Danube Facts and Figures

The Slovak Republic

(March 2007)

General Overview

The Slovak Republic is located in Central Europe and shares borders with Austria, the Czech Republic, Hungary, Poland and Ukraine. The country covers 49,034km^2 and nearly all of this area – 47,084km^2 or 96% of the country – lies in the Danube River Basin.

Slovakia has been a signatory state to the Danube River Protection Convention since 1994, and has been a Party to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes since 1999. The Slovak Republic joined the European Union in 2004.

Topography

A major part of the Slovak territory is located in the Carpathian Mountains, but almost one quarter of the country is formed by lowlands. The Vienna Basin extends into Slovakia from the west, the Pannonian Plain from the southwest and the Great Danubian Basin from the southeast. These lowlands form part of the ecological region known as the Hungarian Lowlands.

Precipitation, climate and water flow

The climate of Slovakia is influenced by its location in a temperate zone. There are several types of climate regions within the country – from cold mountain (along the upper Váh River) to warm dry regions with moderate winters and more sunlight in the south. The long-term average temperature varies from 0-10 degrees, according to the region. The long-term average annual precipitation ranges from 2,000mm.y^{-1} along the upper Váh River to 500 mm.y^{-1} in the south along the Bodrog and Danube Rivers.

Water management in Slovakia is determined by its geographic position on the watershed divide between the Black Sea and the Baltic Sea, along with other natural conditions. The Danube and its tributaries drain 96% of the Slovak territory to the Black Sea. The remaining 4% of waters are drained by the Vistula River tributaries to the Baltic Sea.

Streams rising in Slovakia have relatively unstable discharges. High discharges occur periodically in spring months from March to April; with low discharges in summer and autumn. Slovakia's borders overlap several hydrologic areas, giving rise to problems of assessing water flow in and out of the country. Several rivers

with high water-bearing capacity have an eccentric influence on the country, especially the Danube River flowing from Austria, the Tisza River flowing from Ukraine and the Morava River flowing from the Czech Republic. The average discharge of Slovak Rivers is 3,328 $m^3.s^{-1}$, of which only 398 $m^3.s^{-1}$ (12 %) rise in the country.

Five sub-basins of the Danube River Basin are found in Slovakia:

Danube – The sub-basin covers 3,440km^2, and the main rivers here are the Danube and Morava Rivers. The average discharge of the Danube River at Bratislava is 2,044 $m^3.s^{-1}$.

Váh – The total area of the sub-basin is 18,769km^2, and the river system is characterised by long, relatively narrow valleys. The average discharge of the Váh River at its mouth is 195.8 $m^3.s^{-1}$, including the Nitra and Malý Dunaj Rivers.
The Malý Dunaj River is a former natural branch of the Danube River.

Hron – The total area of the sub-basin is about 12,331km^2 and the major rivers are the Hron, Ipel', Slaná and Rimava Rivers.

Bodrog – The catchment area of the Bodrog River covers 7,272km^2. The Bodrog River is formed by the confluence of the Latorica and Ondava Rivers at 100 metres above sea-level and crosses the Slovak border at an elevation of 94 metres above sea-level. The major tributaries to the Latorica and Ondava are the Topl'a, Laborec and Uh Rivers.
The Uh River rises in Ukraine and runs only 20km in Slovakia. A certain part of the Uh Basin is situated in Slovakia and is drained by waters into Ukraine. A unique hydrologic situation exists in this river basin, as diverged water returns by way of the Uh River to Slovakia.

Hornád – The catchment area of the sub-basin covers 5,272km^2, and the major waters of the catchment area are the Hornád, Bodva and Torysa Rivers.

Land use and settlements

The prevailing land use in the Danube River Basin District of the Slovak Republic is agriculture, at 23,563 km2 or 50%, and forests at 20,501km^2 or 43%. Marshlands and peat bogs cover approximately 43 km2, rivers and lakes around 280km^2 and urbanised areas cover 2,642km^2. Some 2,825 settlements are situated in the Slovak share of the Danube River Basin District with over 5 million inhabitants. The capital Bratislava is located on the banks of the Danube River close to the border with Austria and has around 500,000 inhabitants.

