

Building with LEGO bricks: The Ecocities of Tomorrow



Authors

FO-Aarhus: Elizabeth Gregersen, Anna L. Kristensen

ECO LOGIC: Andrijana Zafirovska, Nikola Neshkoski, Aleksandar Stojanovski

Municipality of Lousada: Ana Maria Pereira, João Gonçalo Soutinho, Milene Matos

SYNTHESIS: Dora Heracleous

Wisamar educational institute: Silke Becker

Design / Layout

Wisamar educational institute: Yekaterina Rabtsevich



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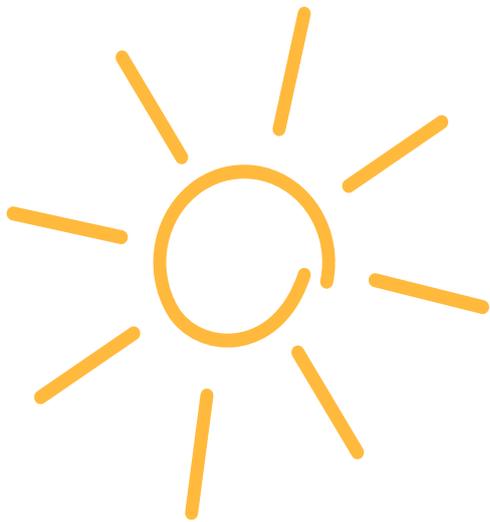
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MODULE 1: **Design with Nature: The** **Theory of Ian McHarg** **on Environmental Planning**

ACTIVITY 1: The Great Landscape
Architect Ian McHarg

Topic

With today's climate change, many countries are facing great challenges such as floods, drought, hunger, dying crops and species. How can we design landscapes and cities *with* nature – and not against nature? How can city planning contribute to solving some of the environmental problems which we see today all over the world?

Background: Ian Lennox McHarg, Scottish landscape architect, writer and thinker, was one of the most important and influential persons in the environmental movement. From the 1960's he was one of the first to bring environmental concerns and ideas about ecological planning into broad

public awareness and policy with his great work *Design with Nature* (1969). In this book, McHarg argued that the way we design cities and landscapes should be planned with careful regard to both the ecology and the character of the landscape.

In this activity the learners will become familiar with the historic person, Ian McHarg, and his ideas on environmental planning through storytelling, quizzing and building with LEGO bricks. The building activity aims at giving the children a basic understanding of how a landscape architect works and what we need to consider when starting a building project in a specific geographical area.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Be familiar with Ian McHarg's personal story and his book *Design with Nature*, its basic ideas and its relevance today.
- Have a basic knowledge of the work of a landscape architect.
- Have a basic knowledge of the different aspects to consider when building in a new place.



Duration

120 minutes



Teaching methods

- Interactive learning
- Game based learning
- Project based learning



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Class reading/storytelling
- Roleplay
- Classroom talk
- Building with LEGO bricks



Guidelines

Through 3 steps, the children will learn about the life and ideas of Ian McHarg and start an awareness of the aspects which need to be taken into consideration when building in a new place.

1. Learners hear about the life and story of Ian McHarg.
2. Learners explore the work of a landscape architect.
3. Learners build their favourite place with LEGO and reflects on advantages and disadvantages of building new sites.

Preparation of the activity

- Become acquainted with the theoretic background of module 1 in the Curriculum.
- Prepare and print the materials needed for the different steps (see »Materials«).
- If it is possible, it is a good idea to involve two teachers for the roleplay in step 2. If you are only one teacher present, you can dress up as Ian McHarg before the activity starts.
- Place 4-5 tables and chairs in the activity room. One large table should be placed in the middle of the room. Place the objects for step 2 on top of the table in the middle of the room and hide all the objects under a blanket.

Step 1: The Story of Ian McHarg (15 minutes)

The purpose of step 1 is to let the children become familiar with Ian McHarg's life and the reasons which lead to his work in environmentalism. Through storytelling, the children are more likely to remember as well as to understand the ideas and theory behind the book *Design with Nature* which is the basis for the following activities.

- Ask the children to sit on the floor in a circle. If you are two teachers present, the other teacher goes outside and dresses up as Ian McHarg. If you are only one teacher present, you can dress up as Ian McHarg before the class starts or simply skip the roleplay.
- Read the story about Ian McHarg to the children (annex 1). Throughout the story, the children will have to guess different answers to questions about the plot. Give the children the different options and let them guess the answer. Reveal the correct answer by showing the matching pictures (annex 2). Remind the children that it is important to remember as many details from the story as possible. They will need it for the next step.

Step 2: A Meeting with Ian McHarg (15 minutes)

The purpose of step 2 is to let the children meet Ian McHarg 'in person' and to present them to different objects and tools which a landscape architect typically uses in his work. After step 1, the teacher dressed up as Ian McHarg presents himself/herself briefly to the children. (If working with older children, you can skip the roleplay.) McHarg then reveals the objects under the blanket on the table and asks the children to find all the objects that they think represent Ian McHarg, his ideas and his life. The children place the objects next to Ian McHarg and leave the objects which do not represent McHarg on the table.

When the children have selected the objects, they can start asking Ian McHarg if the objects have been placed correctly and what he uses each object for. Questions could be:

- *What do you draw in your sketchbook?*
- *What is this called? (for instance a compas)*
- *What do you use this for? (for instance a protractor)*

Step 3: My Favourite Place (90 minutes)

The purpose of step 3 is to introduce the children to one of the main concepts behind Ian McHarg's idea of building with nature. They will reflect on the importance of analyzing an area and its surroundings before constructing new buildings as it can affect the existing nature, people, historic sites etc.

1. Divide the children into smaller groups around the tables and give each group a bag of LEGO bricks.
2. Give the children the following task and let them work on their project for the next hour: *Think of a place in the city where you live or in the nearest surroundings. It must to be a public place: This means a place which everyone has access to. It can be a place which you love to visit on your own, with your friends or with your family. It can be a museum, a lake, a market, a playground, a forest, a park, a lake or something else. Use the LEGO bricks to build a model of your favourite place.*
3. When the children have build their favourite place, ask them to imagine a group of engineers who want to build a highway on the same spot as the their favourite place. Let the children discuss in pairs (or with the teacher):
 - What would happen if a highway was build there?
 - What would be affected? Who would be affected?
 - Which negative consequences would it have?
 - Which positive effects would it have?
4. At the end of the activity the children present their LEGO models and explain why it is their favorite place. Ask them to tell the rest of the class what they discussed in pairs regarding the effects of building a highway on the same spot.



Assessment

Hand out the multiple choice (annex 5) to the children. They can answer the multiple choice individually or in pairs.

Talk the quiz through with the children and talk to them about what they have learned today.



Material

- Tables and chairs
- A big blanket
- LEGO bricks and LEGO plates
- Costume for dressing up as Ian McHarg: A big moustache (annex 2), a grey or black suit, a white shirt, a tie, elegant shoes.
- Objects which represent Ian McHarg: Drawing tools (Sketchbook, pens, pencils or markers), Math- and measuring tools (a ruler, a protractor, a compass etc.), a camera, a Scottish flag and printed pictures and book titles from annex 3.
- Objects which do not represent Ian McHarg: A fashion magazine, a purse, a Spanish flag, a comic book, different plastic objects (e.g. plastic cups, plastic bags etc.), a Coca Cola, mobile phone and printed pictures and book titles from annex 4.

Tips

- Step 1: While reading the story about Ian McHarg aloud to the children, you might consider adding some sound effects, background music or pictures to accompany the different parts of the story, for instance sounds/pictures of nature (wind, forest, birds), war and the big city. If you are two teachers, one of you can read the text aloud while the other is responsible for the effects.
- Step 3: If you don't have a lot of green LEGO bricks that represent vegetation, you could also encourage learners to complement their LEGO brick model with natural materials in order to incorporate green space into their vision.
- As an additional exercise, you can take the children out for a walk in the city to visit the places the children have chosen as their favourite places.
- Make an exhibition of the children's LEGO brick models for other children, teachers and parents to see.



Handouts

- **Annex 1:** The Story about Ian McHarg
- **Annex 2:** Mustache
- **Annex 3:** Pictures and text representing Ian McHarg
- **Annex 4:** Pictures and text which do not represent Ian McHarg
- **Annex 5:** Multiple Choice
- **Annex 6:** Solutions (for the teacher)



Alternative spaces

A school yard, library



Adaptation for 10+ children

- For step 1: Instead of reading the story of Ian McHarg aloud to the children, you can let them read it on their own, either individually or in pairs. Ask the children to mark the important information about Ian McHarg in the text.
- For step 2: You can skip the roleplay and instead show the children a YouTube-video with the real Ian McHarg (see link below). The children might be able to understand some of the English language but the important thing is that they get a sense of Ian McHarg as a real person.

