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| **Project ID: 2021-1-CZ01-KA220-SCH-000034484**  logo of the Le MOON Project  **COURSE FOR ENVIRONMENTAL EDUCATION**  *e-Modules: Teaching Learning activities and their technology enhanced material set to develop*  ***DISCLAIMER***  *Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.*  **COURSE AUTHORS**   |  |  | | --- | --- | | Logo of the Jouvet Highschool | Anne CHIAMA, Paul FERNANDEZ, Frédéric GUILLERAY |   **COURSE SHARING LICENSE**   |  |  | | --- | --- | | Logo of creative common licence | You are free to:   * Share — copy and redistribute the material in any medium or format for any purpose, even commercially. * Adapt — remix, transform, and build upon the material for any purpose, even commercially. | |

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| **MODULE 1** | **HUMAN AND NATURE** |
| **PART 4** | **The roles of producers and consumers on the natural balance** |
| **Lesson 1** | **Producers and consumers in ecosystems** |

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# 1. COURSE TIME, TARGET AND TOPIC

* **Age of target students:** 15+
* **Teaching time:** 1 hour
* **Disciplines:** Biology
* **Title:** Producers and consumers in ecosystems

# 2. COURSE OBJECTIVES

## Competences promoted in this lesson:

* Communication in foreign languages competency
* Digital competency
* Learning to learn competency
* Social and citizenship-related competencies

## Lesson objectives:

* The students discover the components of an ecosystem and the relationship between species in an ecosystem
* They discuss the roles of producers and consumers on natural balance.

# 3. LEARNING – TEACHING PROCESSES

There are 4 activities in this lesson:

1. **ENGAGE:** Initial representation and recall
2. **EXPLORE: The Earth, a set of ecosystems** (watch a video, if there is time, make Internet research and a short presentation)
3. **EXPLAIN: Ecosystems, communities of interacting living beings** (work in group to complete a table)
4. **EXTEND: You’re an exobiologist** (create an imaginary ecosystem)

# 4. EVALUATION

The evaluation is described in the last part of document.

# 5. DOCUMENTS

### ENGAGE

*Initial representation and recall*

This moment is useful

* to bring out the students' mental models,
* and to reactivate certain notions.

## 1. ECOSYSTEM

Ask the students if they can define the word ecosystem and what it means.

Collect their initial representation and record it on the board.

## 2. TROPHIC CHAIN

Ask students if they ate sunshine this morning.

They will say no of course.

Then ask what they ate and list the main foods.

Discuss the origin of each. Most should come from plants (except for salty breakfast with eggs and bacon for example).

Then start with the plants and ask what they eat to make their matter.

Come up with the idea that they consume mineral matter (water, carbon dioxide, mineral salts) and energy from the sun. Then explain the definition of "**Producer**".

Then ask for animals, what they eat. The concepts of **herbivore** and **carnivore** should come out.

Come up with the idea that they consume organic (living) matter to make their own. Then explain the definition of "**Consumer**".

We can distinguish between Primary Consumers who feed directly on producers (called herbivores) and Secondary Consumers who feed on primary consumers (called carnivores). In an ecosystem, there can even be tertiary consumers feeding on secondary consumers.

Recall what are the **decomposers**: all organisms that feed on the dead matter and waste products of all other living things. It decomposes organic matter.

Finally, define a food chain or **trophic chain**: the set of relationships that develop between organisms based on how they feed. Includes producers (plants), primary consumers (herbivores), secondary consumers (carnivores), and decomposers.

