Danube Facts and Figures

HUNGARY

(May 2020)

General Overview

Hungary as a landlocked country is situated within the heart of the Danube Basin. The entire territory (93,030 km^2) is found in the Basin. Rivers enter the country from the west, north and east and flow towards the south. Almost one fifth of the 9,8 million inhabitants live in the capital, Budapest - the City of Spas – which lies on the banks of the Danube. Lake Balaton in the west, the largest lake of the Danube Basin, is a recreational area for the country. 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 of lowland plains. 84% of the country lies below 200 m asl; only 2% is above 400 m and the country’s highest peak is 1014 m located in the north. Floodplains cover nearly 25% of the territory. The Hungarian Danube traverses 417 km. It forms the border with Slovakia in the north-west and then flows south. Tisza, a major Danube tributary river, a 597 km section traverses across country. The gradients of the major rivers are low, typically 7-8 cm/km for the Danube; 2-5 cm/km for the Tisza.

Precipitation, climate and surface 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 being the hottest months (28- 30°C), while December and January are the coldest (down to –15). The average annual rainfall is about 600 mm with ranges of 300-1200 mm (decreasing over the last century).

Hungary’s borders are crossed by 24 incoming rivers, bringing 114 km^3 of water per year. The three major rivers, the Danube, Tisza and Dráva, leave the country discharging an annual average of 120 km^3 water. As evapotranspiration rates (500-600 mm/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 areas: (i) the area to the west of the Danube and (ii) a larger area to the east which forms partly the 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 of fertile plains. Forests cover 19% of the country. Of the 3155 settlements, the major cities are Budapest (1.8 million inhabitants), Győr (132,000), Miskolc (154,000) Debrecen (201,000) Szeged (160,000) and Pécs (142,000).

Natural highlights

The Danube-Dráva National Park provides international protection for 500 km^2 of Danube's and Dráva's riverine habitat. Set up in 1996, it contains a unique 28,000 ha 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 (600 km^2 surface area), is located in Transdanubia, west Hungary. 78 km long, with a 235 km shoreline and an average depth of 3.5 m, it contains 2 million m^3 of water with a catchment of 5775 km^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.

Near Lake Balaton is Lake Héviz located, which is Europe's biggest thermal lake with its 4,6 ha, frequented for its medicinal use.

Human uses of water resources

Public water utilities supply 627 million m3 of drinking water per year mainly from groundwater resources. 95,3 % of the flats is connected to the water supply and 82% to wastewater collection. A further 6,4 % live in areas served by wastewater collection but are not yet connected to the system. 342,6 million m3 are provided for general public use and 113,5 million m3 are provided for other use. 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 may lack sea access, but it has its own brand of water wealth. The landlocked nation is teeming with thermal water springs—more than 1,300, with 123 in Budapest alone—which bring infinite opportunities for year-round bathing in spas all over the country. These water sources are rich in dissolved minerals, with the exact mineral content varying depending on the location.

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

The total floodplain area within the country is 21,200 km^2 (23%). Currently, 97% of the country's floodplain is bordered by approximately 4,200 km long levee network. Floodplains are part of a river valley that may be inundated by high flood waters or being inundated by floods in case when the river is confined between levees. Therefore the flood control is a key consideration. Crucially, this area includes 1.8 million ha arable land, 32% of the rail network, 15% of roads and more than 2000 industrial plants, 646 endangered communities. Affected population is 2,3 million and the total value at risk is about € 20 billion.

Flood control systems:
The main flood defences of 4 327 km total length along the rivers, including 4 011 km earth embankments, 30 km flood walls and 286 km high banks. The state water agency is responsible for 4 128 km of main defences, the rest – 199 km – is owned and maintained by the municipalities.

The new Vásárhelyi Plan: Statistics show that our country in every 3-5 years is threatened by a significant, 7-10 year by a high and in every 15 year by an extreme flood. The floods threaten more than the quarter of the country. On this territory is generated one-third of the gross domestic product. Without any question for Hungary to create flood safety is an issue of national security. There are two major rivers in the country each needs a different strategy how to create a safety flood control system and how to reduce the risks of flooding. For the Tisza, which has a very extreme water regime (the height difference between the water levels went up to 12 m) we developed a previously not used new concept to reduce the risk of flooding. The design concept was named about the engineer Paul Vasarhelyi who elaborated the first concept of the Tisza regulation 150 years ago. The solution is in line with the European Union's principle "room for the river" by focusing on preservation and protection of ecological values, as well. The main idea is that one part of extreme flood should be derived to a so-called flood control reservoirs which is created on the low-lying parts of the natural floodplain of the river surrounded by a dyke system. With the solution we use again and reactivate the major part of the former floodplain of the river. For the application of the reservoir system consisting of 12 reservoirs a specific operation control system has been developed. Our plan is along the development and implementation of the levees and reservoirs to reactivate the high water river bed in order to stabilize the discharge capacity of the river, to stop further rapid deterioration.

30 flood control reservoirs built in the Tisza valley, 6 of them built in Vasarhelyi programme (Capacity: 721 million m^3). In the Körös River system 5 reservoirs are operating. (Capacity: 386 million m^3). The flood control reservoirs situated along the rivers and the part of the flood control system and has local flood peak reducing effect.

- <u>Use of hydroelectric power</u>

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

- <u>Navigation</u>

More than 1600 km of Hungarian waterways are navigable (250 km 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.

- <u>Rivers as receiving waters for effluents</u>

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).

