# Living Map -- Water and Life in Boulder County

**Presentation Theme:** Water travels dramatically through Boulder County, from the Continental Divide to the sea, supporting plants, animals, and people along the way.

**Water and Life in Boulder County**
Boulder County is a remarkable place. Its dramatic landscape, rising from the prairie to over 14,000 feet above sea level, supports an abundance of life found few places on Earth. Using our 12 X 16 foot "Living Map" of Boulder County, we will explore where the water that supports our diverse plant and animal life comes from, and trace how it moves through five biological life zones, from the Continental Divide to the Great Plains. We will also take a look at where some animals live and how they find the water they need to survive.

**Activity Set-up**

- Unfold Living Map and place on floor, north edge to blackboard
- Mount *Life Zones of Boulder County* banner on blackboard (optional)
- Place town labels on map that are most relevant to the program location: e.g, Nederland, Boulder, Louisville, Lafayette, Lyons, Longmont, etc.
- Place the "We Are Here" label on the map at the program location
- Place landmark labels on map that are most relevant to the program location: e.g. the Flatirons, Longs Peak, Continental Divide, Arapaho Glacier, Haystack Mountain, etc.
- Place drainage labels on map that are most relevant to the program location: e.g. Boulder Creek, Lefthand Creek, St. Vrain Creek, Rock Creek, etc.
- Place reservoir labels on map that are most relevant to the program location: e.g. Barker Reservoir, Beaver Reservoir, Buttonrock Reservoir, McIntosh Lake, Boulder Reservoir, Gross Reservoir

**Activity**

- Presenters stand at north side of map at front of room
- Arrange students around the remaining three sides of the map, standing for the intro and orientation to the map so they can see everything, and sitting for the wildlife exercise
- **Question:** What is this a map of? (Boulder County – area: 742 square miles)
- **Question:** What is a "county"? (a geographic area and unit of local government)
    - Colorado is divided into 64 counties
    - Boulder County is one of the original 17 counties created in 1861 as part of the Colorado Territory (Colorado became a state in 1876)
    - Largest county in Colorado: Las Animas County in SE Colorado (4,771 square miles)
    - Boulder County area is 742 square miles (51 of 64 counties in land area)

- **Question:** Where is north on this map? (Place north arrow on map and have students identify where south, east, and west are)
- **Question:** Where are we today? (school location; orient kids to the map: towns, drainages, landmarks, etc.)
- **Question:** Where do you think the lowest and highest elevations in BoCo are? (East edge of map where St. Vrain Creek leaves BoCo [just under 5,000 feet], and northwest corner of map at Longs Peak [over 14,000 feet])
- **Question:** How much does the elevation change between the lowest point in Boulder County and the highest point? (about 9,000 feet of elevation change)
- **Question:** Where do you think most of the water in Boulder County comes from? (From the mountains of western Boulder County near the Continental Divide, where it falls as snow or rain)
- **Question:** What and where is the Continental Divide? (The high peaks on the western boundary of Boulder County that determine whether water flows west to the Pacific Ocean or east to the Atlantic Ocean)
- In Boulder County, water flows east from the Continental Divide into many streams and creeks that are part of the South Platte River watershed. The South Platte merges with the North Platte River to form the Platte River, which is a tributary to the Missouri River, which then flows into the Mississippi River and down into the Gulf of Mexico.
- **Question:** How does most of the rain and snow get to the mountains of Colorado and Boulder County? (Weather patterns from the Pacific Ocean, driven by prevailing westerly winds)
- **Question:** Where do most of the people in Boulder County live? (On the plains east of the mountains)
- **Question:** How does the water get from the mountains to the people down on the plains? (Drainages indicated on the map)
- **Question:** What are all these blue blobs on the map? (Mostly human-made reservoirs)
- **Question:** Why do we need all these reservoirs? (We need to store water because we live in a semi-arid climate and usually receive less than 20 inches of precipitation every year) (compared to St. Louis MO: 38”, Chicago IL: 36”, Washington DC: 39”)
- **Question:** Besides people, what else needs water in Boulder County? (All plants and animals need water)
- Boulder County has more bio-diversity (many types of plants and animals) than most places. **Question:** Why do you think that is? (Because of the five different life zones and diverse ecosystems in BoCo created by the dramatic elevation changes – introduce the five life zones: alpine, subalpine, montane, foothills, and plains)
- Life Zones are identified primarily by the characteristic types of vegetation in each zone. Generally, average temperatures go down and precipitation goes up as you go move from lower to higher life zones.
- **Question:** Which life zone are we in today? (school site)
- **Question:** Which life zone is Longs Peak in? (alpine)
- So, we know that wild animals (or wildlife) live everywhere in BoCo, in all life zones, right? **Question:** What do you call anyplace that wildlife live? (habitat)