### EXPLORE

*The Earth, a set of ecosystems*

**Q1.** Watch this video explaining what is an ecosystem and what are the different types of ecosystems:

<https://www.youtube.com/watch?v=H6PBtCfgcHo>

(from the Youtube *Channel Smile and Learn – English*)

**Q2.** Choose an ecosystem and, with research on Internet, describe some components of its biotope and gives examples of species from its biocenosis (at least animals, plants)

• Desert

• Jungle

• Woodland

• Tundra

• Taiga

• Grassland

• Savanna

• River

• Lake

• Sea

• Ocean

### EXPLAIN

### *Ecosystems, communities of interacting living beings*

**Q.** For each type of relationship between organisms in a ecosystem, **complete the table** with:

* The good **definition** 🡪 cut and paste the definition in the 2nd column
* The **consequence** **for each species** in a relationship 🡪 neutral (0), with benefit (+) or with harm (-)
* A good **example** 🡪 cut and paste the picture in the 5th column and explain in few word

**DEFINITIONS**

|  |  |
| --- | --- |
| a symbiotic relationship where one organism benefits and one is harmed | when two or more organisms rely on the same environmental resource |
| a symbiotic relationship where one organism benefits and one does not benefit but is unharmed | behavior of one animal feeding on another |
| a symbiotic relationship where both organisms benefit |  |

*definition: www.nationalgeographic.org*

**EXAMPLES**

**Attention: one of the relations is in double... Choose only one of the two duplicate images for the corresponding relationship**

**Une image contenant collage, mammifère, capture d’écran

Description générée automatiquement***picture: pixabay.com*

**BIOCCENOSIS INTERACTIONS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RELATIONSHIP TYPE** | **DEFINITION** | **SPECIES 1\*** | **SPECIES 2\*** | **EXEMPLE** |
| **Neutralism** | When two or more organisms coexist without affecting each other | **0** | **0** | Une image contenant invertébré, Macrophotographie, araignée, arthropode  Description générée automatiquement  A spider and a plant have no interaction with each other |
| **Commensalism** |  |  |  | *Paste a picture* |
| **Predation** |  |  |  | *Paste a picture* |
| **Mutualism** |  |  |  | *Paste a picture* |
| **Competition** |  |  |  | *Paste a picture* |
| **Parasitism** |  |  |  | *Paste a picture* |

**\* how to code the consequence for the species?**

**0** : indicate no effect to/on the species in this interaction -- **+** : indicate that this species has a benefit in this interaction **-** : indicate that this species is harmed in this interaction

**BIOCCENOSIS INTERACTIONS (CORRECTION)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **RELATIONSHIP TYPE** | **DEFINITION** | **SPECIES 1\*** | **SPECIES 2\*** | **EXEMPLE** |
| **Neutralism** | when two or more organisms coexist without affecting each other | **0** | **0** | Une image contenant invertébré, Macrophotographie, araignée, arthropode  Description générée automatiquement  A **spider** and a **plant** have no interaction with each other |
| **Commensalism** | a symbiotic relationship where one organism benefits and one does not benefit but is unharmed | + | 0 | Une image contenant hibou, oiseau, Oiseau de proie, plein air  Description générée automatiquement  The bird benefits from nesting in the tree, but the tree gains nothing. |
| **Predation** | behavior of one animal feeding on  another | + | - | Une image contenant oiseau, oiseau aquatique, bec, plume  Description générée automatiquement  The predator feeds on the prey. |
| **Mutualism** | a symbiotic relationship where both organisms benefit | + | + | - The **bee** collects nectar which feeds it and the **plant** can reproduce.  - The **bird** eats the parasites on the **buffalo** which is thus protected. |
| **Competition** | when two or more organisms rely on the same environmental resource | - | - | Une image contenant plein air, ciel, nature, herbe  Description générée automatiquement  The different plants are in competition for resources : water, mineral salts. |
| **Parasitism** | a symbiotic relationship where one organism benefits and one is harmed | + | - | Une image contenant invertébré, vermine, insecte, Macrophotographie  Description générée automatiquement  The **tick** is an external parasite of some animals |

### EXPLAIN

### *An ecosystem is a delicate natural balance*

**Q. In group, pick a card of a case study and discuss about it. To help you, you can use the reference document.**

**After the discussion, share with the classroom your conclusion.**

**REFERENCE DOCUMENT**

Une image contenant cercle, capture d’écran, diagramme, texte

Description générée automatiquement

*Author: User:Thompsma (original), User:Kayau (SVG), on Wikipedia – BY-SA licence*

***Producers:*** *make their own matter with only mineral matter and energy of light*

***Consumers (herbivores/carnivores):*** *make their own matter with the matter of other living beings*

***Decomposers:*** *break down dead or decaying organisms and they make their own matter with them.*

**CASE STUDY**



**Intensive plowing in agriculture decreases the population of earthworms, which are decomposers.**

What do you think is the impact on the ecosystem?

