czech Republic**

according to				
Ecological status	Nb.	59	205	37
	%	20	68	12
Chemical status	Nb.	59	137	105
	%	20	46	34
Total assessment	Nb.	92	173	36
	%	31	57	12

ii) *Groundwater bodies*: In the Danube River Basin in the Czech Republic, 40 groundwater bodies have been identified. Of these, 21 are considered 'at risk' and 19 'not at risk'. Quantitative status is the reason for 'at risk' status in 7 % of the area, chemical status in 14 % and assessment as 'not at risk' in 82 % of the area. Point sources of pollution account for 51% of the stresses, diffuse sources of pollution for 31% and 18 % of the stresses is from their combination or other pollution sources. Priority pollutants cause 24 % of risk assessment, nutrients 38 % and the rest by point sources of pollution.

- Impacts from hydro-morphological alterations (based on the *Year 2004 National Analysis for Water Framework Directive implementation, including the initial classification of heavily modified water bodies*).

The most significant activities which may cause morphological alternation have been identified: significant flow regulations; hydropower generation; water abstraction for urban, industrial and agricultural uses and flood defence measures. The impacts of morphological alternation to water bodies, especially including the straightening of rivers, backwaters and diagonal obstacles (there are 2,153 over 1m), are significant. Almost 50 % of the length of significant rivers has been regulated; the largest continuous regulation is located in the middle stretch of the Morava River.

- Other anthropogenic pressures

Past uranium mining activities in the Dolni Rozinka region are a potential pressure in groundwater quality assessment in the Morava River Basin.

Web-links:

www.env.cz

www.vuv.cz