



Danube Facts and Figures

CROATIA

(May 2010)

General Overview

The Republic of Croatia is a central European Mediterranean country with a national territory of 87,609 km² (including 1185 Adriatic islands), situated at the meeting point of the Pannonian Plain, the Balkans and the Adriatic. The mainland comprises 56,538 km² and borders Slovenia and Hungary to the north, Serbia to the east, Bosnia-Herzegovina to the east and south-east and Montenegro in the south. Total population is recorded as 4,437,460 (2001 census), making Croatia a sparsely populated country in European terms (78.5 people/km²). The country straddles the border of two catchment areas. The Danube Basin, covering the northern and central inland section of the country, comprises 62% of the national mainland (35,090 km²) and is home to 69% of the population. It comprises 4.4% of the entire Danube Basin. This area is dominated by major rivers (and their tributaries), notably the Drava, Sava and the Danube itself. In the coastal areas comprising southern and western Croatia, rivers drain into the Adriatic.

Croatia signed the Convention on Co-operation for the Protection and Sustainable Use of the Danube River in June 1994 and brought it into force in October 1998.

Topography

The morphology of the Danube Basin in Croatia is very diverse with low Pannonian and peri-Pannonian areas in the north and high-lying karst areas in the south (comprising approx. 23% of Croatia's Danube Basin area). The northern area consists of lowland plains (with an average elevation of 80 m asl in the east and 140 m in the west) with a central mountainous area (approx. 1000 m asl) and hilly terrains. The area is dominated by the wide elongated alluvial valleys of the Sava and Drava Rivers, which gradually narrow towards the west and are filled with large quantities of swamp and alluvial sediments. The southern upland area comprises the much higher elevations of the Dinaric karst, through which the watershed between the Black Sea basin and the Adriatic basin passes. The Dinaric mountains include Croatia's highest peak, Mount Dinara, at 1831 m asl.

Precipitation, climate and water flow

Croatia's climate and precipitation regimes are diverse, being governed by the country's geographic position and specific morphology. The country has a continental climate to the north and east and a Mediterranean climate along the coast, with other areas experiencing a transitional regime (incorporating both continental and Mediterranean influences) and upland areas displaying a more mountainous climate. Average annual precipitation in Croatia varies between 650 mm in eastern Slavonia (in the north-east) to 3500 mm plus in the Gorski kotar

region (north-west Croatia). Average annual temperatures range from 3 to 17 °C, with highest temperatures in July and lowest in January.

The Danube Basin region in Croatia is dominated by a continental climate. However, Mediterranean influences are strongly felt on the fringes, along the watershed with the Adriatic Basin. Even though a high mountainous barrier exists between the two climatic regions, they are not separated by a strict boundary, but rather a transitional zone in which their impacts mix. The transitional zone encompasses almost all of the Kupa River Basin. Within the Danube Basin, a nival-glacial regime is typical for the Drava Basin, while a pluvial-nival regime is characteristic of the Sava region.

62% of the Croatian mainland is located in the Danube Basin – in the northern and central inland region of the country (35,090 km²). Hydrologically, it can be divided into three units: the basins of both the Drava and the main Danube river occur to the north in the Pannonian Basin; while in the south, partly straddling the Dinaric karst, is the Sava Basin. These three major rivers and their tributaries dominate the region. Sava tributaries include the Kupa, Bosut and Una while the Bednja flows into the Drava. The majority of the large watercourses have an interstate character (boundary or transboundary): the Sava, Drava and Mura Rivers enter from Slovenia; the Danube from Hungary; and the Una, Vrbas, Ukrina and Bosna Rivers from Bosnia and Herzegovina. The south-western and southern borders of the river basin district form the watershed with the Adriatic river basin district.

Land use and settlements

The Danube Basin area of Croatia is very unevenly populated due to varying levels of economic development. Today, the majority of people live in larger towns. Numerous regions are very sparsely populated, particularly mountainous regions. Population density in the Danube Basin is highest in two regional centres: the capital, Zagreb, and Osijek.

Low-lying parts of the Danube Basin are dominated by arable areas, while the hilly and mountainous regions of north and central Croatia are forested, thinning out towards sub-Mediterranean and Mediterranean belts. Croatia contains a significant area of arable land, although it is not of high quality. Luvisol and hydromorphous soils are present between the Drava, Sava and Kupa Rivers, while highly fertile soils (black soil, brown soil and luvisol) are most frequent in the far eastern area of Slavonia. Mountainous regions are dominated by brown soils.

Natural highlights

National Parks in Croatia cover 994 km² (including 235 km² of sea surface). Within the Danube Basin area, most of the areas of exceptional environmental quality are associated with surface water.

Plitvice Lakes National Park and UNESCO World Heritage Site in the Sava River Basin covers 297 km² and is Croatia's oldest and largest national park (est. 1949).

Designated for its outstanding natural beauty and undisturbed karstic calcium carbonate deposits (travertine/tufa), the park is famous for its stunning waterfalls and brightly coloured lakes.

Risnjak National Park comprises 64 km² of mountainous limestone and dolomite karstic terrain in the Dinaric Alps. Located at the watershed of the Adriatic and Black Sea catchments, a highly diverse flora exists due to the mixture of Dinaric, Alpine, coastal and continental influences.

Lonjsko polje Nature Park and Ramsar site is the largest protected wetland in both Croatia and the entire Danube Basin and is an Important Birds Area (IBA) under the EU Birds Directive.

Kopački rit Nature Park and Ramsar site comprises a large area of relatively undisturbed floodplain around the confluence of the Drava and Danube rivers. One of the largest natural wetlands in Europe, it contains great biological diversity.

