Human Impact to Wetlands

Oregon State Standards

3.2
3.2P.1
3.3S.1
3.3S.2
3.3S.3.
4.2
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4.3S.1
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5.1
5.1L.1
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5.3S.3
5.3S.2
5.3S.3

Vocabulary

- Wetland
- Riparian
- Biodiversity
- Human Impact
- Run-off
- Point source pollution
- Non-point source pollution
- Invasive species

Summary: Students will explore a wetland or riparian area near their school, and gather data on human impacts to the wetlands connected to this area. Students will gather data to demonstrate whether their predictions were correct as to whether they will see more helpful or harmful human impacts to riparian area inhabitants and water quality.

Time: 45 minutes

Grade Level: 3rd - 5th

Goals

- Involve students in a discussion about human impacts to the environment and relate the discussion to a local area.
- Provide students with an opportunity to critically examine the health of a local wetland area.
- Have students go through the process of testing a hypothesis by collecting data.
- Model an example of a good stewardship practice

Learner Objectives

Students will… .

- observe human impact in a local natural area
- gather data and make inferences about impacts on the habitat
- discuss possible actions they can take to support nearby riparian and wetland habitat health
- participate in trash clean up as an example of good local stewardship practices.

Materials

- Data sheet, clipboard, and pencil for each student.
- Area maps for students to share.
- Cleanup bag with plastic trash bags and gloves for students, and hazardous material box for instructor use only (e.g., if used hypodermic needles are found.)

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Human Impacts to Wetlands

Background Information

Wetlands are areas in which water is present some or all of the year. Wetlands are classified by hydrology, hydric (saturated) soils, and hydrophytic (water tolerant) plant communities. Wetlands are generally separated into coastal wetlands and inland wetlands. Coastal wetlands include tidal marshes, estuaries, and marine environments. Inland wetlands include a variety of marshes, swamps, and fens.

Wetlands provide critical benefits to plants, animals, humans, and the total environment. Most wetlands, with their abundance of food, vegetative cover (shelter), and water, are rich with a diversity of wildlife species. In fact, wetlands are one of the most productive ecosystems on earth, rivaling that even of the rainforests, due to the diversity and abundance of plant and animal life found there. Biodiversity refers to the richness or variation of life forms found in an ecosystem or biome. Coastal and inland marshes, for example, are the breeding, resting, and wintering habitats for thousands of migratory birds, including ducks, geese, swans, shorebirds, herons, and other wading birds. Eighty percent of all breeding bird populations in the US and more than 50% of the migratory bird species rely on wetland habitat at some point during their lifecycle.

Riparian areas are the interface of a river or stream and the land. Riparian areas serve as a buffer zone for the water, and support a diversity of organisms. Vegetation in a riparian zone is generally adapted to living in semi-wet conditions, and provides a number of services that contribute to the health of the water. Vegetation typically prevents erosion by containing soil with a net of roots, filters contaminants, provides nutrients, and provides shade that helps regulate water temperature.

Throughout history, many human settlements have been closely tied to wetland and riparian areas. Proximity to wetlands allows people access to resources necessary for survival. This close relationship to wetlands generally leads to human impacts on the natural systems. **Human impacts** are influences that humans have on the natural environment, and generally refer to negative effects of human actions. Human impact on the environment may result from pollution, dams, deforestation, desertification, and overpopulation. Wetlands and riparian areas have experience significant human impact over the past 100 years as the human population and industrialization increased.

Major human impacts to wetland and riparian areas include alterations that interfere with the natural flow or cyclical patterns of flooding. Throughout the world, humans have altered wetlands and riparian areas significantly by converting them to agriculture, diverting their water to other locations for irrigation, installing dams to generate hydroelectric power, using their water to cool of power plants, channelizing them, draining them, and using them as dumping grounds for waste and chemicals. These actions are detrimental to the health of organisms that rely on these habitats, including plants, animals, and humans. A common problem for humans occurs when humans settlements are built without accounting for natural wetland cycles, and thus are subject to destruction by floods and severe weather.

