

Ecosystem in a jar



Simple classroom experiments can help children understand ecology, the science of how different species interact with each other and their environments. The Ecosystem in a Jar experiment tracks down a plant growth in a jar and the changes it takes in its interaction with small organisms and other factors.

Printable resources attached: List of materials

Additional material needed: Jar with a lid, pebbles, soil, moss, water (optionals: some other organisms)

Territory 3 - The Crazy Bayou



Total duration: 45 min.

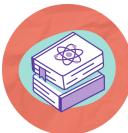
Explanation and Building ecosystem - 45 min.
Observing changes - days/weeks



Learning objectives



Understanding natural systems and technical systems



Practising scientific approaches



Acquiring tools and methods



Experimenting, producing, creating



Understanding the quantities and measures

Linked SDGs



Game modalities

8 - 12 years old

In the classroom

At home

This production forms part of the material produced by the Unplugged project which has received funding from the European Union's ERASMUS + programme under grant agreement n° 2020-1-FR01-KA227-SCH-095528. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License (<http://creativecommons.org/licenses/by-sa/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made and share alike.



Co-funded by the Erasmus+ Programme of the European Union





Pedagogical topics



Concept of an ecosystem: It is important for children to understand the interconnected nature of all life forms in an ecosystem. An ecosystem is a community of interacting organisms and their environment. Ecosystems can be small and large. An ecosystem is made up of all of the living things (biotic) like plants, animals etc. and nonliving things (abiotic) like water, rocks, soil, sand etc. in an area. The major elements of an ecosystem are water, water temperature, plants, animals, air, light and soil.

Interaction between components of an ecosystem: There are interactions both within and among the biotic and abiotic factors. Producers, Consumers and Decomposers are the biotic components and interact by passing food and energy from one to another. However, living organisms also need abiotic components such as sunlight, water, soil etc. to grow, reproduce and survive. There is also interaction among abiotic components. For example, sunlight increases temperature and thus evaporation from water increases. This in turn increases the humidity of the atmosphere which leads to rainfall. There are many more interactions.

Human-nature interactions: Ecosystems change over time. Sudden disruptions such as volcanoes, floods, or fires can affect which species will thrive in an environment. Human activities such as pollution, overhunting, and deforestation have also contributed to the disturbance of many ecosystems.

Exploring and experimenting: After getting general information about the ecosystem, children could be involved in various activities and can learn more about the ecosystems by exploring their own communities and building their own ecosystems through these hands-on activities. The more kids learn about their footprint in the world at a young age, the more conscious they'll be as teens and adults. By doing experiments, children will think like "scientists," making hypotheses, observations, and analyzing data.

Open discussion on the results of experiments: Children can present their findings to the class. The teacher can use this opportunity to find out what for example children know about plants or animals in their local environment or examples where humans have had an impact on an ecosystem. Teachers can also address some misconceptions about the functions of the ecosystem components during the discussions, as well as link discussions to SDGs.



Ecosystem in a jar



Game rules

Game narrative

Ecosystem in a jar is an experiment which introduces components of the miniature ecosystem in a jar. Once a jar is closed, the plant uses the water, sunlight, and nutrients from the soil to survive. As the plant loses some leaves, they are broken down by bacteria and become nutrients in the soil. With the right balance, the ecosystem inside the jar can survive for years. By observing these changes and interactions among organisms and their environment, children will understand how the CO₂ cycle works, how each factor influence the natural cycle etc.

Game rules:

Children should already be familiar with the concept of ecosystem and that all plants need light, air and water for growth. To create a mini-ecosystem, children will need a transparent jar so that light can get through, some potable water and various natural materials. Depending on the level of the experiments jar can also contain Producers (algae and higher plants), Consumers (tiny animals), and Decomposers (bacteria and fungi). Refer to the Going Further section to see an example of ecosystems in a jar.

Children will not see immediate results. They will need to observe the changes in the jar for several days/weeks.

Role of the teacher and game organisation:

Before starting to build the ecosystem, perform a brainstorming to showcase what children know about ecosystems (make explicit their ideas to build from them afterwards). A discussion about the elements/factors needed to make the ecosystem work properly takes place to prepare for the experiment and trace their impact.

Teachers then explain how to create a working ecosystem, requirements for living things and a functioning ecosystem. They could also encourage children to make detailed observations and answer the questions.





Game rounds

Round 1

Children are given instruction on how to build a mini-ecosystem:

1. Take a transparent jar with a lid. Fill 1st layer of small pebbles, Fill in the 2nd layer of soil, Fill in the 3rd layer of moss.
2. Add a few drops of water by pouring them on the moss.
3. Close the lid tightly and put in the sun for a few days/weeks.
4. Observe how water evaporates and rises to the top. Drops of water appear on the glass and run down back into the soil.

The plants in the glass don't dry up, as they have everything they need: light, water, soil and air.

Children then need to observe the changes in the jar during a certain period agreed with the teacher and note down their observations. The results will be presented and discussed in several days/weeks time.

Round 2

Children could be tasked to create a more complex ecosystem in a jar that would contain Producers (algae and higher plants), Consumers (tiny animals), and Decomposers (bacteria and fungi). Or experimenting with different simulations like:

- 24 hours of light vs. natural (12 to 14 hours)
- low pH (simulates acid rain) vs. actual pond pH
- no light (cover with black paper)
- addition of small quantities of fertilizer (simulates fertilizer runoff)
- cold vs. warm temperature
- addition of salt (simulates road salt runoff)
- addition of commercial phosphate detergent (simulates pollution)
- coloured cellophane around jars (growth under different colours of light)



Going further



Topic 1 - Concept of Ecosystem

- How to create Ecosystem in a Jar: <https://www.nsta.org/science-teacher/science-teacher-januaryfebruary-2021/ecosystem-jar>
- What Is An Ecosystem: <https://learnykids.com/worksheets/what-is-an-ecosystem>
- Ecosystems, Science Lesson For Kids: <https://www.generationgenius.com/ecosystems-for-kids/>
- The Ecosystem, Educational Video for Kids - YouTube: https://www.youtube.com/watch?v=q_U1P7XwhI



Topic 2 - Interaction between components of ecosystem

- Interaction In Ecosystem - YouTube: <https://www.youtube.com/watch?v=XJ6VtduDyY>
- 10 Biotic and Abiotic Components Ecosystems With The Explanation: <https://deepoceanfacts.com/biotic-and-abiotic-components-ecosystems>



Topic 3 - Exploring and experimenting

- Lesson plan on investigative science ecosystems: https://www.nfer.ac.uk/media/3097/timss_lesson_plans_ecosystems.pdf
- Hands-On Activities for Introducing Ecosystems to Elementary Students: <https://www.plt.org/educator-tips/ecosystem-activities-elementary-students>
- Activities and Experiments to Explore Photosynthesis in the Classroom: <https://www.plt.org/educator-tips/activities-experiments-photosynthesis-classroom/>



Topic 4 - Open Discussion

- Sustainable Development Goals | United Nations Development Programme: <https://www.undp.org/sustainable-development-goals>
- Ecosystem Worksheet For Kids - kidsworksheetfun: <https://kidsworksheetfun.com/ecosystem-worksheet-for-kids>
- Common Misconceptions about Biomes and Ecosystems: <https://beyondpenguins.ehe.osu.edu/issue/tundra-life-in-the-polar-extremes/common-misconceptions-about-biomes-and-ecosystems>



Materials



MATERIALS

1. Transparent large glass or plastic jar.

2. Pebbles

4. Sand

5. Moss

6. Water

Optional:

7. Earth Worms

8. Other plant eating insects

9. plants



Image source: kucastil.rs