- <u>Use of groundwater bodies: drinking water supply</u>

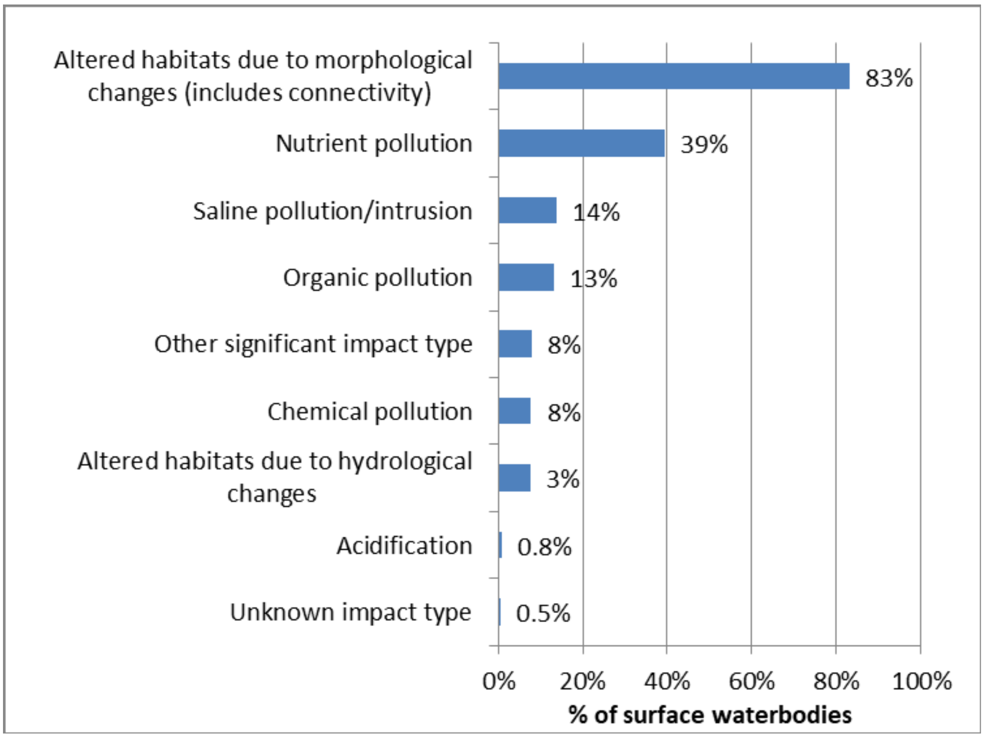
Groundwaters are distributed across Hungary and put to various uses. The vast majority of waterworks are reliant on groundwater and 90+% of the population is supplied in this way (porous and karst aquifers, bank filtered water). Pollution has made phreatic groundwater near the surface unfit for drinking 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.

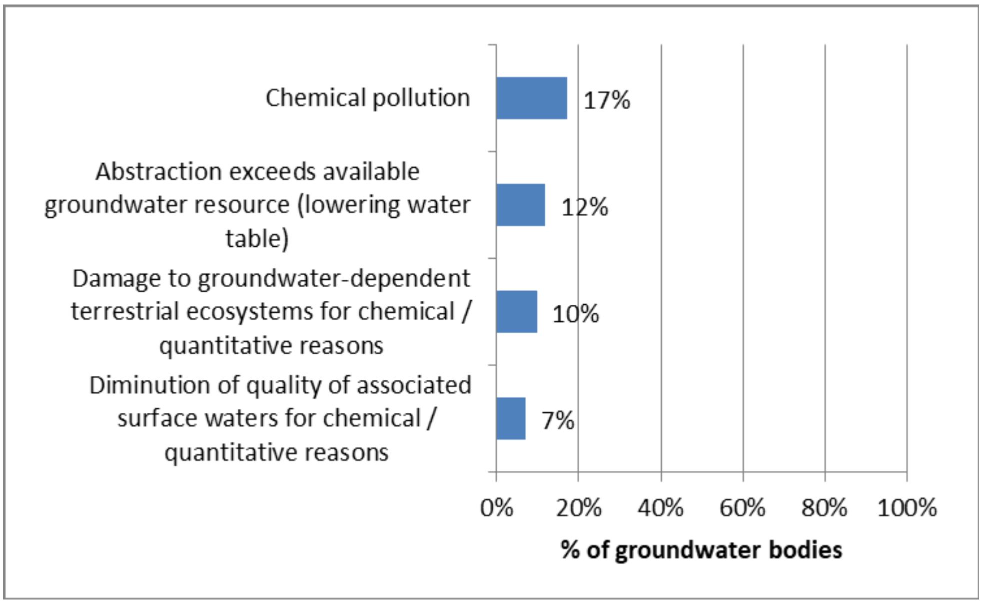
Pressures and impacts on water bodies

For surface water bodies, the most significant pressures in the second cycle of River Basin Management Plan are physical alteration of channel/bed/riparian area/shore due to agriculture (41% of surface water bodies) and agriculture diffuse pollution (36% of surface water bodies). For lake water bodies, unknown anthropogenic pressures were the most significant pressures in the second cycle, affecting 30 % of water bodies.
Altered habitats due to morphological changes were the most significant impacts on lakes (43% of lake water bodies) and rivers (88% of river water bodies) in Hungary in the second cycle.

Chemical pollution was the most significant (17%) of the four impacts for groundwater bodies in the second cycle. 11% of groundwater bodies were at risk of failing to achieve good quantitative status. The cause of the risk in all of the water bodies concerned was exceedance of available groundwater resource by long-term annual average rate of abstraction that may result in a decrease of groundwater levels.

Significant impacts on surface water and groundwater bodies in Hungary for the second cycle of RBMP. Percentages of numbers of water bodies.




Chemical pollution
17%
Abstraction exceeds available groundwater resource (lowering water table)
12%
Damage to groundwater-dependent terrestrial ecosystems for chemical / quantitative reasons
10%
Diminution of quality of associated surface waters for chemical / quantitative reasons
7%
0%
20%
40%
60%
80%
100%
% of groundwater bodies