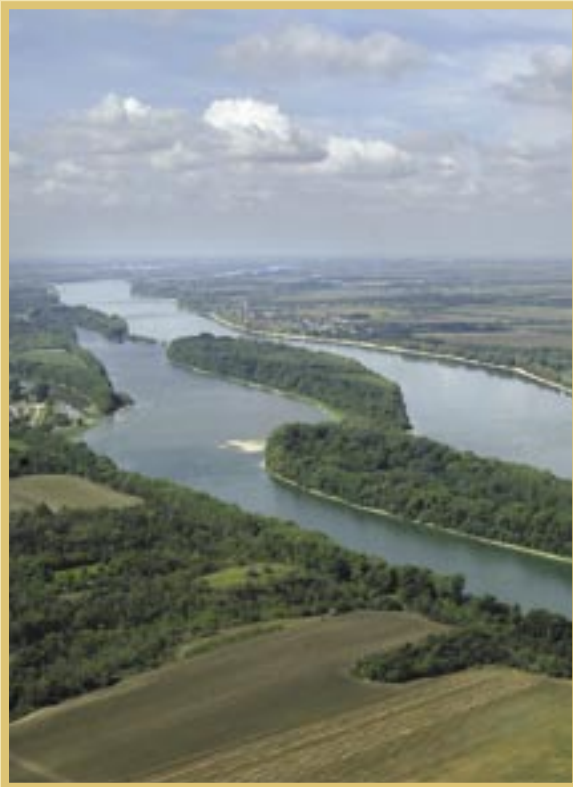


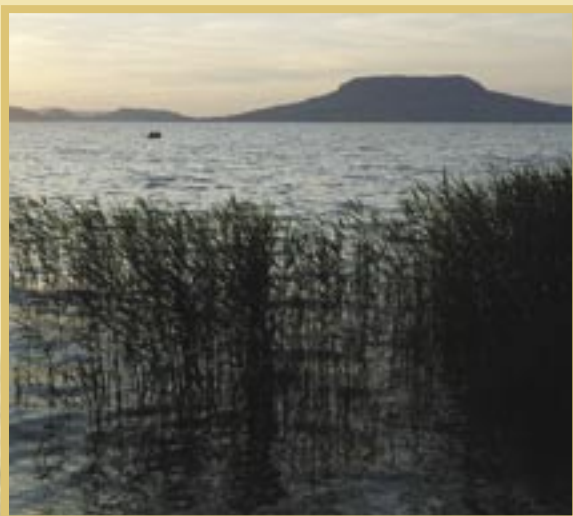


WATER MANAGEMENT OF HUNGARY





Hungary's entire territory is part of the river basin of the Danube River. Our country is situated at the bottom of the Carpathian basin, which means that with the exception of the Zala, Zagyva-Tarna and Kapos Rivers all our rivers come from outside our national borders. 96 per cent of our surface water resources is of foreign origin. Waters accumulating in Hungary reach us through 24 water courses and leave our country via three rivers, the Danube, the Tisza and the Drava. On an annual average we receive 114 km³ water, and the annual quantity of precipitation reaching the territory of Hungary is 58 km³. That is, the yearly average precipitation is 600 mm. 52 km³ of water is evaporated or infiltrated, which means that 120 km³ leaves the country annually. Distribution of the precipitation is uneven, in the east of the country it is generally less and in the south of the Great Plain where, in addition, the number of sunny hours is higher than the national average, the ratio of potential evaporation and precipitation may amount to 1.5. That increases the probability of the occurrence of droughts which generally occur every 3-5 years in Hungary.



LAKE BALATON

With its 605 km² it is the largest lake in Central Europe. It contains some 2 billion m³ water. The water quality of the lake has significantly improved since the 1990s compared to the previous decades.

LAKE VELENCEI

With its 25 km² water surface it contains 41 million m³ water.

LAKE FERTŐ

Under its 309 km² surface 413 million m³ water can be found. Only a small part of its surface, 75 km² is on Hungarian territory.

LAKE TISZA

It is the reservoir of the Kisköre Barrage on the River Tisza, which was established to improve irrigation and to meet the water needs of the Körös Valley. The size of the area under irrigation, however, decreased from 400 thousand hectares to half of it in Hungary since the 1990s. The Lake Tisza is now a protected bird reserve in accordance with the Ramsar Convention on the protection of wetland areas.





OXBOWS

The pearls of our domestic water management are the oxbows. In the valley of the River Danube and the River Tisza 259 oxbows are registered that have a water surface exceeding 5 hectares. These waters are utilised for the purpose of nature conservation, recreation, fishing, irrigation and reception of excess waters.

