

Dams and Other Man-Made Water Structures



What did the fish say when he ran into a cement wall?

Essential Standard 2.4

Evaluate how humans use water.

Learning Objective 2.4.1

Evaluate human influences on freshwater
availability

I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can list several reasons dams are built
- I can explain both benefits and drawback of hydropower dams.
- I can describe various other man-made structures, along with their purposes.

Dams

Dams are barriers designed and constructed to contain the flow of water and can serve several purposes.

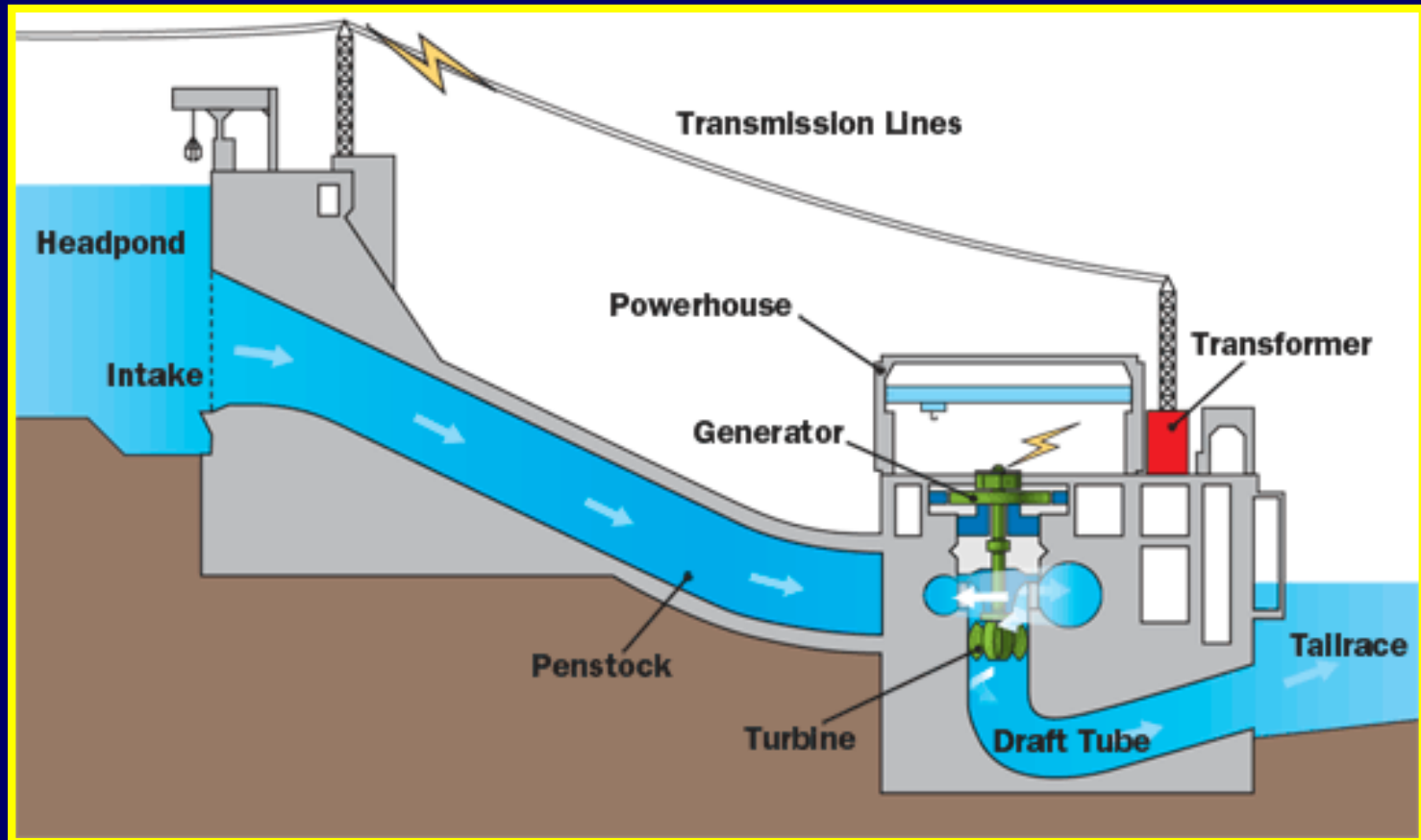


Adam Beck dam at Niagara Falls

Many dams are built along with a hydroelectric power station.