Useful links/Further reading

For dressing up as Ian McHarg - inspiration.

A picture of Ian McHarg:

<https://tclf.org/pioneer/ian-mcharg>

The Daily Tools of a Landscape Architect:

<https://dg2design.com/the-daily-tools-of-a-landscape-architect/>

Video of Ian McHarg:

https://www.youtube.com/watch?v=0L6-cOWR3RA&ab_channel=waterbucket

Module 1 // Activity 1 // Annex 1: The Story about Ian McHarg

You will now hear the story about Ian McHarg - a boy who lived in Scotland where nature is beautiful and breathtaking.

If you have been to Scotland, you will know what the landscape looks like. If you haven't been there, what do you imagine it looks like? Guess the right answer.

- a) **Is it harsh and wild?**
- b) Is it warm and sunny?
- c) Is it flat and calm?

(give the children the correct answer by showing them the pictures on the following pages)

Nature in Scotland is typically harsh and wild. As a child, Ian McHarg loved nature. He also loved to draw and work in the garden, helping out his mother. He would dig in the ground every day, and he often wondered what might be hiding deep beneath the surface of the soil. Were there any plants? Was it hot? Was it cold? Was there any water? Which animals lived there?

When Ian grew older, he often went hiking on his own in the green hills and in the deep forests. He loved the landscape.

One day his father asked him: «What do you want to be when you grow up, my son?»

What do you think Ian McHarg answered?

- a) A musician?
- b) A doctor?
- c) **A landscape architect?**

Ian McHarg wanted to be a landscape architect. This is a person who measures the land, makes maps and decides what to build in different locations. This was Ian McHarg's dream. But suddenly his life took a turn and everything changed all over the world. What do you think happened?

- a) **The Second World War broke out?**
- b) Ian's father lost his job?
- c) The schools closed down?

The Second World War broke out. Although Ian McHarg was almost still a child, he now had to become a soldier and fight in the war.

When the war was finally over, he had seen how evil people can be, and he decided to dedicate his life to make a better world. He also saw that many people lived in poor and unhealthy houses far away from nature and he wanted to change this.

He became a landscape architect and moved to a country far away where he already spoke the language. Where do you think he moved to?

- a) Australia?
- b) **North America**
- c) Ireland?

Ian moved to North America and began writing a book on how to build better cities without destroying nature – and without destroying people. What do you think the book was called?

- a) Design with Your Hands?
- b) Design with Plastic?
- c) **Design with Nature?**

The book was called *Design with Nature*. It became a huge success and inspired people all over the world up until today.

This was the story about Ian McHarg - the Scottish boy who loved nature, who loved life and who loved people.



Picture 1



Picture 2



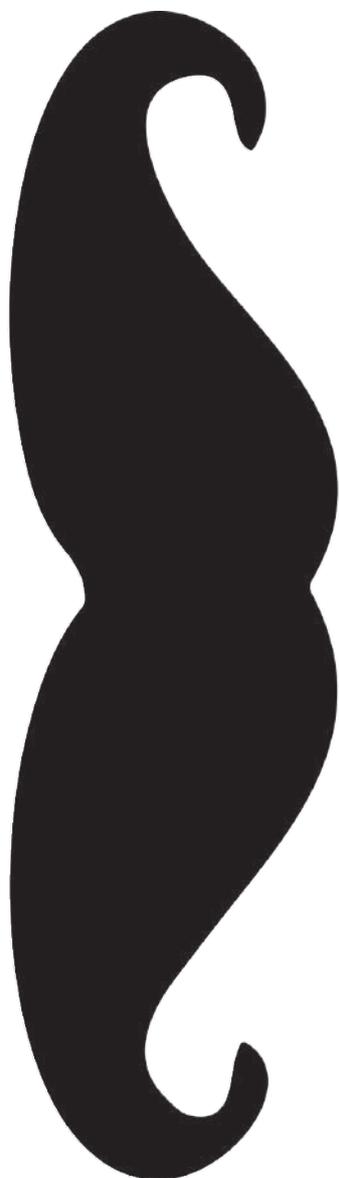
Picture 3



Picture 4



Picture 5



Module 1 // Activity 1 // Annex 3: Pictures and titles representing Ian McHarg





Design with Nature

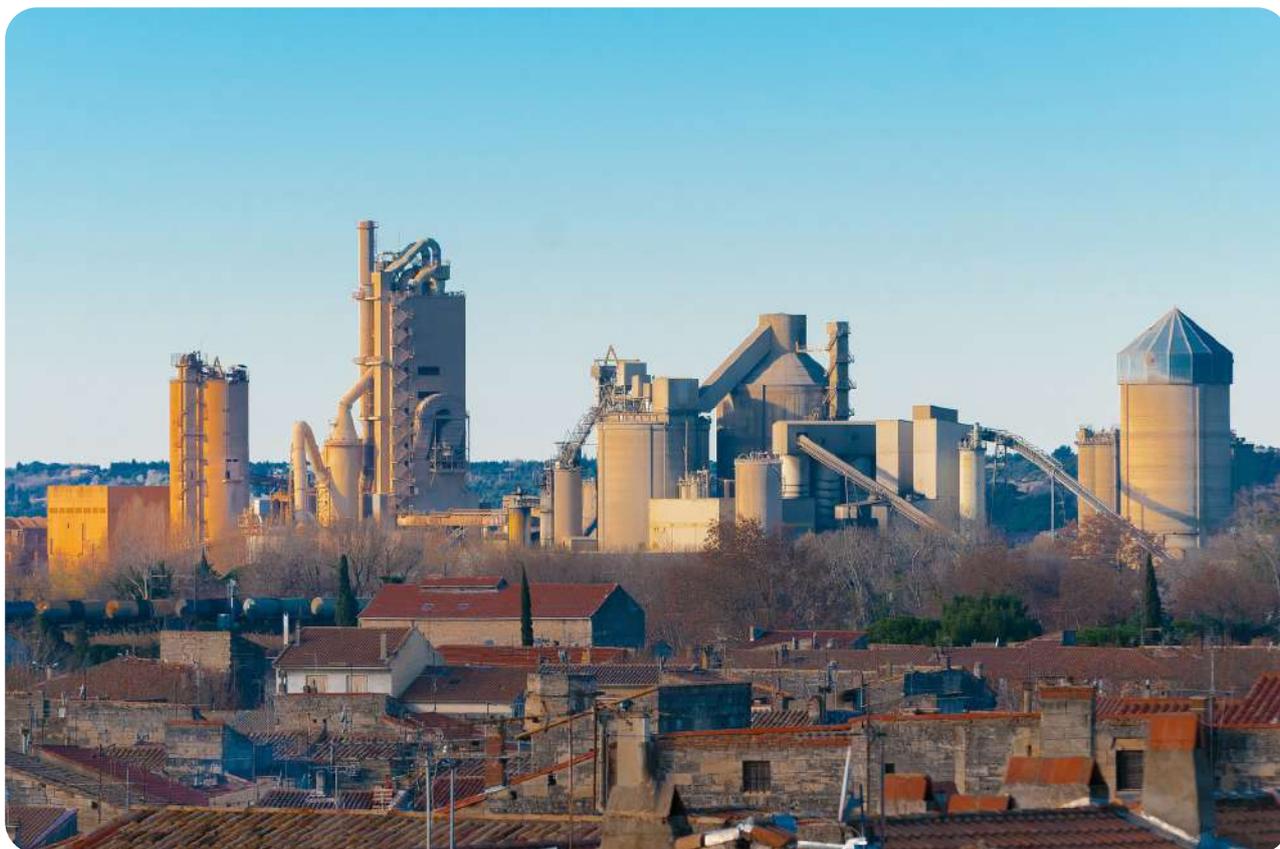
Eco-Cities

Recycled Water

Ecology

Environment

Module 1 // Activity 1 // Annex 4: Pictures and titles which do not represent Ian McHarg





Design against Nature

Building Industrial Cities

Effective Plant Pesticides

Module 1 // Activity 1 // Annex 5: Multiple Choice

Mark the right answer for the questions below:

1. Where was Ian McHarg from?

- a) Ireland
- b) The United States
- c) Scotland

2. What did Ian McHarg love to do when he was young?

- a) To go hiking in the landscape
- b) To go shopping
- c) To watch television

3. What did Ian McHarg want to be when he grew up?

- a) An archaeologist
- b) A landscape architect
- c) A farmer

4. Which objects typically belong to a landscape architect?

- a) A microscope
- b) A map
- c) A remote control

5. What was Ian McHarg's wish after the war?

- a) To make a better world
- b) To live in the big city
- c) To become a doctor

6. What is McHarg's famous book called?

- a) Design with Flowers
- b) Design with Water
- c) Design with Nature

7. Why is Ian McHarg's work still important today?

- a) Because it can help us build healthier cities
- b) Because it can teach us the history of Scotland
- c) Because it can help us to find better jobs

8. What is very important to consider when building a new city?

- a) The natural landscape
- b) The latest fashion
- c) Tourism

Glossary:

- Profession: What a person works with
- Archaeologist: A person who studies human prehistory
- Architect: A person who plans and designs the construction of buildings
- Design: To draw or to plan

Module 1 // Activity 1 // Annex 6: Solutions (for the teacher)

Annex 1 (The Story about Ian McHarg)

1 = A

2 = C

3 = A

4 = B

5 = C

Annex 6 (Multiple Choice)

1 = C

2 = A

3 = B

4 = B

5 = A

6 = C

7 = A

8 = A



MODULE 1: **Design with Nature: The** **Theory of Ian McHarg** **on Environmental Planning**

ACTIVITY 2: Studying the Landscape

Topic

What is hiding underneath the surface of the ground? What can happen if we build a city near the mountains? Or a highway through a forest? How can we decide which zones are most suitable for construction building and causes the least damage to people and wildlife?

