Danube Facts and Figures

HUNGARY

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General Overview

Landlocked Hungary is situated within the heart of the Danube Basin. The entire territory (93,030km^2) contributes to the Basin. Rivers enter the country from the west, north and east and drain towards the south. Almost one fifth of the 10.2 million inhabitants live in the capital Budapest - *the City of Spas* – which is beautifully situated on the Danube. Lake Balaton in the west, the largest lake of the Danube Basin, is a key recreational area for Central and Eastern Europe. Hungary became a Signatory Party to the Danube River Protection Convention (DRPC) in 1994 and joined the EU in 2004.

Topography

Hungary is situated in the lowest part of the Carpathian Basin, most of which comprises lowland plains. 84% of the country lies below 200m asl; only 2% is above 400m and mountain ranges reach 1015m in the north. Floodplains cover nearly 25% of the territory. The Hungarian Danube traverses 417km. It forms the border with Slovakia in the NW and then flows south. The Tisza, a major Danube tributary, flows 595km down the eastern part of Hungary. The gradient of the major rivers is low, typically 7-8cm/km for the Danube; 2-5 cm/km for the Tisza.

Precipitation, climate and water flow

Hungary has a moderate climate with strong continental influence. It is located at the "meeting point" of weather fronts which vary widely in direction and type. Seasons are usually well defined, with July and August the hottest months (28-30°C) and December and January the coldest (down to –15). Annual precipitation is 600mm with ranges of 300-1200mm (decreasing over the last century).

Hungary's borders are crossed by 24 incoming rivers, bringing 114km^3 of water per year. The three major rivers, the Danube, Tisza and Dráva, leave the country discharging an annual average of 120km^3 water. As evapotranspiration rates (500-600mm/year) often equal or surpass annual precipitation, Hungary is very dependent on upstream countries for water (dependency ratio is c. 95%; internal resources are <600 m^3/inhabitant/year). From the viewpoint of hydrology and climate, the country can be divided in two: (i) the area to the west of the Danube and (ii) a larger area to the east which forms part of the Tisza catchment.

Land use and settlements

The majority of Hungary's terrain (62% - 5.8 million ha) is used for agricultural activities and comprises a fertile plain. Forests cover 19% of the country. Of the 3200 settlements, the major cities are Budapest (1.8 million inhabitants; greater metropolitan area: 2.5 million), Győr (127,000 inhabitants), Miskolc (172,000) Debrecen (203,000) Szeged (158,000) and Pécs (157,000).

Natural highlights

The Danube-Dráva National Park provides international protection for 500km^2 of Danube and Dráva riverine habitat. Set up in 1996, it contains a unique 28,000ha wetland, one of few remaining natural Danube floodplains. It is home to diverse waterfowl and supports an outstandingly rich fauna and flora including most wetland plants found in Hungary, as well as soft and hardwood gallery forests. Residents have adapted farming methods to live in greater harmony with the area.

The Szigetköz Landscape Protected Area (NW Hungary), part of the Fertő-Hanság National Park and a Natura 2000 site, comprises a diverse floodplain wetland of branching streams and old oxbows. Located on the southern part of Fertő Lake (Neusiedler See)-Hanság and Répce stream, the area is significant for: gallery forests; wet meadows supporting special plants and invertebrates; nesting colonies of water birds and threatened fish species. Other important areas include the Moson-Danube and the wetland areas between it and the Old Danube.

Lake Balaton, the largest lake in the Danube Basin (605km^2 surface area), is located in Transdanubia, west Hungary. 77km long, with a 235km shoreline and an average depth of 3.5m, it contains 2 million m^3 of water with a catchment of 5775km^2. The area, known in Europe for its smooth water, soft sandy beaches, fish delicacies and the captivating beauty of surrounding hills, contains the Balaton Upland National Park (950,000ha - 10% has official protection).

Human uses of water resources

Public water utilities supply 560 million m^3 of drinking water per year. 99.4% of the population is connected to the water supply and 61% to wastewater collection. A further 9% live in areas served by wastewater collection but are not yet connected to the system. 240 million m^3 are provided for economic and general public use. (Average leakage rate is 19%). Annual industrial and agricultural water abstraction accounts for c. 5000 million m^3 and 680 million m^3 respectively. By far the largest industrial user is electric power generation (95.5% - due to the need for large quantities of cooling water for power stations). Data on on-site water use by hydro-electric plants is not included. The next biggest users are the food (1.8%) and chemical industries (1.2%). 68% of agricultural abstraction is for fishponds, with a further 27% for irrigation. Hungary is rich in thermal water resources, with c. 400 public baths, of which 36 are therapeutic facilities.

- <u>Flood and high discharge management</u>

With close to 25% of the country comprising floodplains, most of the rivers having a very dynamic water regime and 25% of the population living in reclaimed floodplains, flooding is a major issue. 21,712km^2 of Hungary's floodplains are below the rivers' flood level. This area includes 1.8 million ha arable land, 32% of the railway network, 15% of the road network and more than 2000 industrial plants. The highest flood discharge in the Danube is 20 times higher than low flow. In smaller rivers, such as those of the Körös system, this ratio is several hundred to one and floods can develop in a few hours. On larger rivers, they can last several months. Devastating, fast-rising ice-jam floods are especially dangerous.

Flood control efforts over past centuries have resulted in the construction of 4181km of defences (consisting mainly of earthen embankments). Ten lowland emergency flood reservoirs, of 360 million m^3 total volume, relieve flood load on the levees and protect 97% of the floodplains.

