

EVERYTHING FLOWS DOWNSTREAM

GOALS

- Understanding how each of us contributes with our own actions to the pollution of a river that flows towards the sea
- Recognize how this “contribution” can be reduced
- Identify good practices to combat the phenomenon of pollution
- Differentiate between point sources and non-point sources of pollution

WHERE

In the classroom

TIME

About 1 hour

TOPIC

Ecology; pollution with particular reference to plastic

LEVEL OF PHYSICAL ACTIVITY

Light



BASE CONCEPT

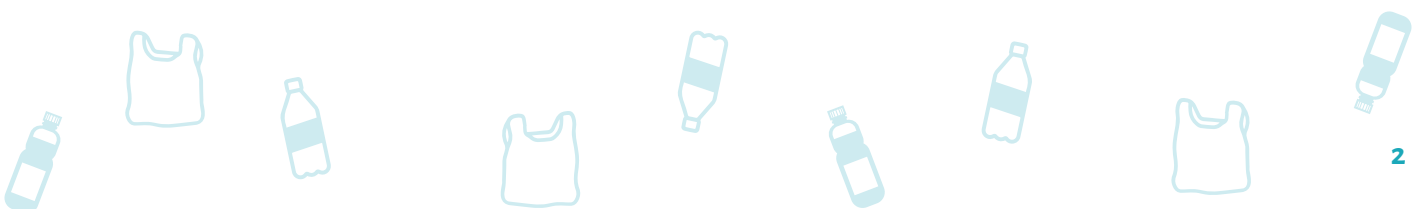
The quality of the water in a river or lake is a reflection of the use made of the soil and the natural factors present in its basin. If the soil near a river or lake erodes naturally, the river is likely to have sediment and turbidity problems. If the ground has stable vegetation covers, erosion is kept under control. As humans settle and change land use, water quality is affected. Plowing fields, cutting down forests, building cities, extracting raw materials: every type of land use affects water quality

Each of us is responsible for the health of watersheds and related water systems (rivers, lakes, wetlands, etc.). Individual actions, both negative and positive, add up. Knowing the state of health of a river or lake involves studying the conditions of its basin: **if it is polluted, the river probably will be too**. River basin surveys are conducted for a variety of reasons: to observe changes in river flows, to monitor fisheries and protect species, to regulate water flows or prevent floods.

This information is of paramount importance to policy makers and water managers. For example, it would be pointless to spend thousands (or even millions) of euros to clean up a lake if basin problems pollute it again. When watershed managers investigate land use practices that could affect water quality, they address two general sources of pollutants: **point source and non-point source**. Point source pollution involves pollutants that are discharged that can be traced back to an identifiable source, such as a factory outlet pipe or sewage drain. Non-point source pollution occurs when the source of a contaminant is not identifiable; that is, the pollutant can come from different places.

Examples of non-point source pollution include runoff of water containing fertilizers and pesticides from agricultural fields, motor oil from urban areas, or eroded riverbank sediments.

Surface and groundwater runoff carries pollutants from both point and non-point sources. From the point of view of monitoring and managing pollutants, those of punctual origin are easier to manage, unlike those of non-punctual origin which represent a great challenge to the protection of hydrographic areas due to the widespread and diverse nature of the problem.



? HOW DO YOU DO IT?

BEFORE YOU START:

Using a blue marker, draw and color a river on the poster, as shown below.

- Divide the river flow in half and crosswise into sections. Each section should provide space to include student drawings. The number of sections must correspond to the number of students or groups of students working together.
- Number the sections on one side of the river in sequential order, placing the numbers in the upper left corners and repeat similarly for the other side.
- Cut sections of the river stream

WARM-UP:

- Determine students' knowledge of watersheds by asking them to name some of the major rivers in Italy. Where do these rivers originate (where are their springs) and where do they flow? How many regions do they flow through?
- Discuss some major types of land use found along a river as it flows within a region. Ask students if and how these activities affect the river

- 1 Inform students that they have just inherited a piece of riverside property and one million euros and ask them to list ways they could use the land and money.
- 2 Distribute the properties "piece by piece" and ask the pupils to draw how they intend to use it with pens and pencils. Explain that blue is the color that corresponds to water and empty space is the land they own. Remember that they have one million euros to use the land with total freedom: they can cultivate or ranch, build resorts, houses, factories or parks, plant forests, timber plants, ecc.
- 3 When students have completed their drawings, ask them to read the number in the upper left corner of their property. Explain that every piece of property is part of a puzzle. You need to start with number one; it will then be necessary to ask the students to assemble their pieces in such a way as to build the path of the river.
- 4 Ask students to describe how they chose to develop their land and how they used the water available. In this phase of the game, students should try to identify in their choices those actions that pollute or add materials to the stream. Students can help themselves through the use of objects in the classroom to represent debris or pollutants (e.g. book, pen, pencil, pieces of paper).
- 5 Ask students to take their items and line them up in front of their property and then pass them along to nearby classmates as the river flows downstream. The students will have to say what kind of pollutants they have put into the river with their activities before passing them on to their classmates. Then number one will pass their items to number two and so on until the last students have all the items.
- 6 In the end, the students have to claim their objects and in doing so they will have to distinguish those that come from point sources of pollution, i.e. objects that are easily recognizable as their own, from those coming from non-point sources that correspond to objects that are more difficult to recognize (e.g. pencils, paper clips, push pins...).

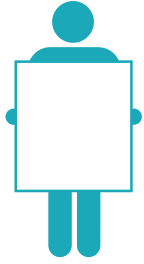
DISCUSSION:

- How did the students feel towards the middle or end of the river? cWhat can be said instead about the choice of using the river property received?