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Background Information continued

Other human impacts may include actions that unintentionally damage natural ecosystems. For instance, non-native species have increasingly become an issue throughout the world. A **non-native species** is a species that is living outside of its natural distribution. Some non-native species do exceedingly well in their new environments and are called **invasive species** because they cause problems and outcompete native species. Wetland and riparian areas are often vulnerable to non-native and invasive species, as water is a medium that allows for the quick spread and widespread distribution of seeds, eggs, and aquatic species.

Humans can make decisions and take actions that support the abundance and survival of living things in riparian and wetland ecosystems. Two examples include adding nest platforms for Osprey use along water bodies and restoring damaged riparian areas by planting native plants. Things that people can do in their homes to limit their harm to local wetlands include using only non-toxic cleaners, discontinuing use of fertilizers and pesticides on lawns, conserving water usage in the home, and landscaping with plants that do not require frequent watering.

Getting Ready

- read over background information
- make photocopies of the student data sheet and prepare materials
- arrange to visit a local wetland or riparian area. (*Tip: To help foster a sense of stewardship, choose an area within walking distance of the school, or a place students are familiar with or able to visit regularly)*
- if necessary, scope out the wetland/river site where students will walk before the lesson. This will help familiarize yourself with the site and allow you to be aware of potential hazards.
- notify students the day before that they will be outside and will need to dress appropriately for the weather

Humans Engineering Rivers: dams and channels

An example of river channelization: River Rouge in Dearborn, Michigan, USA.
Photo from U.S. Army Corps of Engineers Digital Visual

An example dam: Gold Ray dam on the Rogue River, Oregon was originally built for hydroelectric power in 1902. The dam was removed in 2010 to allow for salmon migration upstream and to alleviate mud and debris build-up behind that dam that contained pesticides and heavy metals.
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Human Impacts to Wetlands

Discuss!

- Ask students to define "human impact," and provide examples of both negative and positive impacts human may have on a habitat.
- Define wetland and riparian area for the students. Ask students to recall the last time they visited a local river or wetland. Do they remember observing any human impacts to the wetland?
- Discuss the background information with the students.
- Tell the students that they will be observing a local riparian/ wetland area to assess the human impacts on the habitat for living things and water quality. Ask the students to come up with examples of human impacts that they may see.
- Have students make a prediction about whether they will observe more positive or negative human impacts on their walk.

Investigate

1. Before leaving the classroom, distribute a clipboard, data sheet and pencil to each student. Have students write their names on data sheets. Hand out area maps and orient students to their school, nearby roads, buildings, and other landmarks. Point out the route that group will take to and from the river/wetland. Remind students of the connections between this body of water with surrounding areas (e.g. does this water flow into a local drinking supply, area for irrigation or wilderness area?) Have students carry maps on clipboards, under data sheets, for reference.

2. Once outside, ask students "What human activities near our school might impact the water quality and health of things living in and near the wetland/river?" Allow a few minutes for discussion. Then have each student complete their hypothesis on their data sheet. Encourage students to look for signs of human impact as they walk to the river. Instructor carries cleanup bag, so students can pick up trash where appropriate, as an example of helpful human impact.

3. Stop and gather students in a location that shows clear sign of human impact. Ask students what impact(s) they see. Have them record on their data sheet whether this impact is helpful or harmful, and why. Check to see that data sheets are filled out before proceeding. (Collect trash at this location, if appropriate.)

Point and Non-point Source Pollution

Non-point source pollution comes from a , such as surface runoff is a major threat to bodies of water, especially in coastal areas.
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Point sources of pollution come from a single identifiable location, and include power plants which are often situated near rivers or coastlines in order to use water for cooling of the plant.
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Human Impact to Wetlands

Investigate continued

4. Continue toward the wetland/river, prompting students to find signs of human impact that are both helpful and harmful. Record data, collect trash and discuss along the way. Once at the wetland/river (or an appropriate, safe open area) allow students to explore on their own or in pairs, filling out individual data sheets. Set boundaries for exploration. Ensure students remain in sight and away from roads, high running water, and other hazards.

