Reservoirs and dams

European Environment Agency

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Reservoirs and dams

Reservoirs are human-made lakes created by the damming of rivers to serve one or more purposes, such as hydropower production, water supply for drinking, irrigation and flood protection.

Dams have been built in Europe for over hundreds of years. The oldest still in activity are Cornalbo, Proserpina and El Belcial in Spain, which have been in operation since the 2nd century. The reservoirs resulting from the dams that were built before 1800 were relatively small and were used mainly for domestic water supply, crop irrigation, energy production and canal operation. During the last two centuries there has been a marked increase in both size and number of large storage capacity reservoirs, especially with the development of hydropower and large basin management. There are currently about 7000 large dams in Europe. In addition, there are thousands of smaller dams

Source: EEA

Development of dams

The construction of reservoirs in Europe can be illustrated using the UK and Spain as examples. In the UK, the number of large dams grew rapidly during the 19th century from fewer than 10 to 175 at a rate of 1.7 per year. By 1950, the rate had almost doubled. After 1950, construction took place at a rate of 5.4 dams per year before slumping to zero by the late 1990's. Today, the UK has a total of 486 dams.

By contrast, Spain saw the number of reservoirs grow at the rate of more than 4 per year between 1900 and 1950, before almost doubling and reaching 741 units by 1975. By 1990, this figure had more than doubled again (19.5 per year). Today, there are 1172 large dams.

The total number of dams in Europe is now growing very slowly, as suitable sites becomer

fewer and environmental concerns become greater.

Large dams

The total European reservoir surface area covers more than 100 000 km2; 50% of which lies in the European part of Russia. Although there are only a few reservoirs in this area, they are very large. The six largest reservoirs are located in the Volga river system in Russia. The Kuybyshevskoye (6450 $km^{2)}$ and Rybinskoye (4450 $km^{2)}$ are the two largest reservoirs. Of the 13 European reservoirs with an area exceeding 1000 km^2, only the Dutch reservoir Ijsselmeer lies outside Russia and the Ukraine.

The member state with the largest number of reservoirs is Spain (approx. 1200), Turkey (approx. 610), Norway (approx. 364) and the UK (approx. 570). Other countries with a large number of reservoirs are Italy (approx. 570), France (approx. 550) and Sweden (approx. 190).

Environmental Issues

Reservoir construction leads to a number of environmental issues, both during building and following completion. Upon the closing of the dam the water level in the reservoir rises. As a result, major changes often take place in the area inundated with the water. For example, farmland can be lost, settlements flooded and the groundwater table elevated. Once the reservoir has been established, two types of environmental problems occur, those that:

- render the reservoir unsuitable for its purpose, for example algae and toxic substances in reservoirs used for drinking water.
- induce ecological deterioration of the river system, especially downstream of the reservoir.

Since dams interrupt the natural continuity of a river and reservoirs change the hydrological cycle, the ecological consequences can be manifold. For example, access to spawning sites for migratory fish is prevented. This is a particular problem for fish such as salmon, trout, eel and sturgeon. However, even small dams cause problems, as they constitute impassable barriers for most species of fish. Hence, small dams (less that 10-15m in height), which are 10 to 100 times more common than large ones, have had major adverse effect on fish populations. In addition, reservoirs trap suspended matter (mainly sand) flowing into them. This reduces the suspended matter load to downstream reaches and ultimately to the sea, where the lack of sand leads to coastal erosion.

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