Background: In his book *Design with Nature*, Scottish landscape architect, Ian Lennox McHarg, developed revolutionary ideas and methods to landscape planning. One of his methods was the so called 'layer cake model' where different natural layers of a geographic areas were analysed. These

included the different types of vegetation, soil, rocks, surface water, underground water as well as human settlements. In this way it would be possible to find the best location for building and designing with nature.

In this activity, the learners will become familiar with the layer cake model by identifying the different layers through sensorial play and building with LEGO bricks in order to visualize the different geological information hiding underneath (and above) the ground.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Be aware of the different landscape layers
- Understand the importance of analysing the layers when building a city.
- Illustrate the layers when working with LEGO bricks.



Duration
105 minutes



Teaching methods

- Project-based learning
- Inductive learning method
- Interactive, sensorial and game-based learning



Target ages
6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Sensory play
- Building with LEGO bricks
- Open talk / discussion

Guidelines

Through 3 steps, the participants will become familiar with different types of soil, water and other elements to get a basic understanding of the components under the surface of the ground. They will use this knowledge in creative activities, using LEGO bricks.



1. Learners guess different types of soil, water and other elements, playing ‘What’s in the box?’
2. Learners are introduced to the layer cake model.
3. Learners use their knowledge to build their dream house in a specific location, using LEGO bricks.

Preparation of the activity

- Read the theory for module 1.
- Place 4-5 tables and additional chairs in the room.
- Prepare the material needed for the activity (see «material»)
- Mark the containers/boxes with the numbers from 1-12.
- Fill the boxes/containers with the 12 different materials and cover each container with a piece of cloth. Place the containers on the tables.

Step 1: What’s in the Box? (30 minutes)

The purpose of step 1 is to make the children use their sense of touch to guess 12 materials which represent different layers of the surface and underground. The sensorial play will help the children remember these elements for later and it is a fun and intriguing exercise for all ages.

1. Divide the children into smaller groups and provide them a table. Explain the first exercise: Put your hand inside the boxes on the table without removing the cloth too much and without peeking inside. What do you think is inside the box? Discuss it with your group. Write down (annex 1) what you think is the correct answer and continue to the next box.
2. When all groups have filled out the paper, ask the children what their answers were. After hearing the answers, reveal the content of all the containers, placing the correct labels next to them (“clay”, “soil” etc).

Step 2: The Layer Cake Model (15 minutes)

The purpose with step 2 is to let the children become familiar with Ian McHarg’s layer cake model (a simplified version). Placing the materials from step 1 on the model will help the children visualize the different layers and how they are connected.

1. Ask the children to take a small ‘sample’ of the different materials, using their fingers or a small cup (for the water samples). a
2. Place the printed model with the simplified layer cake model on the floor (see annex 3) and ask the children to place their samples on the category it belongs to:
 - Soil/geology: Sand, clay, rocks...
 - Water: Lake water (fresh water), salt water, warm water, cold water, icy water...
 - Vegetation/animal life: Grass, leaves, grass, bird feathers...
 - Human settlements: Humans, bicycles, cars, buildings etc.
 - Future buildings (new building projects)

Step 3: Building a dream house (60 minutes)

The idea with step 3 is to make the children visualize how a landscape can vary and to make them familiar with the 5 basic layers. They will build from free imagination and with only little knowledge about different types of soil, water etc. However, the main purpose is to make the children aware of the fact that there is always something underneath the ground when you are building something. The children need to illustrate these layers using LEGO bricks. With older children you might start a discussion about which engineering challenges there could occur if you wanted to build in the mountains, at the sea and so on.

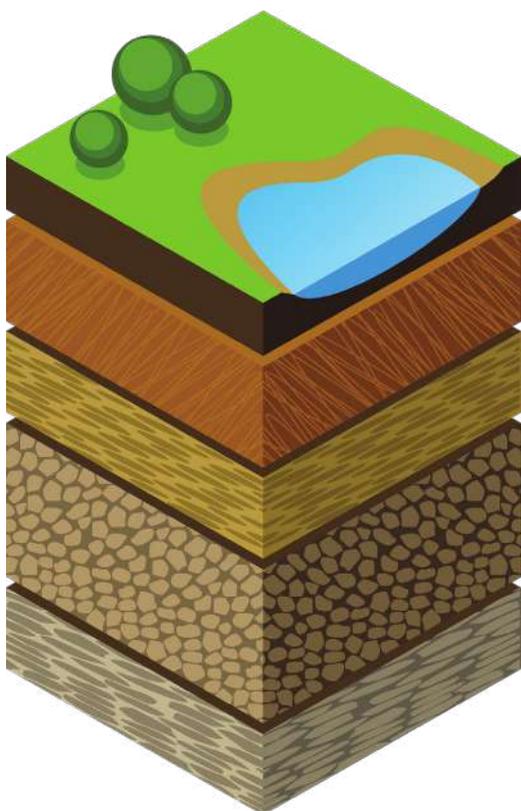
1. The children stay in the same groups as before. Distribute LEGO bricks, LEGO plates and the task described in annex 4. Explain the task before they begin.
2. Let the children work on their model and ask them during their process which layers they are building and why they are using yellow bricks here, brown bricks there, and so on. It doesn't have to be an authentic landscape. The main idea is that they reflect on the varying landscape.

After an hour (or more/less) ask each group to present their LEGO models to the rest of the class.

Assessment

Give the children the task described in annex 5 either as a homework assignment or as the final activity of the day. If you carry out this assessment activity by the end your lesson, you can take the class outside in the school yard or to a park close by.

The purpose of the assessment is to let the children use the knowledge which they have acquired from activity 2. It will make the children become more aware of their own surroundings and where they can find the different layers in their daily life (in their garden, on their street, in their town, in their house). The task will also give an idea of how much the children have learned from the activity, and (if you have more time) it's a good way to recap the learning outcome.



Tips

- If your school is close to a park or a garden, an additional exercise would be to take the class outside and let them investigate their surroundings and the different layers of soil (as in the assessment exercise). Bring along small shovels, scissors and jars and see if it is possible to find and take samples of the same types of soil, leaves, water etc. This would also be very suitable for children age 10+.
- Make an exhibition of the children's LEGO brick models and pictures from the assessment exercise for other children, teachers and parents to see.



Material

- Tables and chairs
- LEGO bricks and LEGO plates
- 12 pieces of cloth Pencils
- 12 non-transparent containers/bowls

Content of the containers:

1. Sand
2. Clay
3. Pieces of rock
4. 'Lake water' (add grass, leaves etc.)
5. Sea water (add some sand, sea shells etc.)
6. Warm water
7. Grass
8. Leaves
9. Bird feathers
- 10-12. Human settlements (use LEGO bricks such as people, cars, miniature houses etc.)



Handouts

- **Annex 1:** What is in the box?
- **Annex 2:** Labels for containers
- **Annex 3:** Layer cake model
- **Annex 4:** Task description
- **Annex 5:** Homework



Alternative spaces

An alternative space to have the activities could be at the park or in a school yard.

Adaptation for 10+ children

For step 3: Once they have finished building their dream house, you can ask the groups which advantages and disadvantages there might be when building at the chosen location. Maybe the soil is too sandy? Maybe it's too soft? Or maybe it's the perfect location.



Module 1 // Activity 2 // Annex 1: What is in the box?