Hydroelectric Dam

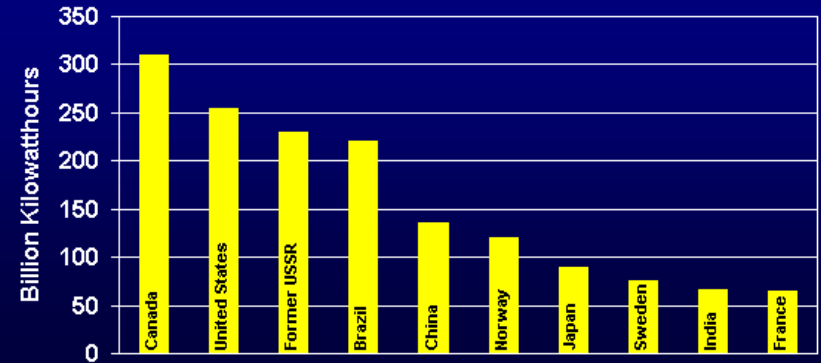
Hydroelectric dams use the energy from flowing water to turn the turbine, in a generator, to produce electricity.



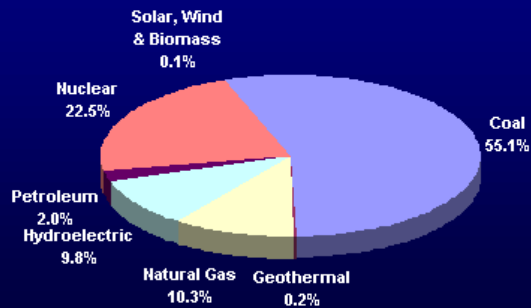
Hydroelectric Power

The United States is the second largest producer of hydroelectric power, providing enough electricity to serve the needs of 28 million residential users.

Top Hydroelectric Generating Countries



U.S. Electric Utility Net Generation of Electricity



However, hydroelectric power only accounts for 10% of the total electricity produced in the United States.

Benefits of Hydroelectric Power

Hydroelectric power is the most efficient way to produce energy.

Modern hydroelectric plants convert 90% of the available energy into electricity.