CLIMATE CHANGE

Globally a number of research programmes have been dealing with the impact of climate change on water management. The average temperature of the Earth increased by 0.6 Celsius in the 20th century. Warming up was experienced until the early 1940s, followed by a slight cooling down until the middle of the 1970s, while an increasing temperature has been registered again until recently. In Europe, temperature increase reached 1-1.2 Celsius. The global temperature of the Earth in 2030 is expected to be 0.3-1.0 degree higher compared to that of today. Changes due to this may strengthen the Mediterranean features in our region; we may have warmer and drier summers, milder and rainier winters, which will increase the

potential of droughts as well. Due to the increased winter precipitation we must expect further excess waters just as well as floods due to snow melting or the unpredictable heavy rains. Although the impacts are still unknown in a number of respects, one thing seems to be certain, namely that the change in the water resources requires the water management sector to have new strategies and flexible planning in place.





PREVENTION OF FLOODS, FLOOD DEFENCE

Most of Hungary is flatland. 84 per cent of its territory does not exceed 200 metres above sea level. This is fundamental in determining Hungary's exposure to floods. Arriving here from the neighbouring mountainous river basin areas, the Carpathians and the Alps, we often have to carry out protection activities against flood waves accumulated here. Hungary is stricken by smaller floods every 2-3 years, by significant floods every 5-6 years and by an extremely heavy flood every 10-12 years. The more significant flood waves stay for 5-10 days on the upstream reaches of our rivers, while on the middle and lower parts of flatter slopes the flood duration may be as long as 50-120 days. Such a long duration is not characteristic to other European rivers. The difference between low and highwater discharge may be tenfold in the Danube, hundredfold in the Tisza and almost a thousandfold on the Körös Rivers. It happens only rarely that we have simultaneous floods on the two large rivers, the River Danube and the River Tisza. We had it the last time in 2006 which was a test for the knowledge and perseverance of the experts and the population. 40 per cent of our agricultural land and plough-land and 32 per cent of our rail lines are on areas exposed to the risk of floods. Flood is a threat to 2.3 million people, and the properties and assets at risk represent 5,100 billion Hungarian forints. In our exposed water management situation close cooperation with the

neighbouring countries is a fundamental prerequisite for Hungary. Cooperation of the five Tisza Valley countries for finding solutions for flood problems is an outstanding example of that.

EXCESS WATER PROTECTION, PREVENTION

Excess waters mostly occur in February, March and sometimes even in June. Fortunately enough, during the winter and spring excess water period plants tend to have a higher level of tolerance than during the vegetation period characterised by higher temperature. Excess water occurrence is quite high: 100 thousand hectares every 2.5 years, 180 hectares every 5 years and 350 hectares every 20 years are expected to be flooded. In order to mitigate the damages caused by excess water our water systems have to be transformed. Our objective is to rapidly eliminate excess waters on valuable lands and to find a solution for water retention on the less valuable ones.

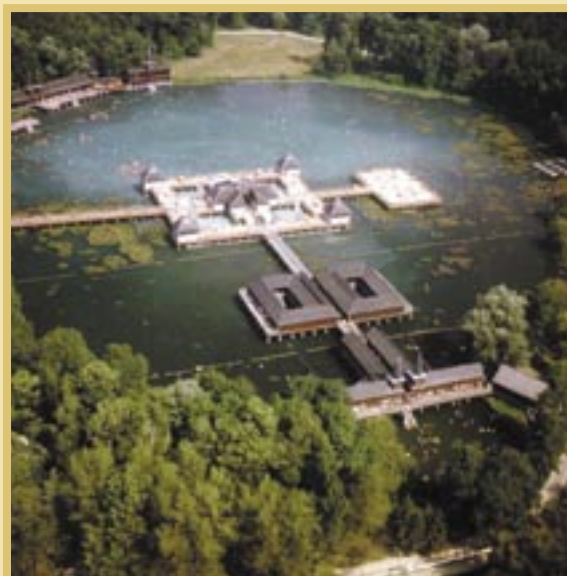
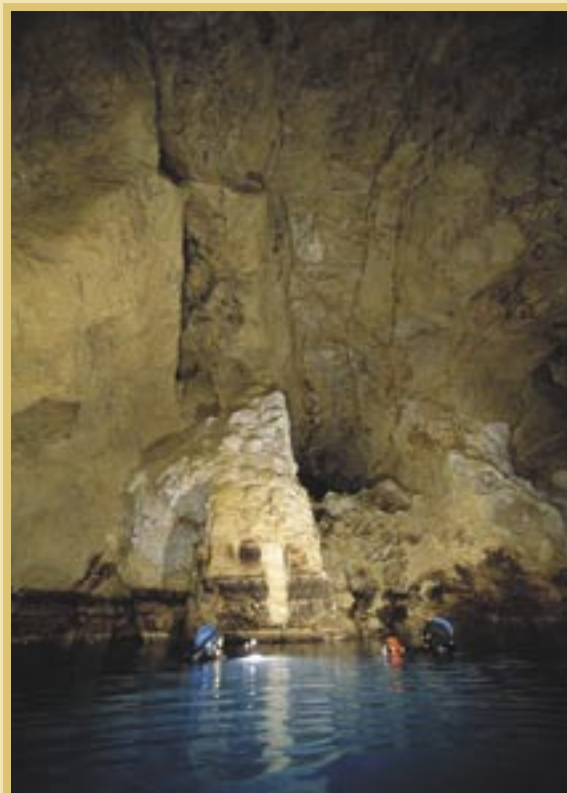