- Use of hydroelectric power

Due to the low gradient of rivers, Hungary does not have significant hydroelectric potential, with c. 1% of energy production generated by hydropower (data for 2002: 194,440MWh, 0.6 % of the total). Utilisation requires high investment. Two relatively large plants exist on the Tisza: Kisköre (30MW) and Tiszalök (11.5MW).

- Navigation

More than 1600km of Hungarian waterways are navigable (250km of which can be used only occasionally). The two most important waterways are the Danube and the Tisza, with the Dráva providing an important route for inland shipping. Cargo transportation use is very small, currently c. 8-10% on the Danube and only 1-2% on the Tisza. The Danube is part of the VII European Transport Corridor. Although Hungary has a relatively good natural waterway network, inside the country there is no connection between the two main rivers. This is a major obstacle to better incorporating inland waterway shipping into the national transport economy. Since neither the Danube nor the Tisza is fully regulated in Hungary, the water regime depends highly on the flow regime, which in turn has a major impact on the efficiency of shipping transport. Passenger shipping carries c. 7.5 million passengers per year; 60+% of which are transported by ferries.

- Rivers as receiving waters for effluents

Rivers are the major recipients of both municipal and industrial wastewater. Point source load is mainly from urban discharges (80-95% depending on pollutant). Diffuse pollution also reaches rivers (see pressures and impacts section below).

- Use of groundwater bodies: drinking water supply

Groundwaters are distributed across Hungary and put to various uses. The vast majority of waterworks are reliant on groundwater and 90+% of the population is supplied in this way (confined and karst aquifers, bank filtered water). Pollution has made phreatic groundwater near the surface unfit for drinking water. Some deep aquifers contain natural contaminants (such as explosive gases, harmful minerals e.g. arsenic, iron or manganese in high concentrations) but the overwhelming majority can be used without significant treatment. Protection against anthropogenic hazards is a priority for water resource management.

Pressures and impacts on water bodies

Water bodies classified[1] as being "at risk" from human pressures are outlined below (by source). 876 bodies have been identified along natural watercourses in Hungary and classified into 25 types according to abiotic (non-living) factors[2].150 artificial water bodies are also listed, which, like their heavily modified peers, have the objective of "good ecological potential" (under the EU Water Framework Directive). The list of lakes includes 100 natural and 124 artificial ones; wetlands in excess of 50ha are also classified.

Organic and nutrient loads from point/diffuse sources are as follows (in 1000 t/year); total nitrogen: 24.8/20.0; total phosphorus: 3.9/3.0; BOD_5 (Biochemical Oxygen Demand): 60.0/3.2; COD (Chemical Oxygen Demand): 12.3/20.5.

- Impacts on Danube fluvial and groundwater resources from organic pollution, nutrients and hazardous substances (based on the 2004 National Analysis for EU Water Framework Directive)[3].

i) Freshwater bodies: 579 surface water bodies are classified as being "at risk" from organic and/or nutrient and/or defined priority (hazardous) substances:

Pollution Sources at "At Risk" sites	Number of sites		
	Organic pollution	Nutrient pollution	Priority (hazardous) substances
Point source	46	130	26
Diffuse source	23	201	170
Foreign origin	5	3	5
More than one source	-	136	-
Total	74	470	201

Approximately 70% of artificial lakes (mainly fishponds) are "at risk" from organic and nutrient loads.

ii) Groundwater bodies[4]: None of the 108 groundwater bodies identified in Hungary are considered to be "at risk" due to human intervention, but 46 sites are listed as "possibly at risk" (mostly from nitrate pollution from diffuse sources). No water bodies are classified as either "at risk" or "possibly at risk" from the use of pesticides and insecticides. This is possibly due to the gradual decline in the annual use of such substances from 50-70 thousand tonnes in the 1980s to 10 thousand tonnes at present. Three water bodies (at Szigetköz; the southern part of Nyírség and Hajdúság and the peripheral area of the Northern Hills) are running quantity risk, as they show a trend of subsidence of water levels and altered flow conditions. An additional 18 water bodies are "possibly at risk", but require further study to identify resources more accurately.

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

349 water bodies have been identified[5] as "at risk", with 234 "possibly at risk". These represent 42% and 25% of the total length of Hungarian water bodies respectively. In the case of lakes, 47 water bodies are "possibly at risk", including Lake Balaton (which also received this classification due to nutrient pollution).

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[1] The EU Water Framework Directive defines the term "at risk" as a potential failure to meet "good ecological status" (respectively potential) of a water body by 2015, based on the knowledge available in 2004. A single body may be "at risk" because of organic, nutrient or hazardous substances or through hydro-morphological changes. In the case where data are missing, then the body is considered "possibly at risk".

[2] The length of a single water body varies widely in the category of rivers: the Hungarian part of the Tisza has 7 water bodies; the Dráva has 2; while the Gerence Creek, at less than 60km long, includes 4.
3 Art 5 report for the implementation of the EU Water Framework Directive.
4 Groundwater bodies are identified by aquifer units (geological formations that make up a unit according to specific parameters) rather than major aquifers and have been classified into three groups: basin porous bodies (52 cold and 6 thermal) separated by the isotherm surface of 30ºC; karst water bodies (13 cold, 15 thermal) and upland water bodies (22). More than half (60) of the groundwater bodies are divided by international borders and some are shared by two neighbouring countries in addition to Hungary. The status of groundwater should be evaluated in terms of chemical composition and volume.

[5] Water bodies at risk from hydro-morphological alterations have been identified where the significant alteration concerns more than 50% of the length of the water body. Where the effect on ecology is uncertain, the water body has been given a "possibly at risk" classification.