Selected natural highlights on rivers and lakes

The Slovak part of Danube River Basin District contains many national parks and natural protected areas as well as Natura 2000 sites, designated under the Habitats Directive and Birds Directive. Larger wetlands of international importance under the Ramsar Convention are described below:

The Danube Floodplains are located in the southwest along a 76km-long stretch of the Danube River from Bratislava to Klizská Nema. It includes a well-developed branch system, oxbow lakes, sand and gravel banks, floodplains, floodplain forests, swamps and lowland meadows.

The Morava Floodplains lie along the Morava River between Brodské and its confluence with the Danube. This valuable floodplain area near the Czech and Austrian borders includes a developed complex of diverse wetlands – streams, canals, river branches, swamps, seasonal pools, wet grasslands and forests. Most of the site is included in the Záhorie Protected Landscape area and other parts have been designated as nature reserves.

The Latorica Floodplain area is located in the southern part of the east Slovak Lowland, from the Ukrainian border to the river's confluence with the Laborec River in the Latorica Protected Landscape Area. It is characterised by a well-developed system of branches and seasonally inundated habitats with adjacent floodplain forests and grasslands. Threatened and rare aquatic and swamp species of lowland, flooded habitats are represented. Several nature reserves are included in the site.

A 6km stretch of the **Tisza River** in the southeast corner of Slovakia is shared with Hungary and Ukraine. Parts of the floodplain are permanently and seasonally flooded, and the site has fragments of floodplain forests and shrubs, an oxbow lake and grasslands. It is part of a planned multi-lateral Ramsar site in the Upper Tisza River Basin. The site contains rare examples of natural and near-natural wetland types found within the Pannonian biogeographic region.

Human uses of water and water bodies

- Flood and torrent management, landslides

For larger Slovak rivers, floods are typically the result of snow melting in the spring from March to April or from heavy long-term rains in the summer months of July and August. Floods on smaller rivers are caused by heavy short-term rainfall (flash floods) and develop rapidly.

In urban areas, most of the larger rivers are modified for flood protection. On larger rivers with catchments above 1,000km^2, the most radical regulations are seen on the Uh and Latorica Rivers and on the Morava, which is 100% regulated. Rivers with the most natural status are the Topl'a, Laborec, which has only 25% of canal regulation. The Hron and the Hornád are 30% regulated, the Ondava River is 44% regulated, and the Váh, Ipel' and Nitra Rivers between 60-80% of their length.

- Use of hydroelectric power

Hydropower plants provide almost 30% of the present energy production in Slovakia. The Váh River and its tributary the Orava River are primarily used for hydropower. The Váh River Cascade is composed of waterworks built on the river,

with hydropower plants built under waterworks or on the diversion canals. Only two hydropower plants are used for peak hydropower generation – the Liptovská Mara plant with compensating Bešenová reservoir and the Orava plant with the Tvrdošin reservoir.

The hydropower potential of other rivers is also used for energy production, including the Danube River – the Gabcikovo dam together with the hydropower plant built on the diversion canal, the Hornád River with the Palcmanská Maša River and the Ružín hydropower plant with compensating Malá Lodina reservoir, and the Ondava River (in the Bodrog sub-basin) with the Velká Domaša hydropower plant and compensating Malá Domaša reservoir.
Water for cooling purposes is used in the Vojany thermal power plant (Laborec as water source) and two nuclear power plants: Jaslovske Bohunice (with water from the Váh River) and Mochovce (with water abstracted from the Hron River).

- Navigation

In the Slovak Republic the Danube River is the only important international waterway. Navigation of regional importance is occasionally operated on the Bodrog River.

- Rivers as receiving waters for effluents

Rivers in the Slovak Republic receive insufficiently treated wastewater from agglomerations, industry and agriculture. Smaller waters are often influenced by diffuse pollution from households in settlements which are not provided with public sewerage system.

- Use of groundwater bodies: drinking water supply

In the Danube River Basin district, 96 groundwater bodies have been identified, including: 15 groundwater bodies in significant Quaternary alluvial sediments, 56 groundwater bodies in prequternary rocks, 25 geothermal groundwater bodies which present groundwater with temperatures above 14 degrees (not used for drinking water production). Of all groundwater bodies, seven were identified as transboundary groundwater bodies – six on the border with Hungary and one on the border with the Czech Republic.

Around 80% of groundwater abstractions are used for drinking water, 17% for industry and around 3% for agricultural purposes. There are 2,479 significant groundwater abstractions in the RBD. The percentage of groundwater bodies at risk in the RBD as a result of groundwater abstractions is 8%. The total volume abstracted in the RBD from significant groundwater abstractions is 403,570 thousands of m^3 per year.