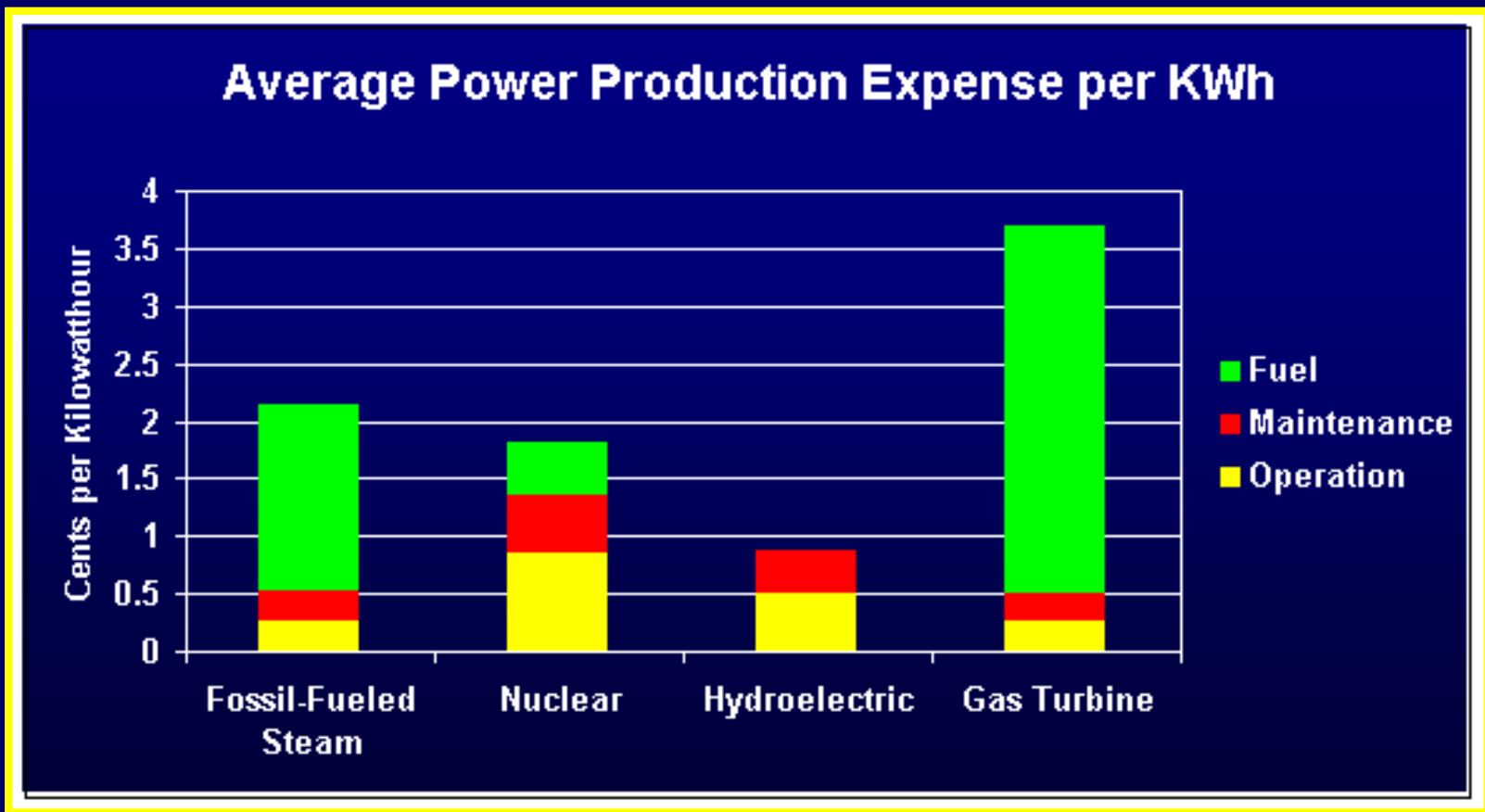


Coal burning plants are only about 50% efficient.



Benefits of Hydroelectric Power

Hydroelectric power is less expensive to produce than coal, nuclear, and natural gas.



Benefits of Hydroelectric Power

Hydroelectric power is clean, in that it releases no greenhouse gases or other pollutants.