- **Question:** What do all animals need in their habitat to survive? (food, water, shelter, and space)
- **Question:** Do people need habitat too? (yes – ask for examples)
- Since all plants and animals need water to live, let's see if we can find where some of the animals in Boulder County might live
- Mix up wildlife pictures so they are not arranged by life zone
    - Alpine: pika and marmot
    - Subalpine: bighorn sheep and snowshoe hare
    - Montane: elk, bear, and porcupine
    - Foothills: mountain lion, mule deer, and Abert's squirrel
    - Plains: black-tailed prairie dog, coyote, and prairie rattlesnake
- If you have enough time, have students place wildlife pictures on map where they think the animals live **(students must take off shoes before walking on map)** If you don't have enough time, show all students the wildlife pictures and ask them where they think the animals live and place the pictures in the appropriate life zone(s)
- **Question:** Where do animals get their water? (streams, ponds, plants, and food)
- **Conclusion:** All living things (plants, animals, and people) need water to survive

***NOTE: This outline is only a suggested program template. Please modify or tailor your program to be appropriate for your group**

# Additional ideas for a program oriented toward water and wildlife (VNs Claudia Van Wie and Pam Payne, November 2016)

This program has three main sections:

1. 20 minutes: Introduce the map as done above. Emphasize that water flows downhill and trace the drainages from the Divide to the plains. Mention how that has shaped the land.
2. 20 minutes: Plants, wildlife and life zones
    - Give students 2 minutes to place stuffed animals/puppets on the map where they think they live. The animals should include species from all the life zones.
    - Starting in the alpine, show ecosystem poster and talk about plants, climate, and water. Move animals to or from the alpine as appropriate. Then do the same for each of the other life zones.
    - Ask how humans fit in and where they live and why.
3. 20 minutes: How water shapes where wildlife can live
    - Why do animals need water? How much of their body is water? What does water do in our bodies? Point out that all animals have the same basic needs for water, but some solve the challenges in different ways. Use the small "What does water do for you?" poster at end of this write-up.
    - Do a think/pair/share for 2 minutes: Select the animals you want to discuss (suggestions: pika, mountain goat, bear, bobcat, bee, owl, snake, prairie dog, deer) and toss the animals to students spaced around the map. Then ask them to figure out with their neighbors how each animal gets water given the life zone in which it lives.
    - Have each group share quickly what they discussed and add/correct information. Use the map to reinforce challenges and ease of finding water.
4. Summarize and challenge students to look as they go home to figure out where the animals they see or know live in their area find water.

**Requirements and sources of water in different animals**

1. Pika: don't need to drink; get water from plants
2. Mountain goats: get most water from food such as grasses, woody plants, and mosses
3. Prairie dogs: get all their water from plants; may eat snow in the winter when pregnant and nursing; this is why we don't see whole colonies of prairie dogs leaving their burrows to march to the nearest stream which would make the hawks and eagles very happy
4. Owls: get water from breaking down fat in the animals they eat; nestlings are not given water; may drink when bathing
5. Snakes: forked tongue can sense water at a long distance; don't need much water because the scales which cover their body form a lipd bi-layer that prevents evaporation; don't

form urine but instead excrete uric acid as pellets; can drink water off their backs when it rains

6. Bees: can fly up to 5 miles to find a suitable water source; will sip from standing water and take it back to their hive; don't like to get their feet wet so land on sticks or leaves; also get liquid from nectar in plants; use water in the hive to keep brood at proper humidity and temperature; on a hot day, will fan water droplets in hive with their wings to cool the hive down and can bring up to a gallon a day back to the hive for this purpose
7. Deer and elk move to lower elevations in winter: better food, water not frozen
8. Bears go into torpor in winter so need less water when it is more often frozen

# What Does Water do for You?

Needed by the brain to manufacture hormones and neurotransmitters

Forms saliva (digestion)

Keeps mucousal membranes moist

Regulates body temperature (sweating and respiration)

Allows body's cells to grow, reproduce and survive

Acts as a shock absorber for brain and spinal cord

Flushes body waste, mainly in urine

Converts food to components needed for survival - digestion

Lubricates joints

Water is the major component of most body parts

Helps deliver oxygen all over the body

http://www.scind.org/333/Health/what-does-water-do-for-you.html

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