Box number	Content: What do you think is inside the box?	Description: How does the material feel?
Example	Clay	Wet, cold...
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

1. Sand

2. Clay

3. Pieces of rock

4. 'Lake water'

5. 'Sea water'

6. Warm water

7. Grass

8. Leaves

9. Bird feathers

10-12. Human settlements



Module 1 // Activity 2 // Annex 4: Task description

Group 1: Your family loves snow sports and dreams of building their new house close to the mountains. Build a model of the house and the layers you think are hiding underneath the ground.

Group 2: Your family loves to go fishing and dreams of building their new house close to a lake or a river. Build a model of the house and the layers you think are hiding underneath the ground.

Group 3: Your family loves to go hiking and making bonfires and dreams of building their new house close to a forest. Build a model of the house and the layers you think are hiding underneath the ground.

Group 4: Your family loves to surf and dreams of building their new house close to the coast. Build a model of the house and the layers you think are hiding underneath the ground.



Module 1 // Activity 2 // Annex 5: Homework (or part of school activities)



Take 4 pictures (or make 4 drawings) of your garden, street or the area that you live in.

The 4 different pictures need to represent:

- 1 type of soil: Clay, dirt, rocks, sand, mud...
- 1 type of water: A creek, tap water from the sink, rainwater, wastewater
- 1 type of vegetation/wildlife: Birds, leaves, flowers, grass, trees, a squirrel
- 1 type of human settlements: A house, a shop, a playground, a road, cars passing by, a train station, a bus stop

Avoid taking close-up pictures of other people.

In the following class, present your pictures or drawings to the rest of the class.



MODULE 1: **Design with Nature: The** **Theory of Ian McHarg** **on Environmental Planning**

ACTIVITY 3: A New Transport System

Topic

How can we build better infrastructure and create modern solutions in smaller communities without interfering negatively with people's everyday lives and wildlife?

Background: The growing urbanization and modernisation represent a challenge for small communities, such as smaller islands, who in many cases witness their everyday lives and natural surroundings changing rapidly. New industries, expanding infrastructure and large buildings can easily represent a threat to the local environment, fauna and wildlife, and it is crucial that we consider the value of the already existing environment in city planning before we start to build.

This activity aims at encouraging young learners to consider positive and negative consequences to landscape designing, based on the map-theory of Scottish landscape architect Ian Lennox McHarg.

The children will learn how to read and analyse a simple map and use this information to decide where and what to build on a fictional island in order to give the inhabitants modern possibilities and at the same time preserve nature and wildlife.

Learning outcomes

By the end of this activity, the pupils/participants should:

- Be able to read a simple (fictive) map and identify different characteristics to a landscape.
- Think of green solutions for building projects which are suitable for both people and nature.
- Use their knowledge and creativity to build simple models out of LEGO bricks to suggest green and modern solutions.



Duration

2,5 hours



Teaching methods

- Game based learning
- Project based learning



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Study of maps and different landscapes
- Finding solutions to a specific case
- Quizzing
- Building with LEGO bricks



Guidelines

Through 3 steps, learners will work with a specific case about a fictional island and use their creativity to find green solutions to city development:

1. Learners will study the map of a fictional island and locate the various geographic features.
2. Learners are given a specific case regarding an engineering project on the island.
3. Learners will build a model of their solutions to the island, using LEGO bricks.

Preparation of the activity

- Read the theory for module 1 in the Curriculum.
- Prepare and print the materials needed for the different steps (see «Material»).
- Place 4-5 tables and chairs in the activity room.

Step 1: A new transport system for the island (45 minutes)

The purpose of the following steps is to give the children a specific case regarding an engineering project which can affect nature as well as people living on the island. The children need to think of solutions to make a transport system which will affect the surroundings the least and which at the same time will give the people on the island modern transport facilities.

1. Divide the children into groups and give them the map of the island (annex 1). Allow the children to study the map on their own for 5 minutes. What characterises the island? (rock, mountain, water, forest, green patches, human settlement).
2. Present the following case to the groups:

On the map you see an island with beautiful beaches, crystal clear water, hills and valleys. The island has a rich wildlife with many birds, deers, fish, insects and a lot of other species. There are two larger cities on the island, City A and City B (marked with an X), but no highway for the people to get from one side of the island to the other. A group of engineers wants to build a better transportation system on the island. However, the local people love the quiet and undisturbed life, and they fear that a new transportation system will have negative consequences for both people and wildlife on the island.

How can the engineers solve this problem with least negative impact?

What sort of transportation system can they build to and where should they build it?

3. Give the children 15 minutes to think of a green solution. Let them know that they can come up all kinds of solutions - even the crazy ones.

For instance:

- a highway on a bridge which goes above the landscape
- a metro going underneath the ground
- a canoe transportation system which uses the many streams on the island.
- etc.

Allow the children to be as creative and imaginative as possible! Let them think out of the box.

Step 3: A green transportation system (75 minutes)

1. Distribute LEGO bricks and LEGO plates on each table.
2. Each group will now build their solution to a transportation system on the island, using LEGO bricks. Let the children work on their solutions, using their free imagination.
3. Once all the groups have finished building their models of the island, ask each group to present their building project and their solutions.

Assessment (15 minutes)

Hand out the multiple choice (annex 2) to the children. They can answer the multiple choice individually or in pairs. Afterwards, talk the quiz through with the children, and talk to them about what they have learned today.



Material

- Tables and chairs
- LEGO bricks and LEGO plates



Handouts

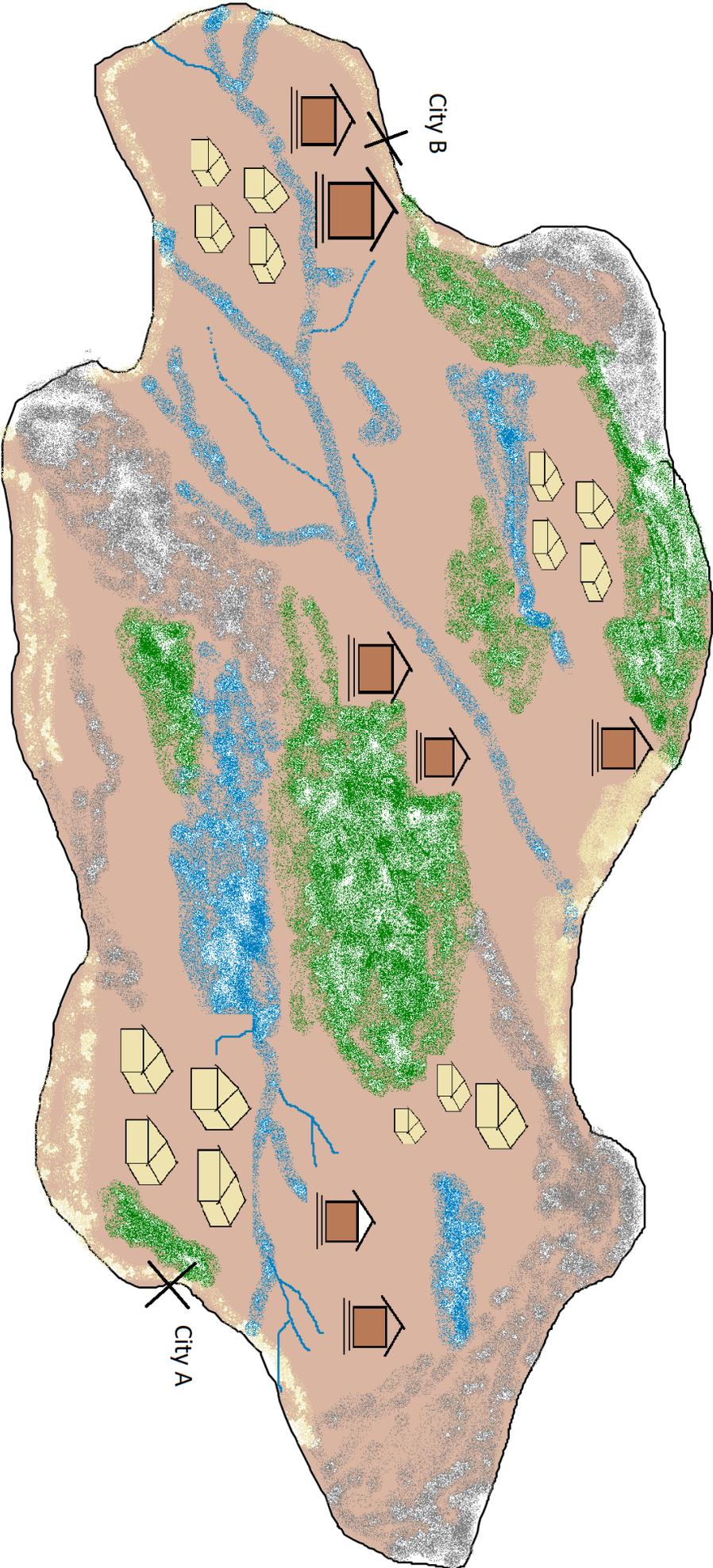
- **Annex 1:** Map of island
- **Annex 2:** Multiple choice
- **Annex 3:** Solutions (for the teacher)



Tips

- You can also choose an authentic island from your home country and use this as a case instead of the fictional island. Maps can be found on Googlemaps, showing the landscape, cultural settings etc.
- If you don't have a lot of green LEGO bricks that can represent vegetation, you could also encourage learners to complement their LEGO brick model with natural materials in order to incorporate green space into their vision.
- Make an exhibition of the children's LEGO brick models for other children, teachers and parents to see.