- Use of surface water bodies: drinking water supply

In the Danube RBD 1,659 surface water bodies were identified as rivers, and 23 as lakes (all constructed reservoirs).

Around 10 % of all abstracted surface water is used for drinking water; the majority of abstracted water is used for industry (85%) and the rest (5%) for agriculture. The drinking water supply is ensured mostly through reservoirs and not from rivers.
There are 55 abstraction points from surface waters, with 639,048 thousands m^3 per year abstracted from the river basin district.

Pressures on surface and groundwater bodies

There are 217 significant point pollution sources in the Danube River Basin District. Of these, 129 are effluents from agglomerations, 82 are industrial effluents and 6 effluents are from agriculture.

It is not possible to estimate an exact figure of the total number of significant diffuse pollution sources in the Danube River Basin District. It is only possible to express diffuse pressures as total area used for agricultural purposes or number of agricultural used cadastres, as total urban area, as total number of municipalities non-connected to the sewerage system or individual treatment system.

- Sewerage and organic pollution

Organic loading from point pollution sources is a significant point source pollutant within the Danube RBD. Sources of such pollutant are effluents from insufficiently treated or untreated wastewater. The total amount of discharged organic pollution into surface waters of the Danube River Basin District from significant identified sources is around 17ktons of BOD and around 54ktons of COD in 2002.

Organic loading from diffuse pollution sources is a significant pollutant within the RBD as well, but it is not possible to quantify it, as mentioned above. Mostly it is caused by soil erosion (agriculture, changes in land use) and by pollution from municipalities not connected to the sewerage or individual treatment system. In 2005 only 57.1% of the population was connected to public sewerage system.

- Nutrient discharge

Significant nitrogen and phosphorus pollution comes from point sources within the Danube River Basin District, mainly from agglomerations. Around 7ktons per year of nitrogen and 1kton per year of phosphorus are emitted into the surface water from significant point sources of pollution.

Emissions from diffuse sources of pollution are possible to quantify with models. Diffuse pollution depends on anthropogenous factors such as land use (urban area, agricultural land and forests) and on land use intensity (including the application of mineral and organic fertilisers). Land use intensity is the major indicator of diffuse pollution and depends on settlement density. Other factors which impact diffuse pollution are climate, discharge regime, soil attributes, retention capacity or losses. The estimation of nutrient loads from the Slovak part of the Danube River Basin District was carried out using results from the MONERIS model. The total amount of this type of pollution is around 39ktons of nitrogen per year (the main pathway in Slovakia is groundwater) and around 3ktons of phosphorus per year (the main source is erosion).

- Priority substances

Pollution caused by hazardous substances comes primarily from industrial and communal wastewater. Other sources include diffuse sources of pollution from herbicides and pesticides in agriculture. Approximately 1.56kg/ha of herbicides and pesticides are used (average of 1993-2002).

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).

Of the 1659 surface water bodies identified in the Slovak part of the Danube River Basin District, 817 were classified as 'at risk' of failing to reach 'good ecological status' by the year 2015, 505 were classified as 'possibly at risk' and 343 were 'not at risk'.

All 23 water bodies identified as lakes are heavily modified water bodies. The status of these water bodies were not assessed due to the absence of data and criteria for ecological potential.

Of the 96 groundwater bodies identified in the Slovak part of the Danube River Basin District, 7 are considered 'at risk' of failing to reach 'good chemical status' due to point source pollution and 16 due to diffuse pollution.

Due to groundwater abstractions, nine groundwater bodies are 'at risk' of failing to reach 'good quantitative status', however within geothermal bodies, none are at risk of failing.

- 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).

A total of 2,372 significant hydromorphological interventions were identified, comprising: tubed stretches, straightening, backwater level, combined assessment, change of cross-section and weirs and drops. Of the 1659 rivers, 18 were identified as heavily modified, 788 as provisionally heavily modified, and 59 as artificial water bodies. All 23 lake water bodies were identified as heavily modified.

Due to these hydromorphological alterations, 806 water bodies were identified as 'at risk' of failing to reach good ecological status and 387 were identified as 'possibly at risk'.

Web-links:

www.enviro.gov.sk
www.vuvh.sk
www.shmu.sk
www.sazp.sk
www.sopsr.sk