5. Gather students back into a group and ask them to tally their data. How many signs of helpful human impact did they see? How many signs of harmful human impact did they see? Circle which they saw more of. Were their predictions correct? As they walk back to class, encourage students to think about actions they can take to support riparian area / wetland health and actions they can take to reverse or prevent harmful impacts.

Examples of human impacts to look for:

- Roads and buildings built on former wetlands (water extracted, land filled in)
- Pollution, including food containers, oil spills, abandoned machinery, etc
- Irrigation ditches, tunnels, pipes
- Use of fertilizers or pesticides
- Waste treatment plants, dairy farms, cattle farms, logging mills
- Bird boxes, nest platforms, bird feeders
- Interpretive trails or signs, protected area signs
- Areas stripped of vegetation, which allow sediment to runoff into water
- Erosion areas
- Buffer zones of grass or forest to prevent soil runoff
- Areas where non-native plant species are thriving
- Areas where native plants species have been planted

Conclusion

1. Ask students to count the number of helpful and harmful impacts they recorded on their data sheet. Was their prediction supported or not?

2. Ask students to reflect on the organisms they noticed during their walk (waterbirds, trees, plants, fish, insects, etc...) Ask students to discuss the human impacts they saw, and write inferences about how they may affect certain organisms.

3. Discuss with students what actions could be taken in the area to help the organisms that live there, as well as the water quality.

4. Ask students to think about specific actions they can take to have a positive impact on the habitat in the area.

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Classroom Extensions

Historical background: Have students conduct research about the history of land use in the area. How have human impacts affecting the wetland/riparian area changed through the years? If historical photographs or maps are available from the town library or online, have students examine and discuss the observable changes.

Outdoor connections

If the nearby area examined in this lesson plan has the potential to be enhanced, consider having the class engage in a *service learning project*.. Lead students through the process:
1. What are the students' goals to improve the area?
2. What steps are needed to achieve their goals?
3. What is the best plan of action? (What is an appropriate timeline and are there long term needs for maintenance or monitoring?)
4. Can other community members be involved in the project? Will they benefit from the project? Can they help achieve the overall goals of the project?
5. What resources are needed to complete the plan and how will they be obtained? (e.g. materials, assistance from others, what permission they may need to obtain etc)
6. Implement the plan!
7. Celebrate their planning and hard work
8. Have students reflect on their project and think about ways to engage with the community and publicize the project

Further Resources

• Environmental Stewardship Topic Page. National Service Learning Clearinghouse website. December 4, 2012 available online: <http://www.servicelearning.org/topic/area-service/environmental-stewardship>

• Educator Resources. 2012 SOLVE website. December 4, 2012. available online: <http://www.solv.org/leader-resources/educator-resources>

Himalayan Blackberry:
removing an invasive plant species

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Himalayan Blackberry, a plant now widespread throughout the Pacific Northwest was brought over from Europe. Difficult to remove, it grows prolifically along streams and wetlands, and has dramatically changed the habitat for native species.

Link to KBO lessons:

Invasive Plant Removal for Bird Habitat

- Students learn about invasive plants and their effects on bird habitat. Their understanding is applied through a service learning project in which they restore a natural area for healthy bird habitat.

Teachers restore streamside habitat for birds by removing Himalayan blackberry and suppressing its growth around native vegetation with cardboard and mulch.
Photo © 2013 Klamath Bird Observatory

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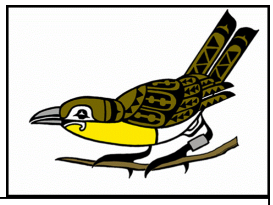

Human Impacts to Wetlands

Collect data about human impacts. For each impact, record whether you think it is helpful or harmful to wetland water quality and the health of things living in and near the wetland. Explain why. Finally, think of things WE CAN DO, now and in the future, to reduce harmful human impacts and create helpful im-

Human Impact	Helpful or Harmful. Why?	What can we do to help?
EXAMPLE: *cars driving by*	*EXAMPLE:* *Harmful - car exhaust pollutes the air that creatures breathe*	*EXAMPLE:* *Carpool, ride bicycles, walk*

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