Module 1 // Activity 3 // Annex 1: Map of island



Module 1 // Activity 3 // Annex 2: Multiple Choice

1. Why is it necessary to study maps before starting a new building project?

- a. Because maps are beautiful
- b. Because you can find the most suited place to build
- c. Because engineers love to study maps

2. What was missing on the island you have been working with?

- a. Wildlife
- b. Water
- c. A modern transport system

**3. Which negative consequences can a new transportation system have on the island?
(more than one correct answer)**

- a. It can attract more wildlife
- b. It can cause more noise
- c. It can cause more pollution

**4. Which positive consequences can a new transportation system have on the island?
(more than one correct answer)**

- a. It will be easier to get around
- b. It can scare away animals
- c. It will give the people modern facilities to get around

5. What is a green transportation system?

- a. A system which has very little negative impact on the environment
- b. Green coloured train tracks
- c. A system made for tourists

Module 1 // Activity 3 // Annex 3: Solutions (for the teacher)

Solutions for the multiple choice:

1: B

2: C

3: B and C

4: A and C

5: A



MODULE 2:

Trees and Forests

**ACTIVITY 1: Forests and urbanization?
There are limits!**

Topic

Forests fascinate us and the more we learn about them, the more we become aware of their complexity, their many communication networks and ecosystems and their important role in maintaining the environment. Forests function as large 'green cities' with food and energy production factories, and they are one of the major responsible for life on the planet.

Background: Forest management is essential even for the life of cities and their residents, where the balance between conservation of natural values and productivity are essential for environmental, economic and social sustainability.

This activity aims at helping learners recognize the importance and functions of the forest and natural habitats, also in cities, and raise awareness on the conciliation of urban planning and environmental quality. Through the exercises the learners will become familiar with the role and functions of ecosystems and preservation of ecological services in the face of the demographic growth and consequent urban sprawl.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify the importance of wildlife, natural habitats and ecosystem services
- Understand environmental policies and sustainable urban planning
- Distinguish environmental impact and ecological footprint factors
- Develop critical thinking for the preservation of natural heritage, nature conservation and territory conservation.



Duration

90 minutes



Teaching methods

- Inquiry-based learning
- Game-based learning
- Interactive methods
- Demonstration-replication methods



Target ages

6 - 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Pedagogical game
- Quiz
- Construction dynamics
- Debate and discussion



Guidelines

Through the following game this activity gives learners an insight into the importance of forests and natural habitats:

1. Learners reflect on the concepts of forest, ecosystems and nature conservation.
2. Learners develop ideas on how to improve and remodel sites.
3. Learners will reflect critically on the impacts of the development ideas.

Preparation of the activity

- Prepare a 50cm x 50cm plaque over which to build a LEGO model of a forest. The plaque should have a marked grid of 10cm x 10cm fields, with vertical identification of columns A-E and horizontal rows 1-5, forming a total of 25 square fields (corresponding to the approximate number of students per class).
- Prepare/build a model of a very simple forest all over the plaque, with LEGO bricks, representing the various elements that can constitute a forest (trees, water, soil, shrubs, rocks, etc).
- Place the model in the center of the classroom.
- Provide, in boxes properly prepared for the purpose, LEGOs of various sizes and colours with characteristics related to forests and other elements related to the construction of structures and buildings.

Step 1: Introduction (5-10 minutes)

- Introductory approach to the ecological function and characteristics of a forest.
- Diagnosis of the students' knowledge about forest, through debate.
- Develop concepts of: forest types, ecosystem services and nature conservation.
- Ask students about concepts related to sustainable land planning and forests (such as areas for conservation, leisure, demographic growth, etc).

Step 2: Game introduction (50-70 minutes)

Explain the game rules (3 min). Divide the class in two groups. Group 1 - GREEN («forest friends») and Group 2 - GRAY («builders»). Sort and deliver the cards – one card (A1, A2, B3, etc) for each student. Each card represents the grid's square where each child can work on (2 min).

Step 3

Round 1:

Start the first round with the "GREEN" group having 5 minutes to remodel/strengthen/alter their site/area. Each child should alter their square (ex. B5) individually with forest elements, in order to improve its ecological importance (ex: add more trees or a pond). Then the "GRAY" group children have 5 minutes to individually build over their own plots (the GRAY group will alter different squares from the GREEN group).

At the end of this first round, the teacher should promote a joint analysis/debate on the transformation of the original forest (that was previously built over the plaque). Facilitate the discussions, asking students about the impacts the changes have had on the forest/landscape and identifying the problems caused by the changes, promoting environmental awareness and warning about the value of ecosystem services. The discussion of possible solutions for solving the problems caused by the changes should also be encouraged.

Round 2:

After the debate, organize pairs of students. Two students at a time have 2 minutes to modify the terrain in order to ecologically improve it, following the conclusions of the debate of the first round. GREEN students will work on green squares and GRAY students will work gray squares. After everyone's participation, there is another pause for debate.

- At the end of the second round, facilitate a new analysis/debate on the forest transformation and urban sprawl. Problems are identified and solutions should be discussed.

Round 3:

Organize groups of four students (2 GREEN and 2 GRAY) and ask the GREEN students to make changes (adding, replacing or removing elements) in the GRAY terrains, and the GRAY students to make changes to the GREEN terrains (5 minutes). After the participation of all students, there is another pause for analysis/debate.

- At the end of the third round, encourage a new analysis/debate on the transformation of the forest, pointing out the environmental problems and the consequences caused by the alterations carried out, and then ask students about the best solutions.

Round 4: (10 minutes)

Organize the class choosing ten students (5 GREEN and 5 GRAY). This time, all changes (replacements, changes or removals) must be decided in group, and can only be carried out with the unanimity of the group. Each group can only make changes in their respective terrains (green or gray).

- After the participation of all students (two groups), there is another pause and analysis/debate regarding the changes introduced in the forest. Give special focus to the role and importance of nature conservation and, on the other hand, promote reflexion on urban sprawl and the destruction of forests.

Round 5:

Ask what final changes students could make to achieve a healthy forest that provides a variety of ecosystem services. It is intended to foster a critical spirit for the conservation of nature and natural heritage, as well as awareness for the preservation of natural habitats and more sustainable environmental policies regarding land planning.

- NOTE: Record/photograph the result of the changes made in each round so that they can be projected at the end of the activity as an evaluation of results.



Assessment

For the workshop evaluation, ask each student to describe five factors that promote forest conservation, and five factors that make the forest more vulnerable to its loss or degradation.



Material

- Pre-prepared 50x50 cm plaque with 10cm x 10 cm marked grid
- LEGO bricks
- Camera
- Memory card
- Pen drive or computer (to store the pictures)

Tips

- Check if the school premises have the space and conditions necessary to carry out the activity.
- Ensure that all students participate, remain focused and motivated.
- Support children who have more difficulty in carrying out the tasks.
- At the end, collect the analysis of the workshop, pictures and the result of the knowledge shared with the students.

Adaptation for 10+ children

If the workshop is to be held with students aged between 10 and 14, the language and concepts must be more complex and closer to real-life environmental policies and land use planning situations.

Useful links/Further reading

Inspirational videos - [Conservation Strategy Fund](https://www.youtube.com/c/ConservationStrategyFund/):
<https://www.youtube.com/c/ConservationStrategyFund/playlists>





MODULE 2: **Trees and Forests**

ACTIVITY 2: Tiles of Progress

Topic

Green spaces in cities perform vital functions for the social, emotional and economic quality of life in cities. It is therefore essential to recognise and value these natural values, from a single tree to tree assemblages.

Background: Urban sprawl defines the unrestricted growth of housing, industries, commercial development and roads in urban and suburban areas. Urban sprawl happens without great concern for urban planning and can have negative consequences for people and the environment.