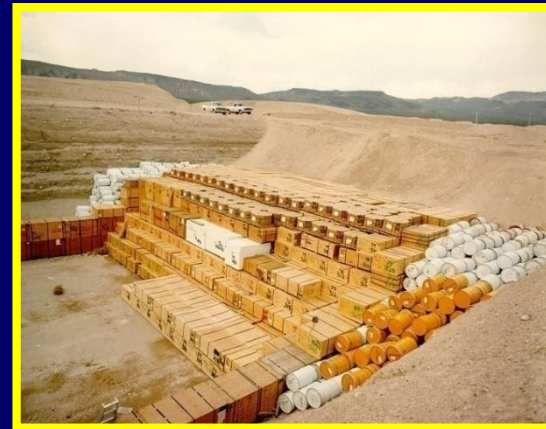
Coal Burning Plant



Coal Ash



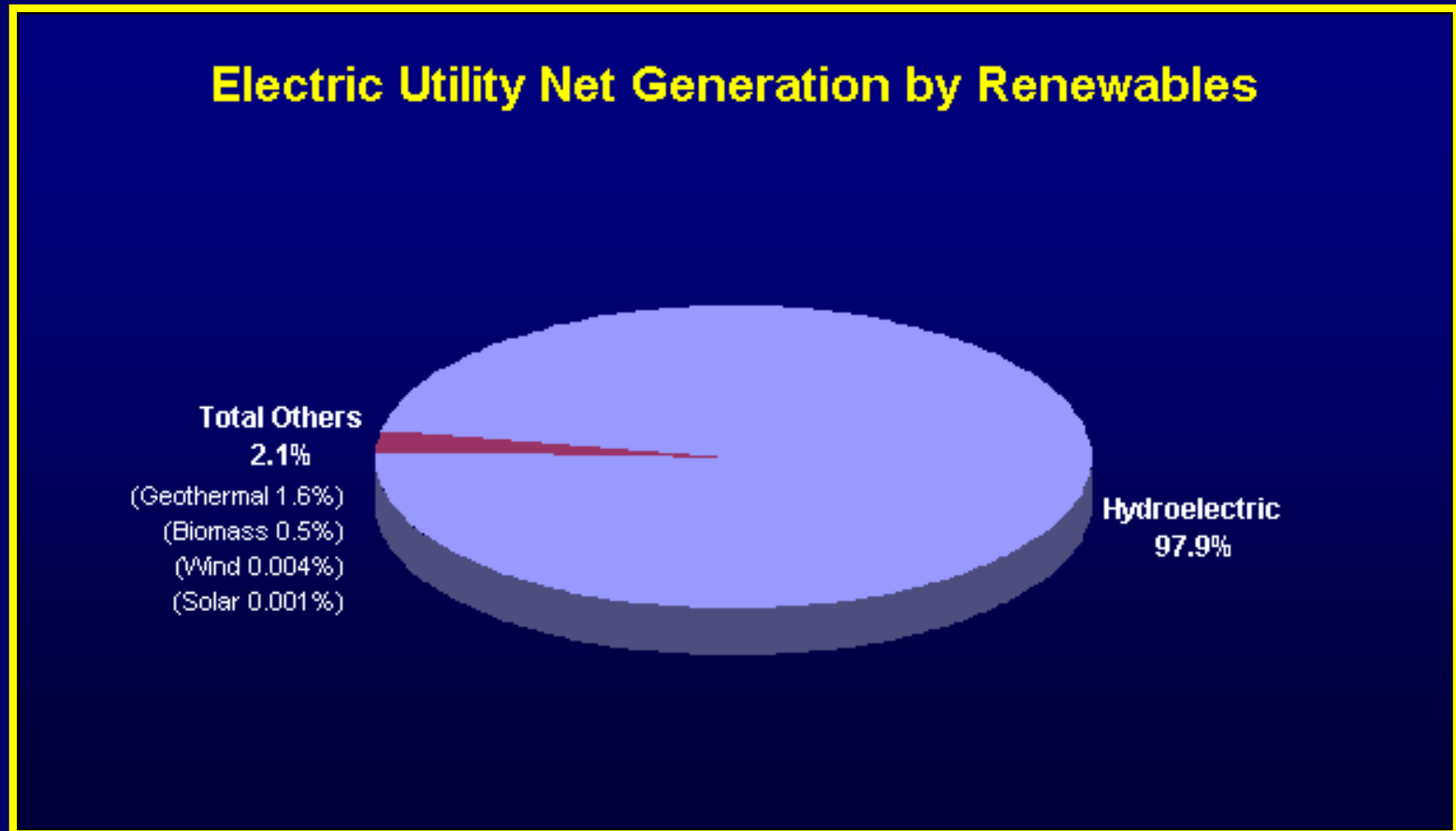
Nuclear Waste



Nuclear Storage, Nevada

Benefits of Hydroelectric Power

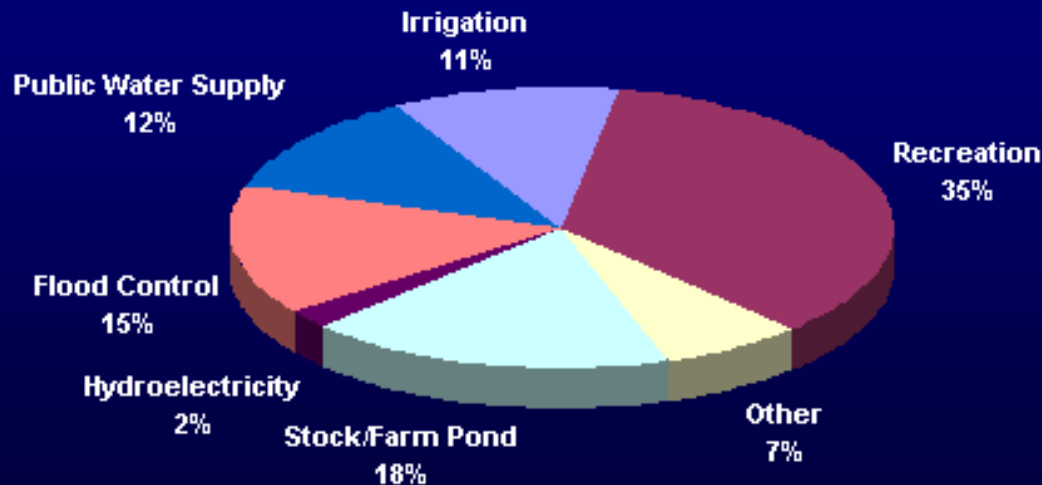
Hydroelectric power is the leading source of renewable energy, providing 97% of all the electricity generated by renewable sources.



