

DROPS OF KNOWLEDGE FOR RIVERS OF CHANGE



GLOBAL TEACHING
AND LEARNING MATERIAL

A hands-on guide to teaching
and learning about
water, sanitation, hygiene,
and the environment

SWAROVSKI
WATERSCHOOL

ACTIVITY 7.3: EXPLORING YOUR RIVER – WATERWAY MAPPING AND HABITAT ASSESSMENT (Adapted from Swarovski Waterschool China)

As a main source of freshwater on Earth, the river network not only nourishes the land on which human civilizations are developed, but also plays a significant role in the evolution of the ecosystem. A river provides a habitat for the many plants, animals, and organisms that utilize water and nutrition from the river and produce “waste” for other organisms to use. Organisms in a “healthy” river can absorb excessive organic matter to clean the water. They are also part of food chains through which energy and nutrition can be fully used through the cycle of the system. As vessels of the biosphere, the rivers in a network also transfer water and nutrition to other freshwater biomes such as lakes, ponds, deltas, wetlands, and grasslands through on-the-ground and underground channels.

Human activities are changing the natural landscape. In rural areas, water withdrawal and pollution caused by agriculture, domestic usage, and industry are changing the water quantity and quality of rivers. In cities, issues of water shortages and pollution are even more serious. Artificial rivers such as canals and waterway transformation projects are radically different from rivers in nature, but they can still support life within or alongside them.



STUDENTS EXPLORING THEIR RIVER, SWS CHINA

A river is not merely running water: it is a delicate system in which water, environment, and all kinds of organisms interactively support each other. How are rivers in nature, villages, and urban areas supporting human activities and other living things? What kinds of plants, animals, insects, and other organisms live in the river ecosystem? What are the criteria and indicators to measure whether a river is healthy or not? This activity allows students to explore a selected river near their school, so they can learn by themselves and find answers of their own. The suggested age for this activity is 12–18 years old.

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Time: 90 minutes / **Thematic Areas:** Geography, Environmental Education /

Goal for Learning: Enhance students' awareness of the interrelatedness of the life-support system of rivers to humans and other species, and therefore promote understanding of the importance of conserving river ecosystems.



Materials: Map of the area where the activity will be performed / Gloves / Checklist and pens or pencils to record observations (see Step 3 below) / Bottles (to hold water samples) / Magnifying glass / Poster board or cardboard / Colored pencils or markers

ACTIVITY STEPS:

1

SELECTING THE SITE: Before beginning the activity, teachers should select a small section of a river, stream, or creek near the school or neighboring community as the site for observation, water sample collection, and measurement. When choosing a site, consult with a local administrative department to make sure the area is safe.

The site should be an open area where students can safely get access to the water. The riverbank at the selected site should not be too steep, and a site with trails going from the bank to the water edge is preferred.



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2 **GENERAL INVESTIGATION:** Using an amplified map of the area, students should investigate the stream and surrounding land and note locations and information on: > the patterns of land use, such as farming, grassland, uncultivated land, or forest > possible pollution sources, such as industry, factories, and wastewater outlets > environmental problems, such as soil erosion or littering > landmarks, including roads, drains, buildings, fences, and bridges

3 **STREAM HABITAT ASSESSMENT:** Stream habitats include the aquatic zone (the habitat found in the water) and the riparian zone (the habitat around the water). These zones are related to each other. Students should examine these zones and note the characteristics of different areas and types of vegetation and small animals found in specific areas, filling out a checklist similar to the one below.

Zone	Area type	Characteristics	Vegetation	Animals
Aquatic	Ripples	Shallow, rock or gravel ...		
	Pools	Deeper areas, slow-flowing water ...		
	Runs	Deeper than ripples and faster than pools ...		
Riparian	Top of bank			
	Face of bank			
	Sandbar zone			
	Toe of bank			

Students can collect water samples from different sites in the same watershed areas and compare them using a magnifying glass. They can record the findings from each of the places and compare the sediment concentration and other properties of the samples. If time permits, the students can draw conclusions relating to comparison of the samples with the local environment from which the samples were collected.

- 4 Observing the stream: Students should choose a site to take notes for one hour during a day or over a few days about the activities on or near this water resource. They should make a detailed list of how the water is used, by whom, and for what reasons.
- 5 Mapping the stream: Mapping involves drawing a detailed sketch of the site area, showing all the important features that affect the habitat or water quality. Use different colors and symbols to add information the students have collected through the investigation and habitat assessment to a basic map of the area. Ask the students to point out locations where they made the habitat assessment and recorded water usage activities. When these maps and lists are finished, display them in the classroom and discuss them

Optional Extension:

- 6 Additional physical-chemical assessments could be made, according to the students' course schedule and capabilities, and conditions at the observation sites. By measuring water temperature, depth, flow rate, and quality, students will gain a comprehensive understanding of how these factors are affected by and influence the riverbank's structure, including rocks, soil, and vegetation.

Regular monitoring of the biological, physical, and chemical changes at the site could be carried out so that students will see how supportive or destructive changes in one element or several affect the waterway and surrounding vegetation. The students' monitoring results can be used to generate conservation actions to protect the health of the stream.

OBSERVATION AND DISCUSSION:

What kinds of vegetation and animals live in the different zones of river habitats?

How do these various organisms utilize water resources? What supportive and destructive effects are they facing in their survival? How do you think these organisms have developed to adapt to their environment?

ACTIVITY 7.3

How do humans directly or indirectly utilize the water resources? How did artificial construction change the river habitat?

What criteria do you think could be used to determine if the river is healthy or not? Do human activities positively or negatively influence the health of the river?

ADDITIONAL
RESOURCES:

Southwest Florida Water Monitoring District, "Water Quality Monitoring," www.swfwmd.state.fl.us/education/kids/watermonitoring

U.S. Environmental Protection Agency, "World Water Monitoring Day," water.epa.gov/type/rsl/monitoring/monitoringmonth.cfm

“This activity made me realize that all the components in the ecosystem are interconnected. I planted trees in my school and also the village because they purify air and give out oxygen.”



SWS INDIA

—STUDENT, AGE 12, SWAROVSKI
WATERSCHOOL INDIA