This activity aims at helping the young learners become aware of these consequences and the impact on the environment, biodiversity, health, economy, city management and society.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Understand and identify the reasons for urban sprawl
- Create a set of measures to respond to urban sprawl Introduce the concepts of soil suitable for different tree species, tree monocultures, farmlands, and urban soil waterproofing
- Understand concepts of landscape fragmentation, landscape matrix, patch connectivity, ecological corridors and their effects on biodiversity
- Discuss the consequences that urban sprawl brings to the environment, biodiversity, health, economy, city management and society



Duration

120 minutes



Teaching methods

- Problem-based learning
- Game-based learning
- Interrogative methods
- Logical inference



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Pedagogical game
- Building activity
- Quiz



Guidelines

Through the following game, this activity provides learners with knowledge about the consequences of urban sprawl:

1. Learners will gain knowledge of sustainable land planning.
2. Learners will become aware of the dangers of bad land planning.
3. Through the game and use of LEGO bricks, learners will reflect on solutions to help prevent disasters.

Preparation of the activity

- Prepare a 50cm x 50cm plaque over which to build a LEGO model of a landscape with a forest. The plaque should have a grid of 10cm x 10cm tiles, with vertical identification of columns A-E and horizontal rows 1-5, forming a total of 25 square tiles (corresponding to the approximate number of students per class).
- Over the plaque, build a model of a landscape with a forest on the hills and a city in one of the corners.
- Prepare an illuminated room with a table at the center and place the model over it.

Introduction (5-10 minutes)

1. Gather the full group and start by explaining the activity:
2. Explain how the game is built to simulate reality and therefore the participants must be aware of concepts such as forest, biodiversity, connectivity, agriculture, urban planning, natural disasters and cause-relation of the human activity.
3. Shuffle the 25 coordinate cards (from A1-A5, B1-B5,...E1-E5) and assign one to each children; the cards identify both the order of playing and the tile each student will be managing during the whole activity.
4. Shuffle and simply explain the wild cards' function in the game: floods, wildfires, landslides, heat wave and nothing happens. The wild cards are self-explanatory, but the wild card effects can be checked in the rulebook; The wild card effect must be resolved by the order of playing (from A1-A5, B1-B5,...E1-E5);
5. Clarify the base mechanics of the game. This is a 10 turn-based game and the playing order is determined by the coordinate cards given above (from A1-A5, B1-B5, to E1-E5). A turn ends when all participants (from 1 up to 25) have done their move (doing nothing is also considered a move, but must be stated). At the beginning of each turn, excepting the first turn, a wild card is drawn and revealed, being its effect applied at that moment.

Game (90 minutes)

The aim of this game resides in making students understand and be aware of the dangers of bad land planning, for instance having monocultures, building in steep hills and nearby rivers, not incorporating trees and forests in urban planning, etc – so their thinking on sustainable planning will evolve during the activity.

Player moves

For each turn, the participants may (or may not) improve/change their tile. Each turn should not take more than 10 minutes. The game can end after 10 turns.

Teacher's role during the game

Demonstrate a tile improvement/change: Pick a random tile and explain how students can reorganize it, with each improvement done to a tile with LEGO bricks. In other words, explain the way that the students can change the LEGOs that are on their tile by adding new ones, altering positions or removing pieces. The risks of having housing or other constructions in certain locations (steep hills, nearby rivers, close to forestry monocultures) should also be explained, relating this to the explanation of the wild cards done before. Note that trees and forests will prevent casualties caused by the wildcards.

Let the game run and act as the “storyteller”, reading the wild cards, explaining what is happening, commenting on the students' choices and facilitate helping with doubts that may come up.

Take note of how many times the participants suffer casualties filling the “Casualties Table”.

The winner(s)

Optional: Determine the victor at the end of the 10 turns.

The winner(s) is(are) the player(s) who suffered less effects from the wild cards, by having planned their tile properly and consciously.

Conclusion (10 minutes)

Verify the final state of the project and discuss, considering the events that happened during the whole game under the light of sustainable land planning.

You can debate the ways that the players could have played to avoid certain situations, or the best moves they did, acknowledging the importance of trees and forest to prevent disasters.

The assessment (see next page) resides on a brief talk about the concepts the students have learned using logical inference and the interrogative method.

Clean, pack up and close.

Assessment

At the end of the activity, the teacher should make sure that the pupils/students absorbed the target terms by orally questioning the group.

Pictures from each step of the game can be taken, to further discuss on the changes that happened after each wild card.



Material

- LEGO set prebuilt of 50x50cm, with pieces for a forest (trees) and a city (small and big houses)
- 1 cardboard plaque 60x60cm with 50x50cm grid with tiles numbered from A-E to 1-5
- 1 set of 25 coordinate cards (from A1-A5, B1-B5,...E1-E5)
- 1 set of wild cards (floods, wildfires, landslides, heat wave and nothing happens)
- Printed Casualties Tablewave and nothing happens)
- Pen drive or computer (to store the pictures)

Adaptation for 10+ children

For 10+ children, the teacher/facilitator is mostly present to explain the game basics and to solve inherent problems. Students should debate more independently, making use of more complex concepts of land planning, facilitated by the teacher.

Useful links/Further reading

Articles:

- [«Charaterization of Forest Fragmentation and Urban Sprawl Using the Time Sequential Landsat Imagery»](#)
- [«Monitoring, Causes And Consequences Of Urban Sprawl In Al-Bayda, Libya»](#)

Videogames:

- Cities Skylines
- Tropico 6
- Besiege

Boardgames:

- The Settlers of Catan
- Game of Thrones the Board Game

Tips

- For beginner monitors/professors, is recommend starting with a few students (maximum of 10) to pilot the game;
- If the age is between 6 and 8, the game should be simplified, with the monitor stating everything that would happen for each choice in all moments of the game;
- Check if the school premises have the space and conditions necessary to carry out the activity;
- The teacher must ensure that all students participate, remain focused and motivated, supporting children who have more difficulty in carrying out the tasks;
- At the end, the monitor should collect, from the teacher, the analysis of the workshop and the results of the knowledge shared with the students.



Handouts

- **Annex 1:** Wildcards Rulebook
- **Annex 2:** Casualties Table

Module 2 // Activity 2 // Annex 1: Wildcards Rulebook

Wildcards Guide

Some previous notes:

- The wildcards are a random effect that may (or not) affect the student's in-game tile. The wildcard deck, containing at least 3 wildcards of each type, must be shuffled at the beginning of each game and then placed at the left side of the game board.
- Wildcards must be drawn at the beginning of each round, with the exception of round 1.
- Each round that goes by, the monitor must take note, on the Casualties Table, checking with a X, if the student suffered, or not, a casualty.

Wildcards effects:

Nothing happens: Nothing really happens in this turn.

Floods: Students that have tiles on each side of the river* (margin) suffer casualties, and must remove all buildings in the affected areas (i.e. the areas on the river margins).

Wildfires: Students that have 3 or more trees of the same species (same LEGO model) will have those trees destroyed and removed, suffering a casualty.

Heat wave: This card only takes effect if there are more than 5 tiles with buildings in game. In this way everyone suffers a casualty, not removing any game structure.

Landslides: Students that have houses, or other buildings, on hills* will have them destroyed.

Notes: Trees and forest can prevent or stop casualties. Explain this to students when examining the casualties or improving their tiles.

*The location of the river and hills depends on the way the teacher builds the initial model. At the beginning of each game the locations of both rivers and hills must be stated and visible to all students.

Module 2 // Activity 2 // Annex 2: Casualties Table

Player Number	Round when the casualty happened									
	2	3	4	5	6	7	8	9	10	
A1										
A2										
A3										
A4										
A5										
B1										
B2										
B3										
B4										
B5										
C1										
C2										
C3										
C4										
C5										
D1										
D2										
D3										
D4										
D5										
E1										
E2										
E3										
E4										
E5										



MODULE 2: **Trees and Forests**

ACTIVITY 3: Your Green School Yard

Topic

Sustainable urban planning should take into account the importance of street trees, the preservation of ecological corridors and the ecological functionality of both the city and its surroundings.

Background: Street trees are known for their many benefits for people, wildlife and the environment in cities. Street trees affect us in many positive ways: They create shade on hot summer days, they transpire and give water vapor from their leaves,

creating a cooling effect, they are beautiful to look at and offer recreational spaces, they protect us from cars on the road, from storms and floods, and they offer homes for many smaller species (insects, squirrels, birds). In this activity the learners will learn about urban planning, ecological corridors and urban trees and become aware of the ecological importance of vegetation in the urban context, as well as the various «human» benefits provided by city greening.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Understand the importance of regulatory services in cities.
- Develop argumentation and construction skills.
- Create alternatives of construction and planning in urban organization.
- Discover the ecosystem services provided by green corridors, such as reducing air and noise pollution.
- Recognize how well-cared green natural areas can help improve life quality in cities.