Benefits of Hydroelectric Power

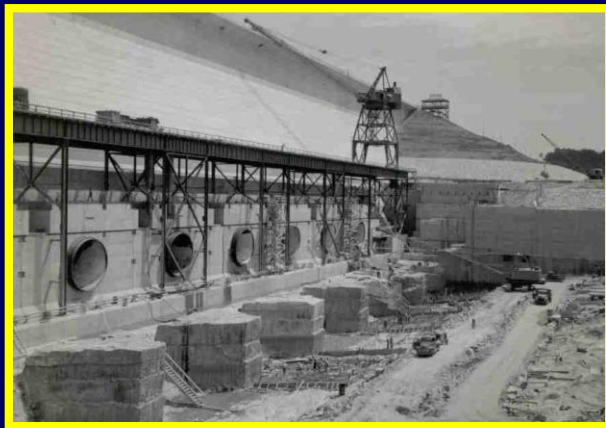
Dams are not just built to produce hydroelectric Power.

Primary Purpose or Benefit of U.S. Dams



Control Flooding

Dams are also built to help control flooding, especially in areas where flash floods are common.



Clark Hill Dam on Savannah River, near Augusta, Georgia.

Reliable Source of Water

Dams are also built to create a reservoir, in order to provide a constant source of water, especially in arid areas.



Hoover Dam on the border between Arizona and Nevada

Recreation

As an added benefit, dams also provide areas for recreation.



Norris Dam in Eastern Tennessee

Dam Impacts

The construction of dams dramatically alters the landscape, flooding habitat and even towns.



China



Old Butler, Tennessee



Shasta Dam, California



Dam Impacts

One major impact of dams is organic material, that would normally wash downstream, build up behind dams resulting in the lowering of dissolved oxygen as it is decomposed.



Dam Impacts

Sediments also build up behind the dam, lowering water quality by blocking light needed for photosynthesis, increasing the water temperature, as well as clogging fish gills.



Dam Impacts

Dam on the Yellow River in China washes out the sediment on an annual basis.



Dam Impacts

Creating reservoirs robs downstream river basins of water, sometimes resulting in a drying out of the river.



Colorado river in Mexico

Dam Impacts

Dams also changes diverse river habitat to less diverse reservoir habitat, leading to a loss in biodiversity.



Dam Impacts

Fish migration is also disrupted by dams, especially in the case of salmon in the American northwest where salmon populations have decreased by 85% since the installation of dams.



Fish Ladders and other methods have been unsuccessfully used to try to help salmon cross the dam.

Dam Failure

In May of 1889, the South Fork dam failed uphill of Johnstown, Pennsylvania, washing away the town and killing 2,209 people.



The people standing on the rooftops in this striking image are likely sightseers who have come to see the flood destruction.



This photograph was taken of the destruction of Main Street in Johnstown.



Many people who survived the floodwaters were killed in the fire that broke out in debris trapped at the stone bridge. The bridge is still an important Johnstown landmark today, and an eternal flame burns nearby in memory of the flood's victims.



Dikes and Seawalls

Dikes and seawalls are man-made structures to help protect areas from flooding and sometimes to prevent erosion of the harbor or river bank.



The Battery in Charleston Harbor, SC.

Levees

Levees are also man-made structures to help prevent flooding.

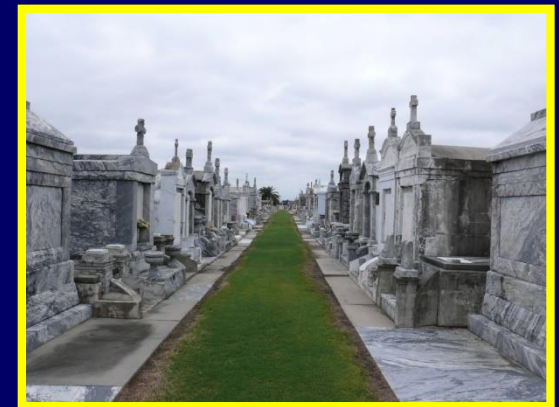


“Drove my Chevy to the levee but the levee was dry”

[American Pie](#)



New Orleans was built on the Mississippi River delta and sits below sea level.