Other RAMSAR sites include *Mokro polje* and *Crna Mlaka*.

Human uses of water resources

Although unequally distributed, Croatia contains large quantities of surface and ground water resources.

▪ Flood management

Estimates indicate that approximately 15% of the national mainland territory is at risk of flooding; however the major part of this is now protected to varying degrees. In order to prevent floods and the adverse effects of floodwaters, water structures have been constructed and maintained; protective works carried out and flood defence measures undertaken.

Within the Sava Basin, due to the reduction in peak flows of flood waves in lowland flood storages, the Middle Sava Basin system (Srednje posavlje) plays a key role in protecting the Slavonian stretch of the Sava River (downstream of Stara Gradiška), as well as protecting the neighbouring countries of Bosnia and Herzegovina and Serbia. Flood protection measures, based on lowland flood storages and expansion areas, have enabled the preservation of environmentally favourable conditions on wide floodplains. Consequently, part of the Middle Sava Basin protective system has been designated as Lonjsko polje Nature Park as a result of its exceptional natural environment.

Concerning the Drava and Danube Basins, protection against flooding from the Danube, Drava and Mura Rivers is based on protective embankments and wide foreshores along watercourses. Construction and subsequent reconstruction of the Drava-Danube and Zmajevac-Kopačevo protective embankments have made it possible to efficiently protect Baranja against high waters in the Drava and Danube Rivers and to preserve wide floodplains near the Drava-Danube confluence. This

solution has a positive impact on the natural water regime in Kopački rit Nature Park and also on flood protection in downstream areas along the Danube.

▪ Use of hydroelectric power

Croatian hydropower plants (HPP) generally have a multi-purpose nature, involving wider social and water management issues. The most significant HPPs are those built on the Drava (Varaždin HPP, Čakovac HPP and Dubrava HPP). Croatia's most effective locations for hydropower production have already been exploited. Those left are mostly located in valleys where plants would potentially cause greater environmental impact (including impacts on surface and groundwater regimes).

▪ Navigation

Major international waterways in Croatia are the Danube (along its entire Croatian length: 138 km) and the Drava (from its mouth to the town of Belišće). Regarding the Sava, the Framework Agreement on the Sava River Basin, signed by Croatia, Bosnia and Herzegovina, Slovenia and Serbia, is key to restoring navigation. Currently, more than 80% of goods shipped on inland waterways in Croatia involve international transport. International and national legislative preconditions for further development of inland navigation have been met recently; however available capacities for more intensive navigation is yet to be exploited.

▪ Wastewater recipients

Discharging wastewater (both treated and untreated) into watercourses is common practise in the Danube Basin. In Croatia, discharge of wastewater directly into groundwater is prohibited. The majority of industrial facilities discharge treated or untreated wastewater into public sewerage systems; some of which is then treated before being released into watercourses.

▪ Drinking water supply

Around 80% of the population is supplied from public water supply systems (2006). Significant variations exist between counties (from 31 to 99%) and even more so between individual towns and municipalities. Approx. 90% of abstracted water is from groundwater supplies, with the remainder from surface water abstracted from rivers and multi-purpose reservoirs: surface water intakes are few. An important measure for protecting aquifers containing water used for human consumption is the adoption and enforcement of decisions on sanitary protection zones. The protection of water for human consumption and, more specifically, implementation of protection measures within sanitary protection zones, are challenging tasks for the majority of water abstraction sites. This is particularly so at locations where the source is close to major towns.

Pressures on surface and groundwater bodies

▪ Organic load

In settlements with more than 10,000 inhabitants, connection rates to public sewerage systems are considered to some extent to be satisfactory, with

connection rates of 75-80% (2007). However it is in small settlements (up to 2000 inhabitants), in which approx. 40% of the population live, that the most serious problems occur. Croatia also has a large number of settlements with less than 500 inhabitants, home to approx. 800,000 people. In these settlements, technical and financial constraints make the construction and operation of centralised public sewerage systems hardly feasible.

A combined sewerage system is the norm in inland Croatia (i.e. in the Danube Basin). The development and operation of public sewerage systems is undertaken by local government. Out of a total of 295 settlements with built sewerage systems, 44% have a wastewater treatment plant (WWTP). A total of 109 WWTPs has been constructed, varying in terms of development and capacity. 38 involve preliminary treatment, 24 primary, 46 secondary and one WWTP has tertiary treatment. Modified economic conditions have brought about changes in industrial wastewater treatment, with many industries constructing their own plants for preliminary treatment. At the same time, connection rates for public sewerage systems with central municipal plants has not taken place at the rate predicted due to unfavourable economic conditions and high construction and connection costs. Major parts of many settlements remain without connection to central WWTPs. Of the 28% of wastewater that is treated, 43% undergoes preliminary/primary treatment and 57% secondary treatment.

- **Discharge of nutrients**

Regarding agricultural pollution, and on the basis of processed data, the highest loads from diffuse sources are present in the Drava and Danube Basins and in the immediate Sava Basin. The impact of pesticide use can only be identified through measurement. A complete list of pesticides to be monitored will be determined after the screening of pesticides and other plant protection products used.

- **Priority and dangerous substances**

Currently, only a small number of priority substances (according to the Dangerous Substances Directive) are monitored. The regular monitoring programme requires extension to encompass all substances included in the list.

Useful web links

Ministry of Economy and Sustainable Development website: <https://mingor.gov.hr/>
Hrvatske Vode website: <https://voda.hr/en>