Duration

About 180 minutes



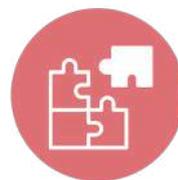
Teaching methods

Game-based learning
Inquiry-based learning



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Building activity



Guidelines

Through the following game, this activity provides learners with knowledge about the consequences of urban sprawl:

1. Learners will gain knowledge of sustainable land planning.
2. Learners will become aware of the dangers of bad land planning.
3. Through the game and use of LEGO bricks, learners will reflect on solutions to help prevent disasters.

Preparation of the activity

Prepare the materials, the LEGO bricks and the room for the activity.

Introduction (10 minutes)

- Explain the session's objectives (theme) - "Green Connections".
- Diagnose the students' knowledge on the subjects, such as green corridors and the services they can provide in a context of urban planning.

Deelivery of the activity (150 minutes)

1. Explain the importance of connectivity between natural and green areas in the city.
2. Demonstrate planning actions that can be made to promote ecological connectivity, such as the construction and plantation of green corridors (please find examples in the useful links below).
3. Explain in a simple way the importance of sustainable land planning, leaving space for nature and connectivity before building (please find examples of current solutions for urban planning concerning green corridors in the useful links below).
4. Display some good examples of green structures built to provide helpful services such as noise reduction, air filtration, water purification (examples in the links below).
5. Encourage discussion on anthropogenic issues related to cities with no green areas (water management, noise and air pollution, health issues, loss of biodiversity), and pay attention to the students' reactions to the human pressures on the environment, in urban planning (destruction of green areas, waterproofing of soils, landscape loss, etc).
6. Divide the students in two groups.
7. Ask one group to build a 3D model, sized about 50cm X 50cm, in LEGO bricks, of a known semi-urban area or urban neighbourhood.
8. Ask the second group to plan a 50cm X 50cm already considering green corridors and ecological connectivity.
9. Allow a good time for construction and thinking. After the constructions are done, swap the groups and models, and ask the students to build green corridors around or throughout the models (this should happen mostly on the known urban model), bearing the previous discussions and concepts in mind.

10. Help with planning the green connectivity and the reconstruction of the cities green areas.
11. After the alterations have the children reflect on the difficulty (and costs) of altering an already built city, and the benefits of building at first already considering sustainability.
12. Analyse the models and discuss the importance of the improvements made, from a life quality point of view.

Conclusion (10 mins)

- Synthesis of the fundamental subjects covered by the activity.
- Diagnose the knowledge acquired by the students.
- Clarification of doubts.
- Clear and organize the room, leaving it as it was before the activity (students can help!).
- Closure.

Assessment

- Validation of the functionality of the suggested green corridors.
- Getting three correct answers on assessing the knowledge that was assimilated by the students, at the end of the activity.



Material

- LEGO bricks

Tips

- Check if the school premises have the space and conditions necessary to carry out the activity.
- Ensure that all students participate, remain focused and motivated.
- Support children who have more difficulty in carrying out the tasks.
- At the end, collect the analysis of the workshop and the results of the activity.



Useful links/Further reading

«Medellín Green Corridors»:

<https://www.youtube.com/watch?v=Kv0m2MSlo2s>

«New York City's Green Revolution»:

<https://www.youtube.com/watch?v=Bfj75Wi87tg>

«China's GREEN Corridors - URBAN LANDSCAPING» :

<https://www.youtube.com/watch?v=XoiMHSMLKC8>

«Green Corridor in Sao Paulo—a Gray City Going Green»:

<https://www.youtube.com/watch?v=217wFk0FZyY>

Figure: «Ecosystem-services provided by green and blue infrastructure»:

https://www.researchgate.net/figure/Ecosystem-services-provided-by-green-and-blue-infrastructure-a-regulation-of_fig1_348592833

«What is an urban forest?»:

<https://cities4forests.com/lg-urban-forests/what-is-an-urban-forest/>

«Urban Forests and Trees: a reference book»:

https://www.researchgate.net/publication/267330299_Urban_Forests_and_Trees_a_reference_book

«The magic of urban trees»:

<https://www.cnu.org/publicsquare/2020/08/10/magic-urban-trees>

«The role of green corridors for wildlife conservation in urban landscape: A literature review»:

<https://iopscience.iop.org/article/10.1088/1755-1315/18/1/012093>

«Green Corridors – Essential urban walking and natural infrastructure»:

<https://naturalwalkingcities.com/green-corridors-essential-urban-walking-and-natural-infrastructure/>

«Green spaces and corridors in urban areas»:

<https://climate-adapt.eea.europa.eu/metadata/adaptation-options/green-spaces-and-corridors-in-urban-areas>

«Green corridors, how to take care of the environment in cities?»:

<https://www.iberdrola.com/sustainability/green-corridor>

«Urban green networks, corridors and linkages»:

<https://www.forestresearch.gov.uk/tools-and-resources/fthr/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/planning-integrated-landscapes/urban-green-networks-corridors-and-linkages/>



MODULE 3: **Urban Mobility, Health** **Benefits of Urban Ecology** **and Human-Nature** **Connection**

ACTIVITY 1: Community Garage

Topic

As inner-cities are transformed into a less car-dependent setting, infrastructure that is currently dedicated to cars will be available for other uses. This activity wants to encourage learners to think of the city as an open opportunity space and to imagine more enjoyable, healthier urban environments that make it easier for people to connect.

Background: Parking spots occupy a massive share of the space in our urban environment. Almost every street is lined with parked cars on one or both sides. Parking lots and parking garages might be occupied by shoppers in the afternoon or on Saturdays but are usually empty if shops and offices are closed. Easy and sometimes even free parking in the city center makes it all the more difficult to motivate car users to switch to public transport. In the United States there are 500 million parking spots for 326 million citizens!

If we look ahead and consider a future that has managed to change the car-dependency into climate-friendly mobility, what do we do with the relicts of individual motorized automobility? This is no hypothetical. The most climate-friendly way to make space in the city is to use existing structures and architects are well aware of that: <https://www.archdaily.com/899598/transforming-the-parking-garages-of-today-into-the-housing-of-tomorrow>. For further inspiration find pictures in Annex 1.

The multi-story parking garage is a structure that can be found in any inner city. At the same time it can serve as a blank canvas for the learners' 3D-imagination, if all cars are stripped away from this structure and make place for children's needs.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Reflect on how much urban space serves car infrastructure.
- Assess how their urban surrounding serves their own needs.
- Reflect on how other purposes of urban public space could be enhanced by taking space away from cars.
- Reflect on what they want to experience in cities.
- Express through model building how they want city space to transform to their needs.



Duration

2 hours or more



Teaching methods

Learner-centered inquiry
Game-based learning



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Place-based learning
Field trip alternatively
active / movement game
Art-based exploration /
Visual Recording
Model building



Guidelines

Through three steps learners are encouraged to reflect on the child-friendliness of cities, assess current building practice and create a vision for a transformed sustainable city:

1. Learners explore what they like and dislike about cities and what they miss in the urban space.
2. Learners explore how urban space currently is predominantly shaped through car infrastructure.
3. Learners redesign city space by transforming a parking garage into a community space.

Step 1 (30-45 minutes) :

The aim of step 1 is to encourage learners to reflect on what aspects of the city serve them and what aspects are child-unfriendly. At the end of the first step, there should be a visual collection of what the learners appreciate in cities and what they want more of.

Depending on your classroom context, this could happen...

a) ... through a field trip to the city center or the urban surroundings of the school. Learners record with pictures, what they like and what they don't. They photograph spots with using a red cardboard frame for dislike and a green cardboard frame for like. At the same time, they collect ideas of what else they would like to experience in the city. This could also include a visit of an actual parking garage, where children can hardly move around without getting in danger.

b) ... through a collage with pictures from their city. Learners manipulate the pictures with painting, collaging and comments explaining their work. Afterwards they present their collages/paintings to their peers and the teacher collects things that learners miss in their city on the board.

c) ... through drawings or photographs that learners prepare as homework. Learners are asked to make a drawing or take pictures of things they like or dislike in the city.

Step 2 (at least 20 minutes):

The aim of the second step is to experience physically the dimensions of a parking car in relation to a child / person. This could be done in groups or with the whole class:

1. Find out how much space a parked car takes. How long is a normal car and how wide? How long and wide is a parking space for a car? If learners need more instructions (like count your steps or find a stick to measure it), the teacher should provide help. This could be conducted in the school's parking space. If you have enough time, you could also let learners estimate how big a car and a parking space is beforehand by letting them tape the estimated dimensions on the classroom floor.
2. Every group / the whole class marks the size of a parking space on the floor with tape. If the classroom is too small, which is likely to happen if you are doing it in groups, go outside to the school yard and use chalk.
3. For the next task groups can work together and use props (chairs, sticks, etc.) they can find in the classroom / school yard. How many people can fit in one parking spot standing? Pretend the parking

spot is a bus – how many people could sit in the bus? Pretend the parking spot is a child’s bedroom (You could use chairs to set up furniture). In the end you give every group / the whole class the task to agree on one of the things they would like to do in the city as (brainstormed above) and play it out on their spot.