Dead must be buried above ground

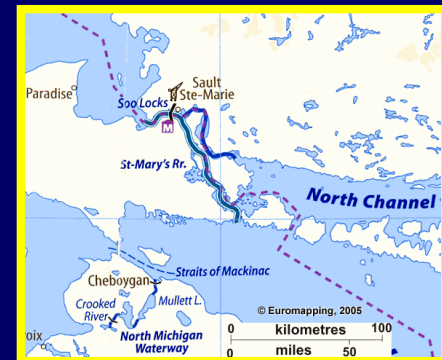
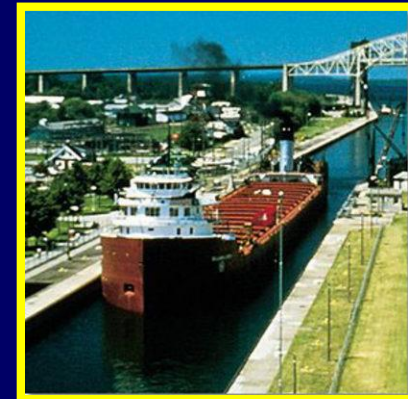
Levee Failure

In 2005, during Hurricane Katrina, the levees in New Orleans failed and 80% of the city flooded, some parts as deep as 15 feet.



Locks and Canals

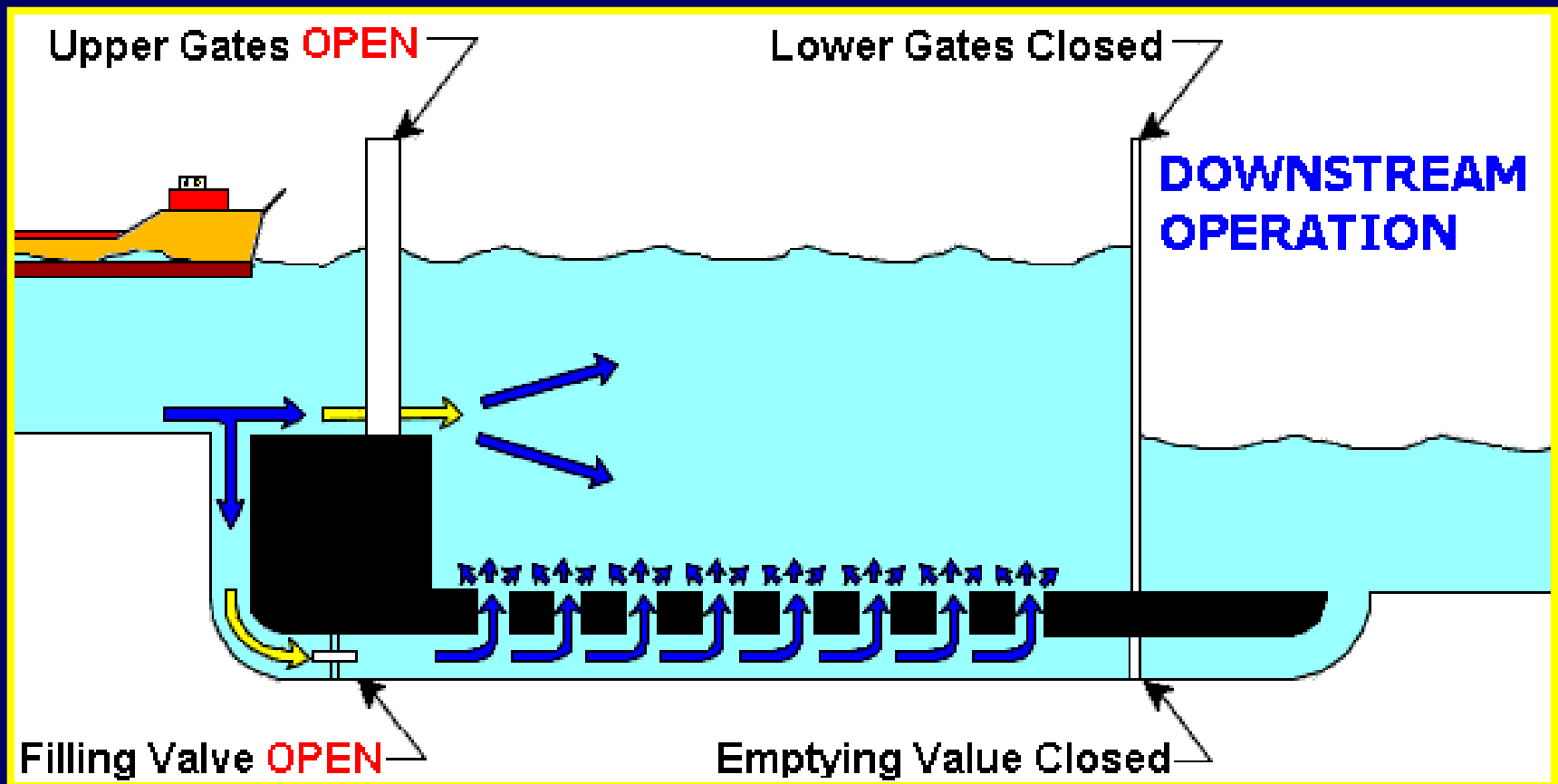
Locks are similar to dams, in that they are man-made structures to control water flow, but they are usually built to aid in water navigation.



