

Just Dam It!

This activity is part of the **Water Protection** theme

Purpose of this activity:

Students will come to understand the importance of all the elements used by beavers when building a dam (sticks, mud and water) and will learn about the benefits of the flooded area, which is produced. Students will also investigate factors that alter various habitats and will learn that living things (including humans) rely on other living things. Through props and discussion, the interdependence of plants and animals within specific habitats and communities will be explored.

Key Messages:

- Beavers are industrious creatures and are well adapted for their role as a keystone species.
- Although the construction of a beaver dam and the resulting flooding may seem destructive, it creates habitat not only for the beaver but also for many other species.
- Beavers play an important role in the dynamics of the forest ecosystem.

Materials:

- Two beaver dam activity models with water attachments
 - Two hoses coming off of “Y” coupler and feeding the rivers at the top of the two beaver dam activity models
 - Water barrel filled with clean water
- Two Water collection containers
 - Place at bottom of the beaver dam activity model, water will drain into container
 - This is where the debris will go after hosing down/cleaning up the model after the activity is complete
 - Sticks and mud can be collected and muddy water disposed of
- Two containers of varying sized sticks (ranging from 2 inches to 4 inches)
- Two containers of mud
- Container of props
- Backdrop of Beaver pond (if available)

Activity set up

- 1 Set models up on tables. Spacers may be placed under the models to increase slope and the effect of gravity.
- 2 Set up a small barrel at the end of the table for water to drain into.
- 3 If using pump, place a small inflow/outflow water pump on a plywood platform on top of the collection container. A hose from the inflow of the pump will collect water from the container. A hose from the outflow of the pump will travel up to the top of the activity table and will feed the river(s).
- 4 If using a hose from a water faucet, secure the hose ends to the top of each activity model.

What will I be doing?

At the beginning of the day you will ensure that the set-up has been completed and that you have all of the materials necessary to run the station. For each rotation you will be monitoring the students' success in filling the basin surrounding the river, the beaver pond. The goal is to get the students to stop water from passing through the stream and fill the basin until the water reaches the golden trees! After the group has accomplished there task of creating a beaver pond initiate a discussion, using props, on some of the adaptations of beavers to their industrious aquatic lifestyle.

- 1 Explain to the Students that the objective of the activity is to build a dam which will stop the flowing water of the river and fill the basin up to the “golden trees” which will create a beaver pond.
- 2 Explain that it is important to fill the basin up to the “golden trees” because Beavers depend on trees for food and for building their dams/lodges. Beavers are safer when they are in the water (their main predator, the wolf, cannot reach them), consequently, they want to fill the basin up to the “golden trees” so that they can access the trees without getting out of the water.
- 3 Divide students into two groups. Explain that they need to build their dam in the lower narrow of the river (downstream from the basin) and

what they need to build their dams is all in front of them in the buckets (sticks and mud). Emphasize to the students that they can not pierce the model (the Styrofoam) with their sticks to make them stay (as this will destroy the activity).

- 4 Start the water running and have the students build their dam. Make sure that the water running from the hose is flowing at a somewhat slow pace.
- 5 The students who get their basin to fill and reach the "golden trees" have accomplished the goal - They've made a beaver pond!
- 6 Initiate a discussion, using the following 5 question and answers provided.
- 7 If time, ask students, "What other animals benefit from beaver ponds?"
- 8 If still time, pull out a prop and ask students, "What does this have in common to a beaver?" (see *What's that For?* under Additional Background Information)
- 9 Wash away mud and sticks from beaver dam activity model into collection bucket. Sticks and mud can be collected out of this for other groups and the dirty water can be distributed elsewhere.

At the end of the day make sure all items for the presentation are tidied up. Leave the site as you found it for the next day's volunteers.

Answer students' questions about the model or start a discussion by asking them the following questions.

Questions to Ask Students:

Q: Why do beavers cut down trees?

A: Beavers live on the bark of trees, their favourite trees being aspen but birch, cottonwood, willow, and alder also are feed on. Trees may be cut down and immediately eaten, but they may also store branches and stems underwater for a winter food supply.

Conifer trees are an example of trees that are mainly cut down for building materials, for both their dams and lodges. As the front cutting teeth of the beaver never stop growing, beavers need to cut down trees to manage the growth of these teeth while keeping them sharp.

Q: Why do beavers build dams?

A: Beavers dam up slow moving streams in order to control their aquatic environments. The beaver controls the level of the water to ensure that their lodges are neither flooded nor left dry. The flooded area serves as

a protective moat from the beaver's predators, such as wolves, bears and sometimes coyotes. The flooded area also provides the beaver with the deep water needed for winter food storage.

Q: How does a beaver change their habitat?

A: Beavers are known for their ability to change their surrounding environment in order to meet their needs for survival. When beaver dams a stream or a small river they alter the surrounding area by flooding the area creating a wetland. This in most cases changes the surrounding area from a terrestrial ecosystem to an aquatic ecosystem.

Q: What types of animals would benefit from the presence of a beaver?

A: Within an active beaver pond animal species such as; waterfowl, amphibians, reptiles, bats, wetland bird species and fur bearers (otters, raccoons) benefit from the provided habitat.

Q: What is a keystone species? Would you consider a Beaver to be a keystone species?

A: Is a species that affect many other organisms within an ecosystem or habitat. Such species affect many other organisms in an ecosystem and help to determine the types and numbers of various others species in a community.