DROUGHT

Amidst Hungary's climatic conditions precipitation shortage does not occur every year. Sometimes, however, we have years when we have floods, excess waters and water shortage during the same year. In 1999, the Great Plain was hit by an exceptional excess water event; 360 thousand hectares were under water. The same year the water level of Lake Balaton began to decrease and there was almost an atmosphere of panic about it when water level recovered without artificial water supply. We have immense tasks ahead of us in the area of irrigation development. Termination of water shortage requires redistribution of water, at regional scale, namely from the Tisza River into the Körös, the Tarna and the Zagyva Valleys having less water.

GROUNDWATER RESOURCES

With a few exceptions, the spatial distribution of groundwater resources is much more even. Although resources would justify the opposite, the economy – with the exception of thermal power plants and fish ponds – prefers to use groundwater to surface water. There are areas where resources are almost fully exploited. Strongly exploited regions are, for example, the areas between the Danube and the Tisza Rivers and Nyírség and with regard to karst waters the Transdanubian Central Mountains and the Buda thermal karst system. Hungary's geothermal features are rather favourable. The explanation to this is that in our country drilling into smaller depths is sufficient to reach temperature higher by 1 degree than generally in the world. On about 80 per cent of Hungary's territory, thermal water of a temperature higher than 30 degrees Celsius can be exploited. Exploitation of thermal water, however, has to be cautiously done as the recharge of the resources is slow and their use is limited for the sake of sustainability. Groundwater quality is still generally favourable which allows multiple utilisations. 94-95 per cent of Hungary's drinking water is gained from that resource. Shallow groundwater, the first aquifer, is, however, contaminated in a number of places. At the same time, contamination occurred also in some 5-6 per cent of the deep groundwaters and karst waters which put a limitation on their utilisation.





WATER SUPPLY

Every settlement of Hungary has public utility water works; some 98 per cent of the population have access to public utility water supply, within this about 94 per cent of the homes are connected to a pipeline network of water supply. Water consumption decreased by about 50 per cent compared to the late 1980s. This process has stopped by now. Water consumption of the population gets stabilised. The daily consumption of a person is about 100-110 litres of water on the national level. Figures, however, change in accordance with the size and the level of supply of the settlement. While in Budapest on an average the daily consumption of a person is 150-160 litres, in large rural cities it is 120-130 litres, in small villages it is 50-70 litres. The improvement of drinking water quality is an issue of strategic importance in Hungary. Our national water supply decisively relies on groundwaters. This circumstance is of great importance from the aspect of water supply security. In the case of vulnerable water sources, protection of appropriate level is required. At the same time, water sources based on protected deep groundwaters are characterised by water quality problems of geological origin. As a result our drinking water quality does not meet the European Union and national requirements in case of 30 per cent of the Hungarian population due to its boron, fluoride, nitrite, arsenic, ammonium, iron or manganese content.





DRINKING WATER QUALITY IMPROVEMENT PROGRAMME

The programme affects 836 settlements, over 2.3 million people and the implementation costs about 200 billion Hungarian forints, 90 per cent of which will be provided by the European Union. It is expected to be completed in 2012-2013.

NATIONAL WASTE WATER PROGRAMME

The area covered by waste water collection systems is continuously increasing in Hungary. While in year 2002 some 56 per cents of the homes were connected to the waste water collection network, in year 2007 this figure was close to 70 per cent. This programme enables us to implement in Hungary the provisions of the EU's urban waste water directive. Due to waste water treatment plants development 14 per cent more waste water was treated in 2007 than in year 2002. Biological waste water treatment amounted to 75 per cent. The entire programme is the largest investment of Hungary in infrastructure.