The Soo Locks at Sault Ste. Marie, Michigan allows ships to move from Lake Superior to the Detroit River.

How Locks Work

Locks use a series of gates that allow for flooding or unflooding of a channel to help ships change elevations in water flow. (Sort of like elevators)



Aqueduct

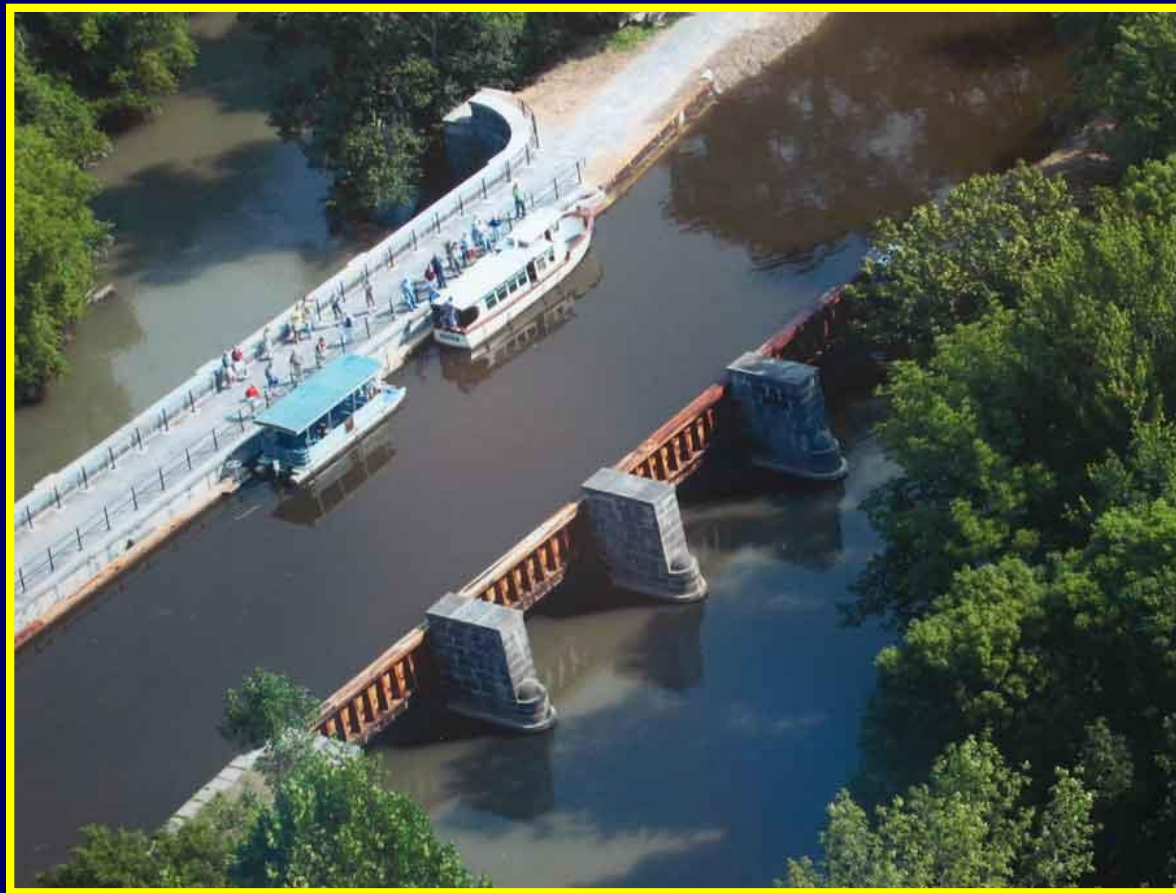
Aqueducts are man-made channels, usually elevated above ground, that move water from one place to another and can also be used for water travel.