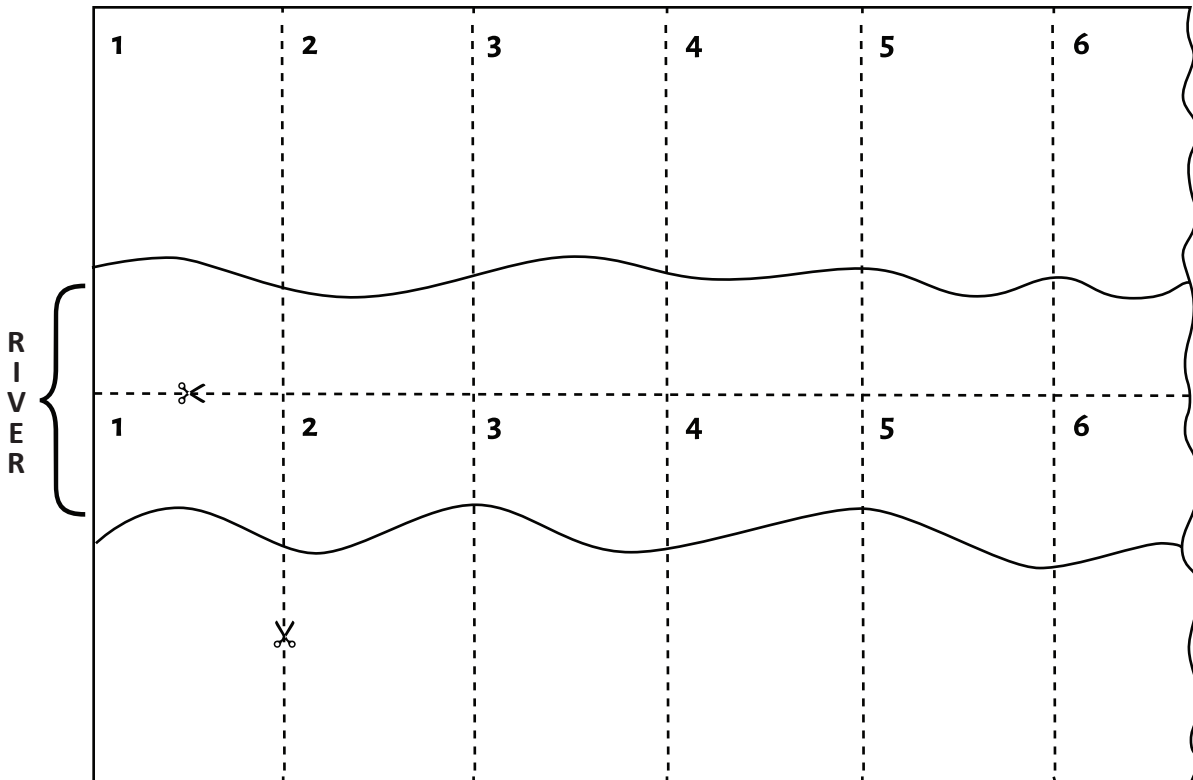
WHAT DO I NEED?



**A LARGE
BOARD**



**MARKERS
AND PENCILS**



MAIN NON-PUNCTUAL POLLUTION SOURCES AND MAIN SOLUTIONS

SOURCE

SOLUTION



Roads

- Dispose of paints, solvents and petroleum products in special sites authorized for the treatment of special waste;
- check the oil and any leaks from cars; use materials of natural origin (sand and ash) on roads, sidewalks and driveways;
- build a sediment catchment basin to collect stormwater runoff.



Agriculture

- Read and follow all labels and ask for application directions before using chemicals, fertilizers, and pesticides;
- do not modify the natural filtering strips of land and the wetlands along the watercourse;
- use cover crops to protect exposed soil and to ensure crop rotation;
- create plant protection belts and windbreaks;
- establish grazing management plans;
- protect the terraced areas exposed to erosion;
- build ponds for the collection and treatment of livestock waste; seal off;
- abandoned disposal wells;
- create fencing waterways to reduce the impact of riparian zones on livestock.



Mining

- Monitor the water entering/leaving mining sites;
- intercept and redirect uncontaminated water away from contaminated areas;
- build catch basins and terraces and cover crops, to catch sediment and prevent road erosion;
- collect and treat contaminated water;
- stabilize flow channels and mine discharge areas to prevent material release.





Construction work

- Implement a sediment control plan;
- land cover to reduce erosion;
- dispose of solvents, waste and paints in the appropriate authorized disposal sites;
- build small temporary dams to slow down the flow of water;
- build sediment collection basins to be able to collect them through water filtering;
- use compounds of natural origin (sand and ash) on driveways and sidewalks.



Residents

- Read labels before using toxic pesticides and fertilizers;
- be sure to dispose of special household waste in the appropriate disposal sites;
- maintain septic tanks if sewers are not available.



CREDITS

This game was made by “[Sailors for the sea organization](https://www.sailorsforthesea.org/)”, thanks to developers Laura Dunphy and Rachael Miller of the Rozalia Project for a Clean Ocean. To learn more about the project cleaning up the oceans and find useful information about marine resources and debris, visit the website www.rozaliaproject.org.

REMEMBER THAT SHARING IS IMPORTANT!

Take a picture to tell us about your experience in class and send us an email at: info@istituto-oikos.org.
Share it on social media with the hashtags: **#LifeBeyondPlastic#PlasticLessSchool!**

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