Discuss the effects on producers, on other consumers.

**CASE STUDY**



**A plant species arrives in an environment and growths particularly well there. It covers more and more surface and consumes a large part of the nutrients present in the soil**

What do you think is the effect on the ecosystem? Discuss the effects on the producers, on other consumers.

**CASE STUDY**



**A carnivorous animal species thrives particularly well in an ecosystem.**

What do you think is the effect on the ecosystem?

Discuss the effects on producers, on other consumers.

**CASE STUDY**



**A herbivorous animal species thrives in an ecosystem.**

What do you think is the effect on the ecosystem?

Discuss the effects on producers, on other consumers.

### EXTEND

### *You’re an exobiologist*

**Q. In group, pick a card of a case study and discuss about it. To help you, you can use the reference document.**

**After the discussion**

You are an exobiologist and you arrive on an unknown planet like for example the moon of Pandora (movie: Avatar).

You have to describe an ecosystem of this planet.

Your description must contain:

* a description of the **biotope** (example: temperature, light, pressure, gas, water, wind, climate, etc.)
* a description of the **biocenosis** including at least
  + somes **species**:
    - a producer species
    - one primary consumer species
    - a secondary consumer species
    - a tertiary consumer species
    - a decomposer species
  + **interaction** **between species**. You must also describe at least one example for each of the following relationships: mutualism, commensalism and parasitism

Une image contenant invertébré, barrière de corail, Invertébrés marins, Organisme

Description générée automatiquement

*Author: Nhobgood Nick Hobgood, on Wikipedia – BY-SA licence*

### EVALUATE

**What is an ecosystem?**

□ The area or place where an organism lives in an ecosystem.

□ It is a community of organisms that live together in a particular habitat.

□ It is a community of organisms that eat other living things.

□ Is all the members of one species that live in an area of an ecosystem.

**Link the name of the components of an ecosystem with its definition:**

|  |  |
| --- | --- |
| Biotope □ | □ abiotic factor (non-living factor) |
| □ living beings |
| Biocenosis □ | □ wheather |
| □ somes species |

**Organisms that can produce their own matter with mineral matter are called:**

□ Biocenosis

□ Producers

□ Consumers

□ Decomposers

**Organisms that can produce their own matter with organic matter (living matter) are called:**

□ Biocenosis

□ Producers

□ Consumers

□ Decomposers

|  |  |
| --- | --- |
| **In the African savannah, some species of ants live in the spines of acacia trees where they defend the trees against herbivores, especially elephants. If the ants are removed, the tree is quickly defoliated and die. If the ants are transplanted to another tree, that tree is avoided by the elephants. This case is an example of:**  □ Predation  □ Competition  □ Parasitism  □ Mutualism  □ Commensalism | Une image contenant arbre, plein air, branche, plante  Description générée automatiquement |

|  |  |
| --- | --- |
| **The opposite picture showing a lioness and a hyena fighting for prey is an example of:**  □ Predation  □ Competition  □ Parasitism  □ Mutualism  □ Commensalism | Une image contenant mammifère, Animal terrestre, faune, plein air  Description générée automatiquement |

|  |  |
| --- | --- |
| **Remora are suction cup fish that can attach themselves to large shark species and feed on the remains of the shark's meals. The shark is not bothered by remora. This case is an example of:**  □ Predation  □ Competition  □ Parasitism  □ Mutualism  □ Commensalism | Une image contenant requin, poisson aux nageoires à rayons mous, poisson, Aileron  Description générée automatiquement |

|  |  |
| --- | --- |
| **The mistletoe draws water and mineral elements from poplars, apple trees, lime trees or willows in particular that it colonizes. This case is an example of:**  □ Predation  □ Competition  □ Parasitism  □ Mutualism  □ Commensalism | Une image contenant arbre, plein air, végétation, Biome  Description générée automatiquement |