This Roman aqueduct still carries water today from 12 miles away. The water is on the structure and the structure is bridging a different river.

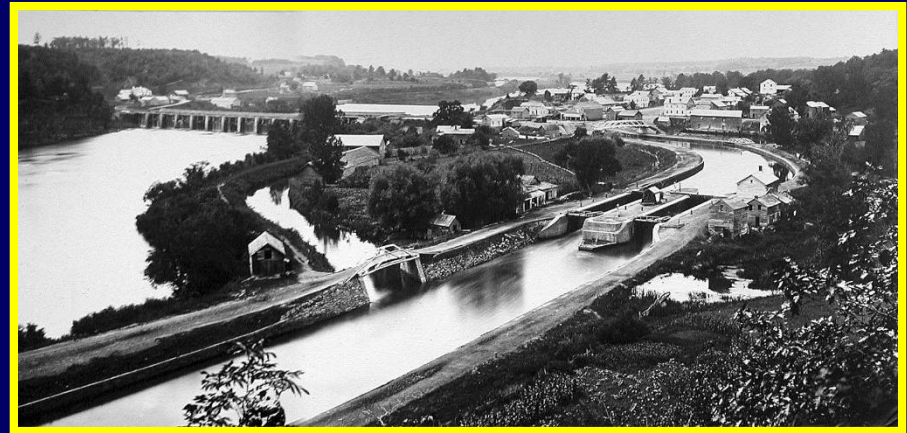
Aqueduct

This is an aqueduct in New York State, as seen from above.



Canals

Canals are man-made streams built for navigational purposes.



Erie Canal connects Lake Erie, in Ohio, to the Hudson River, in New York.



Mules were used to tow the barges up and down the canal.

[Erie Canal Song](#)

Tow Path Trail in Ohio

Some of the canals built no longer function and instead have been turned into recreational multi-purpose trails.



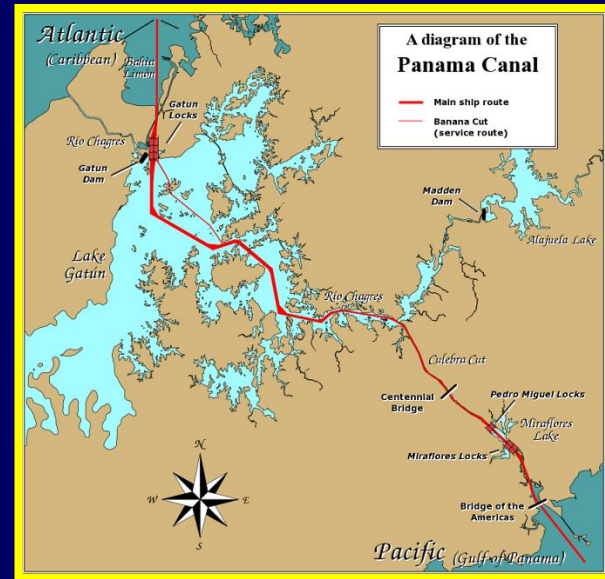
Ohio-Erie Canal used to connect Lake Erie to the Ohio River, which flowed to the Mississippi River.



Currently, the towpath trail is used as a popular recreational trail.

Panama Canal

The Panama canal connects the Pacific Ocean to the Atlantic Ocean using locks and a man-made lake.



The End

