



# Dams

## Good or Bad?

### What is a dam?

A dam is a barrier built across a stream, river or estuary to hold and control the flow of water for such uses as drinking water supplies, irrigation, flood control and electric power generation.

### Types of dams

There are several different types of dams including earth fill, rock fill, gravel fill, solid-masonry gravity, solid masonry arch, arch gravity, structural masonry and steel or timber. The choice of dam is decided upon by examining foundation conditions, load strains, temperature and pressure changes, chemical characteristics of ground water and possible seismic activity.

The most common types of dams are embankment (earth fill) and masonry (concrete). *Embankment* dams retain water across wide rivers when large amounts of fill are needed. They are less expensive and more adaptable to natural changes. *Masonry* dams are made of concrete and they use the force of gravity and the weight of the materials to counteract the horizontal force of the moving water. Another type of masonry dam is the arch. It consists of a convex arch that faces the reservoir and is reinforced by the pressure of the water.

A type of embankment dam is a *lowhead* dam, which is found on the Red River. Lowhead dams are useful for water supply purposes because they provide a pool within the river. This facilitates the access of water from the river through water supply intake structures on the shore. On the other hand, lowhead dams may impact fish spawning and cause concerns for public safety.

### How are dams used?

Dams contain outlets that allow enough water to pass through for irrigation, water supply or power generation. They may include special gates with stepped pools, locks or fish ladders for the upstream or downstream passage of migratory fish. The sluices or gates drain silt, which accumulates behind the dam. If not drained, additional pressure can occur and fill up the reservoir. Spillways discharge excess amounts of water due to rain or landslides and this water is diverted alongside the dam.

### Benefits of dams

The benefits of dams are usually to the advantage of humans. They may include:

- Hydroelectric production
- Domestic water supply
- Flood control
- Recreational opportunities
- Navigation
- Industrial and irrigation water supply
- Aeration of water

For animals the benefits may include:

- Larger numbers of fish and birds in the reservoir
- Greater habitat diversity

### Disadvantages of dams

- Alterations in temperature and flow in the river downstream from the dam
- Loss of flowing water habitat and replacement with standing water (reservoir) habitat
- Interruption of animal movements along the course of the river

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- Possible alteration of the fish community in the region of the river now inundated and upstream from the reservoir
- Interruption of genetic exchange among populations inhabiting the river course
- Reduction in the delivery of river nutrients to downstream section of the river because of entrapment by the reservoir
- The loss of the floodplain habitat and connectivity between the river and bordering habitats upland

\*\* Adapted from *River Voices-Winter 1995*\*\*

### **Dams can be dangerous**

Seemingly harmless lowhead dams like those present in Fargo and Moorhead can pose a larger threat to safety than the larger more massive dams. Usually, lowhead dams are no more than 10 feet in height. Water pouring over the dam creates a churning backwash or hydraulic action. It is a recirculating current which can take an object or a person down to the bottom, release it back to the top and suck it back down again. This cycle can occur continuously.

### **Dam removal**

Dams, on average, last around 40 years. Many dams are in need of rehabilitation because of safety concerns. Usually, it costs a great deal of money to do this so the removal of the dams is one way to deal with the issue. In most cases, dams are removed because they are too expensive to rehabilitate. Most proposed removals stem from the significant impacts they may be having on fish migration. The assessment of dam rehabilitation, modification or removal is complicated and often controversial.

### **Dams of the Red River of the North**

There are 8 dams on the Red River and they are located at:

- Whapeton, ND- Breckenridge, MN
- Wolverton, ND
- Hickson, ND
- Grand Forks, ND- East Grand Forks, MN
- Drayton, ND

In the Fargo/Moorhead region of the river there are three lowhead dams:

- North Dam on 12<sup>th</sup> Avenue, Fargo and 15<sup>th</sup> Avenue, Moorhead
- Midtown Dam at Dike East
- South Dam on 32<sup>nd</sup> Avenue, Fargo and River Oaks Park, Moorhead

### **Midtown Dam modifications**

The Midtown Dam at Dike East in Fargo was reconstructed in 1960. This dam provides a pool of water for Fargo's water treatment plant, but it has also been the cause of several drownings.

In order to make it safer and allow for fish passage, a Midtown Dam Improvement project was completed in 1999. The completed project cost about \$240,000 and consists of a man-made rock rapid, constructed at a five percent slope. This was the first dam on the Red River to be modified. Since then, the North Dam and South Dam in Fargo, Riverside Dam in Grand Forks, and Kidder Dam in Breckenridge, have also been modified.

### **Positive outcomes**

- The deadly roller effect and undertow current located below the dam were eliminated.
- Upstream fish migration will be possible, contributing to improved fish populations.
- It is more visually attractive.

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### **For more information:**

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