Props and Explanations

- Carpenter's chisel
 - Let students come up with ideas
 - Then show beaver teeth (skull with front teeth intact)
 - Associated Facts:
 - Beaver teeth continuously growing
 - Orange pigment on outside = harder enamel than white inside
 - Therefore, as beaver cuts into wood of trees, inside wears faster forming a chisel like shape
- Bottle of oil and pair of long johns (or a pair of mittens)
 - Let students come up with ideas
 - Then show beaver pelt
 - Associated Facts:
 - 2 layers of fur → cottony under fur (insulative layer) and longer guard hairs (protect under fur)
 - Oil keeps guard hairs waterproof
 - Spend a lot of time grooming themselves to keep oils throughout

such as food, for survival.

- pelts and tangles out
- Swim fin(s) and comb
 - Let students come up with ideas
 - Then show beaver track casts
 - Associated Facts:
 - Their webbed feet helps them swim and push through the water
 - A split toenail on the 2nd toenail on their hind feet acts like a comb so they can groom their pelt
 - Keeps tangles out and dispersing the oil
 - Can also talk about the front paw and its dexterity for placing sticks and packing mud
- Steering wheel (or pictures of directions; left, right), whistle and cooler (for storage)
 - Let students come up with ideas
 - Then show beaver photo and point out its tail
 - Acts as rudder (a steering wheel) when swimming, especially when it is dragging branches through the water
 - Slapping it on the water to warn of danger
 - Also, serves as a fat storage depot in fall and winter
- Goggles
 - Let students come up with ideas
 - Then show beaver photo and point to beavers eyes
 - Transparent membrane to protect eyes as they swim
- Sink plug (or silicone, tire patch, plastic wrap, Tupperware lid)
 - Let students come up with ideas
 - Then show beaver photo and point to its mouth
 - There is a furry patch inside the mouth which closes when carrying branches or eating under water to prevent them from swallowing water
 - Using the same photo point to its ears and nose
 - Beavers have valves in their ears and nose which close while under water to keep water out
- “No Trespassing” sign
 - Let students come up with ideas
 - Then show beaver dried castor gland
 - Beavers are territorial and deposit a scent from their castor glands to warn other beavers to stay away. It's a way to protect their resources

At the end of the day, please let clear water run through the system to clean out any food colouring. Then turn off the pump and empty the tank. (You will be shown where to do this).

Background Information

Beaver Facts

- The scientific name for beaver is *Castor canadensis*
- Trees up to 15 cm can be cut down within 50 minutes
- Thickest tree cut by a beaver which has been recorded = 1.2m (4ft)
- Average number of trees cut by an adult beaver in one year = >200
- Why do beavers cut down trees?
 - To obtain leaves, buds and bark for food
 - To obtain branches for the construction of dams and lodges
- The largest rodent of North America
- Adult body length = 60-90cm (2-3ft)
- Adult weight = 18-36kg (40-80lb)
- Tail Length = 23-33cm (9-13in)
- Heaviest beaver recorded = 50kg (100lb)
- Calls - mumble, hiss or nasal blowing when angry, cry when frightened
- Food
 - Summer - Water lilies, arrowhead, watercress, duckweed, yellow arum, cattails, grasses, sedges, leaves, berries and ferns
 - Winter - bark and twigs of aspen, birch, poplar, mountain maple, willow
- Average lifespan = 4-5 years, up to 16 years in the wild and 23 years in captivity
- Predators = wolves, bears and rarely coyotes
- Capacity to hold breath under water → up to 15 minutes
- Average swimming speed = 4km/hr (2.4mph), but can swim up to 10km/hr (6mph)
- Age of oldest beaver fossils = 12 million years
- Estimated ON population = 1.5 – 2 million (check with updated info)

Beaver Lodge Facts

- Domed lodge
- Made from branches and mud
- ~2m (6.6ft) high
- ~ 4-8m (13.3-14.6ft) wide above waterline
- Lodges have one or two underwater entrances, no access from above water
- Built at the centre of ponds or at the side of already existing lakes, occasionally in bank

- burrow
 - Offers protection from most predators (exception, otters)
 - Average number of beavers per lodge = 5-9
 - Average number of lodges per km² (0.4sq.mi) in Algonquin Park = 0.4-1
 - Young beavers leave home usually at age 1, some stay for 2 years

- Upland nesting ducks
- August & September → wolves, pups play and rest while the adults are off hunting (rendezvous site)

Beaver Dam Facts

- Dams can reach up to 3m (10ft) in height and 500m (1640ft) in length
- Average dams in the Algonquin area reach up to 0.96-1.2m (3-4ft) in height and 15-30m (50-100ft) in length
- Biggest beaver dam recorded = 1500m (5000 ft) long, 3m (10ft) high (in Saskatchewan)
- Longest measured beaver canal = 230m (750ft) (in Colorado)
- Dams are built to create and control their aquatic environment
 - Ensures access to food sources
 - Ensures that lodges are neither flooded or left high and dry
- A pair of beaver can build a solid dam in 3 to 4 days

Beaver Pond Facts

- Average area covered by a beaver pond = 4ha (10 acres)
- Ponds created are deep enough that they do not freeze to bottom
- Common beaver pond inhabitants or visitors
 - Muskrat
 - Mink
 - Otter
 - Moose
 - Great blue heron (dead standing trees → nesting)
 - Mallard, black and wood ducks (dead standing trees → nesting)
 - Hooded mergansers (dead standing trees → nesting)
 - Three-toed woodpeckers (dead standing trees → nesting)
 - Migrant geese
 - Tree swallows
 - Harriers
 - Frogs
 - Minnows
- When the dam breaks after abandonment, a grassy meadow develops ... a beaver meadow
 - Common beaver meadow inhabitants
 - Swamp sparrows and other field songbirds
 - Meadow mice
 - Foxes

Clean Up procedures

- Account for all props and associated beaver parts and place into proper containers
- At end of day, wash off beaver dam activity model, pat dry and place in container but leave container opened to allow the activity model to fully dry over night.

