

# Comparing Beaver Dams & Human-Made Dams

Manmade and beaver dams both shape water flow but differ in purpose and impact. Human-built dams focus on flood control or power, while beaver dams support biodiversity and wetlands. Comparing them reveals their unique roles in ecosystems. These systems vary in their structure and dynamic nature, resulting in differing impacts on the movement of water, sediment, and aquatic organisms through the stream or river.

## Beaver Dam

Aquatic organisms, such as fish, can often navigate around or through the openings in a beaver dam.

Sediment is allowed to move down the stream around or through openings in dam or when the systems blow out.

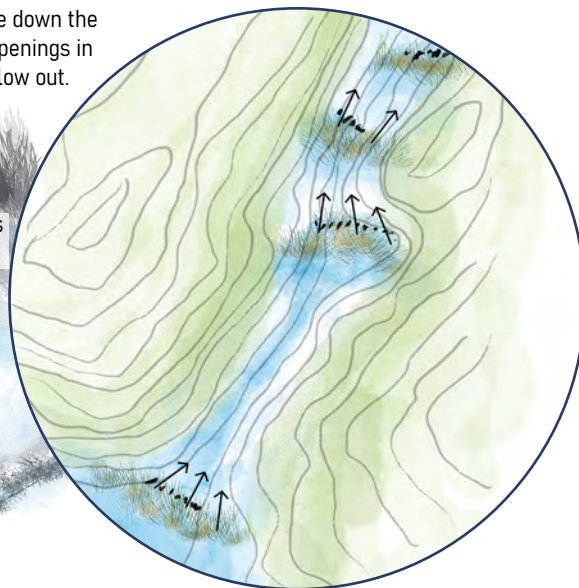
Beavers need to actively maintain dams or they will degrade or collapse.



Dynamic wetlands upstream of beaver dams enhance habitat complexity.



Beaver dams are made of sticks, mud, rocks, and vegetation and can be destroyed in storm events.



Aerial view of a series of beaver dams, which can produce a variety of habitats varying in age and composition.

## Human-Made Dam

Generally, low habitat complexity upstream.

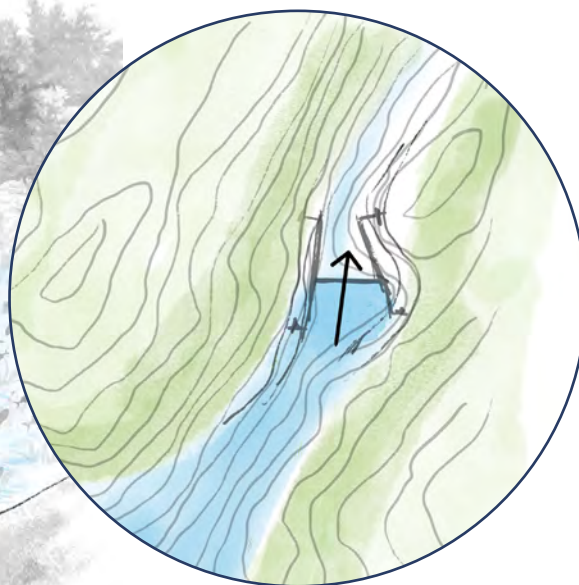
Created from steel, cement, and concrete to be as static as possible.



Sediment is held behind the dam, creating a sediment starved environment downstream.

Aerial view of a human-made dam showing a reservoir upstream.

Static and uniform nature of dam prohibits movement of organisms upstream.



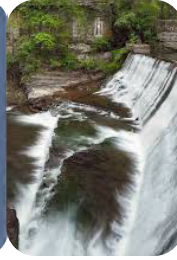
# Key Differences Between Beaver Dams and Human-Made Dams



## Water Passage

Leaky and variable through side channels and openings in the dam.

Flow through outlet structure--little flow around the dam.



## Structure

Variable in structure and source material--mixed wood, rock, and sediment.

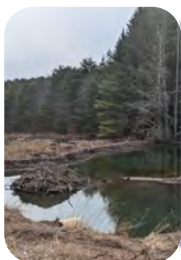
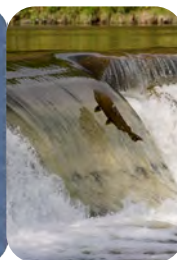
Uniform and hardened with cement, stone, and pipes. Uniform and hardened with cement, stone, and pipes.



## Aquatic Connectivity

More permeable to organisms through channels and openings in the dams as well as through blow outs and abandoned dams.

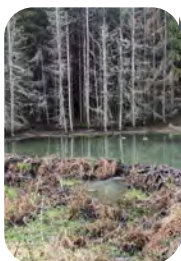
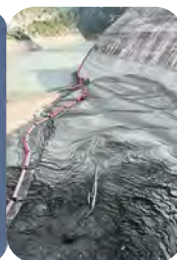
Barrier to aquatic connectivity and organism passage.



## Sediment Behavior

Sediment build up behind the dam but also sediment passage through leaks and blow outs.

Sediment accumulation behind the dam and sediment-starved streams downstream.



## Ephemerality

Highly dynamic systems, usually lasting months to decades. Degrades when abandoned and may wash away in flash floods.

Static system. Dam can last for up to centuries. Impoundment may fill with sediment.



## Habitat

High habitat complexity with a series of small pools, channels, and wetlands with varying ages and structures.

Water reservoirs with low habitat complexity and biodiversity.



Beaver dams are complex and leaky, allowing water, sediment, debris, and organisms to pass through and around them. These dynamic structures can break apart during large storms if left abandoned and unmaintained. Upstream, sediment accumulates, forming wetlands—or beaver meadows—with a mosaic of ponds, channels, and habitats. Beaver dams often occur in complexes, adding diversity to habitat age and structure. This creates hydrologically and ecologically intricate stream systems that vary across space and time. Their leaky nature ensures water movement, maintaining cooler temperatures and higher oxygen levels that support diverse invertebrate and fish populations.

In contrast, human-made dams are static with simple, steep structures, typically higher and interfacing with the stream at a 90-degree angle rather than a slope. They create a single large impoundment, sometimes with fringing wetlands, leading to temperature stratification—warmer waters and lower dissolved oxygen in both the impoundment and downstream releases. This can promote harmful algal blooms during warm years. Water passes only through the outlet structure, trapping sediment upstream and leaving downstream areas “sediment-starved.” This triggers downstream bank erosion as the stream attempts to replace the trapped sediment.

## Resources

The engineering in beaver dams. [https://www.researchgate.net/publication/311507975\\_The\\_engineering\\_in\\_beaver\\_dams](https://www.researchgate.net/publication/311507975_The_engineering_in_beaver_dams)

Beaver. In *Wild Mammals of North America: Biology, Management, and Conservation*, Second Edition. <https://cornell.box.com/s/Oe2vb6wubqpzusnv30qjwjo0mfa8rxh0>

Aquatic connectivity and barrier removal. <https://dec.ny.gov/nature/waterbodies/oceans-estuaries/hudson-river-estuary-program/aquatic-habitats/aquatic-connectivity-and-barrier-removal>

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