

Definition: **dam** from *Philip's Encyclopedia*

Barrier built to confine water (or check its flow) for irrigation, flood control or electricity generation. The first dams were probably constructed by the Egyptians 4,500 years ago. **Gravity** dams are anchored by their own weight. **Single-arch** dams are convex to the water they retain, supported at each end by river banks. **Multiple-arch** and buttress dams are supported by buttresses rooted in the bedrock. The cheapest commercial source of electricity comes from hydroelectric projects made possible by dams, such as the Aswan High Dam, Egypt.

Summary Article: **dam**

From *The Hutchinson Unabridged Encyclopedia with Atlas and Weather Guide*

Structure built across a river to hold back a body of water (called a reservoir) in order to prevent flooding, provide water for irrigation and storage, and provide hydroelectric power. The biggest dams are of the earth- and rock-fill type, also called embankment dams. Such dams are generally built on broad valley sites. Deep, narrow gorges dictate a concrete dam, where the strength of reinforced concrete can withstand the water pressures involved.

Concrete dams A valuable development in arid regions, as in parts of Brazil, is the **underground dam**, where water is stored on a solid rock base, with a wall to ground level, so avoiding rapid evaporation. Many concrete dams are triangular in cross section, with their vertical face pointing upstream. Their sheer weight holds them in position, and they are called **gravity dams**. They are no longer favoured for very large dams, however, because they are expensive and time-consuming to build. Other concrete dams are built in the shape of an arch, which transfers the horizontal force into the sides of the river valley: the **arch dam** derives its strength from the arch shape, just as an arch bridge does, and has been widely used in the 20th century. They require less construction material than other dams and are the strongest type.

buttress dams are used when economy of construction is important or foundation conditions preclude any other type. The upstream portion of a buttress dam may comprise a series of cantilevers, slabs, arches or domes supported from the back by a line of buttresses. They are usually made from reinforced and pre-stressed concrete.

Earth dams Earth dams have a watertight core wall, formerly made of puddle clay but nowadays constructed of concrete. Their construction is very economical even for very large structures. **Rock-fill dams** are a variant of the earth dam in which dumped rock takes the place of compacted earth fill.

Major dams Rogun (Tajikistan) is the world's tallest at 335 m/1,099 ft. New Cornelia Tailings (USA) is the world's biggest in volume, 209 million cu m/7.4 billion cu ft. Owen Falls (Uganda) has the world's largest reservoir capacity, 204.8 billion cu m/7.2 trillion cu ft. Itaipu (Brazil/Paraguay) is the world's most powerful, producing 12,700 megawatts of electricity. The Three Gorges Dam on the Chang Jiang was officially inaugurated in 1994 and is due for completion 2009. A treaty between Nepal and India, ratified by Nepal in 1996, included plans to construct the 315-m/1,035-ft Pancheshwar dam across the River Mahakali, a tributary of the River Ganges.

In 1997 there were approximately 40,000 large dams (more than 15 m in height) and 800,000 small

ones worldwide.

UK dams Early dams in Britain, built up to about 1800, had a core made from puddled clay (clay which has been mixed with water to make it impermeable). Work on the first concrete-core dam in Britain was begun at Woodhead, in the Peak District, in 1862. The first dam in which concrete was used to seal the joints in the rocks below was built at Tunstall, Staffordshire, in 1879.

Dams and the environment Although dams can service huge irrigation schemes and are a reliable and cheap source of power, they cause many environmental problems such as the forcible removal of local communities, waterlogging and salinization of land in the area, and loss of habitat. For example, the Kansa dam in Zimbabwe flooded habitat used by the rhinoceros, one of the world's most endangered mammals.

There is also controversy about the effectiveness of large dams, since the reservoirs tend to fill with silt from upstream. This leads to a gradual reduction in reservoir depth and hence in the volume of water held back by the dam, which in turn reduces the power delivered by the hydroelectric turbines. The fact that silt is held back from the lower stretches of the river also has an adverse effect on river and marine life. Sediment that would have been washed downstream is now deposited behind the dam, reducing the flow of silicates. This leads to a change in the types of algae that live in the sea, favouring species that form toxic blooms; these can kill fish and other marine life.

Dam demolition The first dam to be demolished for purely environmental reasons was a dam on the Clyde River in Newport, Vermont, USA in 1996. In 1997, there were campaigns to demolish several dams, notably in the USA, Australia, and France. Also in 1997, the US government ordered the destruction of the Edwards Dam, near Augusta, in southern Maine, the first ever recommendation of this kind.

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Drainage basins and flooding

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Glen Canyon Dam, Colorado

Hoover Dam

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Chicago



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