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Water: from the source to the treatment plan

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As a biology and geology teacher, I have worked on water, from the source to the treatment plant, with pupils between 14 and 15 years old.

Lesson 1. Introduction, the water in Vienna
Aim: The pupils have to consider why the water is so important in Vienna (history, economy etc.)
Activities: Brainstorming about where and why we use water every day and why the water is different in Vienna.

Lesson 2. Soil, rock and water
Aim: Permeability/ impermeability of the different layers of earth
Activities: The pupils have measure the permeability and porosity of different stones: granite, clay, sand, carbonate and basalt.

Lesson 3. Relationship between water's ion composition and the stone's mineralogy
Aim: Each water source has the same ion composition as the soil where the water comes from.
Activities: Comparison between the stone's mineralogy and ions in water. They had a diagram with the ions of granite, clay, sand, carbonate and basalt and the label of different water. They had to make hypotheses about the type of soil where the water came from. They verified this with a geology map of France and Austria. They have to make a profile of the area where the water comes from. They had to confirm or reject their hypothesis.

Lesson 4 .Water-catchment and reservoir rocks
Aim: Construction of a confined aquifer and artesian well
Activities: With sand, clay and a basin, they have to model a confined aquifer and make an artesian well, using what they have learned in lesson 2.

Lesson 5. Organic material breakdown and it's affect on the oxygen levels in an aquatic ecosystem
Aim: Evaluate the relationship between oxygen levels and the amount of organic matter in an aquatic ecosystem. Explain the relationship between oxygen levels, bacteria and the breakdown of organic matter using an indicator solution.
Activities: Put 5 ml of a different water sample in each tube with 20 drops of methylene blue. Observe the tubes after 1 month.

Lesson 6. Visit to the biggest water treatment plant in Europe in Vienna

Lesson 7 Water Quality Monitoring: Biochemical Oxygen Demand
Aim: Measure the quantity of oxygen used by microorganisms in the oxidation of organic matter for different water; downstream and upstream of polluting refuse, after addition of glucose, milk or humus in the water.
Activities: After dissolution of the different samples of water they measure the dissolved oxygen with the Winkler Method.