THE NEW VÁSÁRHELYI PLAN

In addition to the creation of flood safety, the scope of this complex project also covers the regional and rural development of the region concerned, the application and introduction of a new type of agriculture on the territory of flood control reservoirs and the development of infrastructure at the settlements along the Tisza River. The principles of the project are as follows:

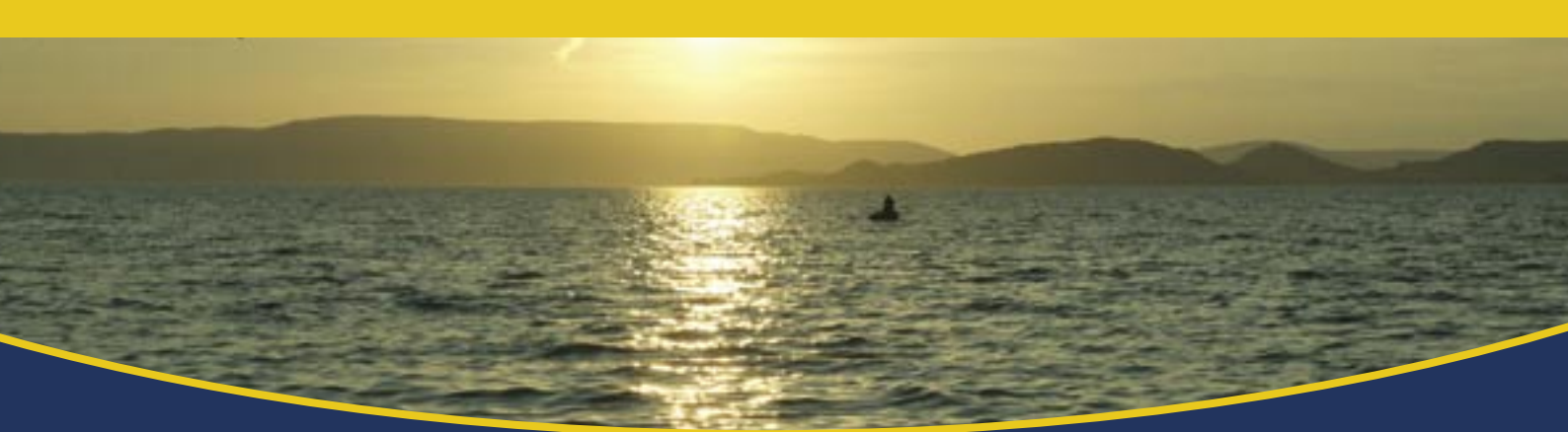
- the floods of the Tisza River must be conveyed primarily in the highwater bed between the flood protection dikes to be built up in accordance with the standards, but at the same time the flow conditions, the conveyance capacity must also be improved with attention to the ecological aspects.

- Low frequency flood events with dike breach and inundation risk must be controlled by flood peak attenuation measures; between 2005 and 2008, 22 components of the programme have been implemented, such as the Cigánd-Tiszakarád and Tiszaroff emergency reservoirs, the summer dikes at Tiszadob and Vezeny have been reinforced, and the outlet lock of the Lónyay main canal has been built.

Projects under realisation:

- Hany-Tizzasüly reservoir: 247 million m³. Expected to be completed in 2011.
- Nagykunság reservoir: 99 million m³. Expected to be completed in 2011.
- Reservoir between the Szamos and the Kraszna rivers: 126 million m³. Expected to be completed in 2012.
- The Bereg reservoir: 60 million m³. Expected to be completed in 2013.





THE WATER FRAMEWORK DIRECTIVE AND THE RIVER BASIN MANAGEMENT PLANNING

In accordance with the provisions of the Water Framework Directive (WFD) representing the water policy of the European Union, the surface and groundwaters must reach a good status until 2015 in the Member States. This good status must also be maintained. This 'good status' means not only the purity of the water, but it also means the most natural status of the habitats linked to water and an appropriate quantity of water.

In order to implement the provisions of WFD the EU Member States, by the end of 2009, must prepare their river basin management plans with the involvement of the stakeholders. The plans must contain the measures as a result of which the good status, with certain exceptions, can be achieved.

The Hungarian river basin management plan will be prepared to cover the entire territory of the country, including four sub-basins:

- Danube: 34,730 km²
- Tisza: 46,380 km²
- Drava: 6,145 km²
- Balaton: 5,775 km²

On the four sub-basins, river basin management plans will be prepared also for 42 sub-units by using unified methodology. In addition to the assessment of the current initial status, a central component of the plans is the programme of measures as a result of which the 'good status' can be reached. All these consist of basic measures that effectively facilitate the efficient and sustainable use of our waters, such as water source protection, national wastewater programme and protection of waters against nitrate contamination of agricultural origin. Where this package of measures proves to be insufficient to achieve a good status, additional measures will have to be introduced.

Sub-units of river basin management planning