Step 3 (60 minutes):

The teacher prepares a model of a simple parking garage with LEGO (see Annex 2). This should be split in vertical segments (number depending on how many groups you will form). Each group then gets one of the segments and has at least 40 minutes to transform it. The teacher asks the learners to imagine that this parking garage was in their city center and they can do whatever they want with the space. Each group gets enough LEGO bricks to transform their segment. The teacher should monitor and also support by pointing out the ideas they collected in

the first step. The teacher can also help by explaining how much space they have to invent: “Remember, we couldn’t fit three cars into our classroom, so this is the size of our classroom,” etc. In the end of the lesson the learners put together their segments and gather around the complete community garage. Each group can share their built ideas and learners can point out what they like about their peers’ work.

Alternatively if there is not enough time for the teachers to prepare a parking garage, pairs of students could also work on a LEGO model of a single parking spot (you could use LEGO panels of 6x16 studs for that, which in scale equals a parking space of ca. 2,20m x 5,70m). In the end you could put them all in a row, take a picture and photoshop it into a real street in your city.

Assessment

As in step 3 of the activity, learners are relatively free to develop whatever they want, but it is necessary for the teacher to monitor the progress. The teacher can guide learners through asking questions that relate to the results of step 1 and 2, so learners take into account their peers’ perspectives.

In this activity the learners are the best judge of each other’s ideas’ child-friendliness, so give time at the end of the lesson for peer-assessment. Point out though that there is no right or wrong solution and a lively community space benefits of multiple perspectives and the richness of different ideas.

If the built LEGO-models allow for that, you can also point out various parameters of sustainable cities as explained in the curriculum like stormwater management through green roofs or green walls to cool down buildings.

Tips

- If you don’t have a lot of green LEGO bricks that represent vegetation, you could also encourage learners to complement their LEGO with natural materials in order to incorporate green space into their vision.
- Take the chance, if you can, and connect this activity to a real life situation: The school wants to transform its parking space? Try to replicate the situation in the model! There is a parking garage or parking space in your town whose future use is unclear? Pick that particular one!
- You can use the learners’ models to organize an exhibition. Learners could be the experts to explain their models and show how they fulfill their expectation of urban space. Invite the school community and also stakeholders if real-life environments are being transformed (see tip above).



Material

- At least one camera / mobile phone
- Per camera one set of cardboard picture frames in red and green (DIN A3)
- Tape or chalk to mark a parking space's dimensions on the floor
- Prepared segments of LEGO parking garage, a lot of LEGO bricks



Handouts

Annex 1: Pictures as inspiration for transformed parking space.

Annex 2: Instructions for teachers of how to build a simple parking garage structure.

Adaptation for 10+ children

For step 1: Every learner gets a map of the city or the neighbourhood they are living in. They mark what spots in the city they like and what spots they dislike. They present their maps in groups and brainstorm on what they miss about the city. You could also scan all maps and use an image-editing-program to create a layered image of all maps combined. This way you get a collective map of the class's favorite and least favorite spots.

For step 2: Use math to illustrate the relation of humans to cars. For example, let the learners calculate how many square metres a car needs to park and what the average living space of the learners is. Another idea to incorporate math is to let learners calculate the scale of the LEGO models: How big is a parking spot in LEGO scale. Use a LEGO figure as reference. How many cars could park in the model?



Alternative spaces

City, classroom, school yard, parking lot

Useful links/Further reading

Transformation of the top deck of a Houston hospital parking garage into a Zen garden for its patients:

<https://inhabitat.com/intexure-architects-transform-parking-garage-into-a-rooftop-zen-garden/greenbriar-rooftop-garden-1/>

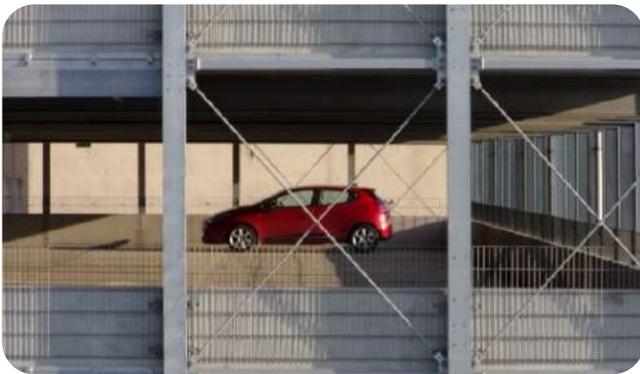
Transformation of a parking lot into a public space for the community:

<https://www.shareable.net/interviewed-david-bollier-on-patterns-of-commoning/>

Only for German readers: Transformation of parking garages into living space:

<https://www.tagesschau.de/wirtschaft/technologie/bauboom-klimafolgen-101.html>

Module 3 // Activity 1 // Annex 1: Classic parking garages:



Sources:

- Red parking garage by Jeramey Jannene on flickr.com*
- Insight the parking deck by liebeslakritze on flickr.com*
- Endless Garage by Eric Kilby on flickr.com*
- 1111 Parking Garage by Phillip Pesar on flickr.com*



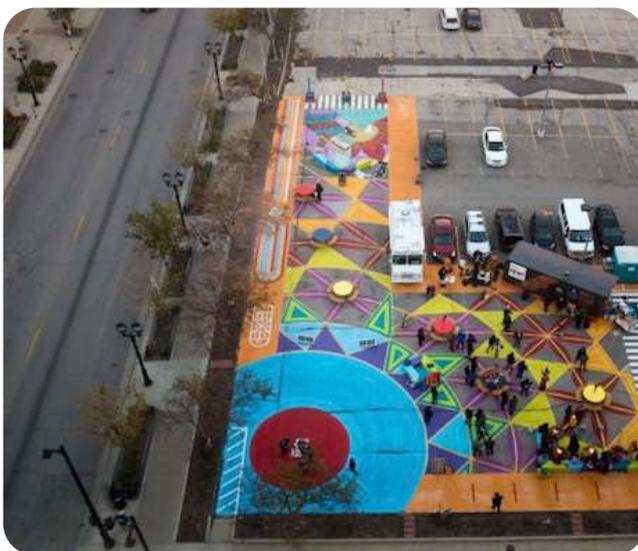
Transformed Parking Space:



Parking Day in Leipzig, Germany:

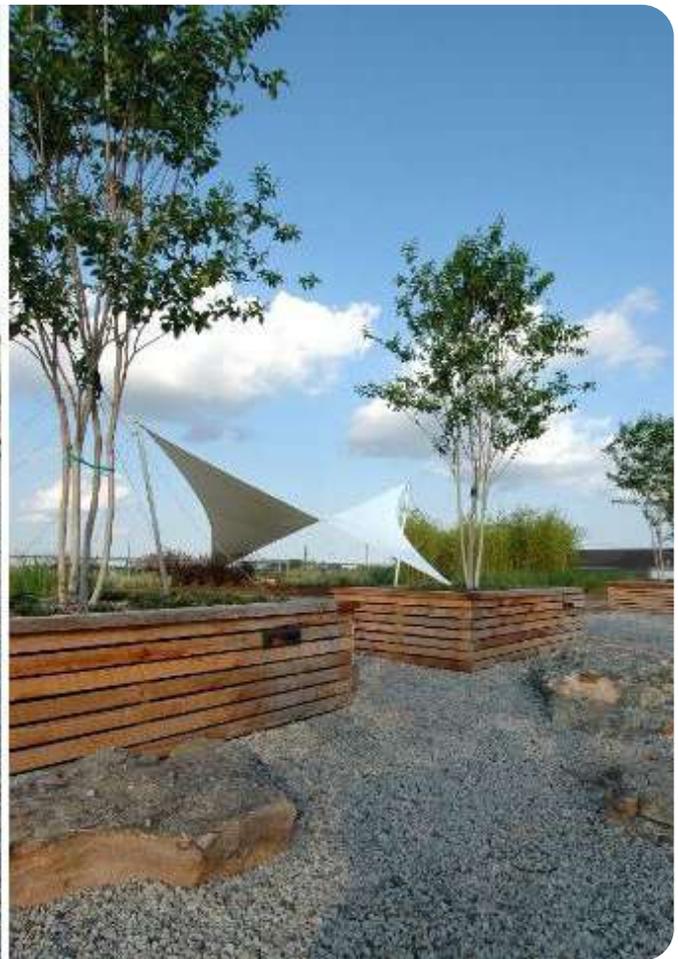
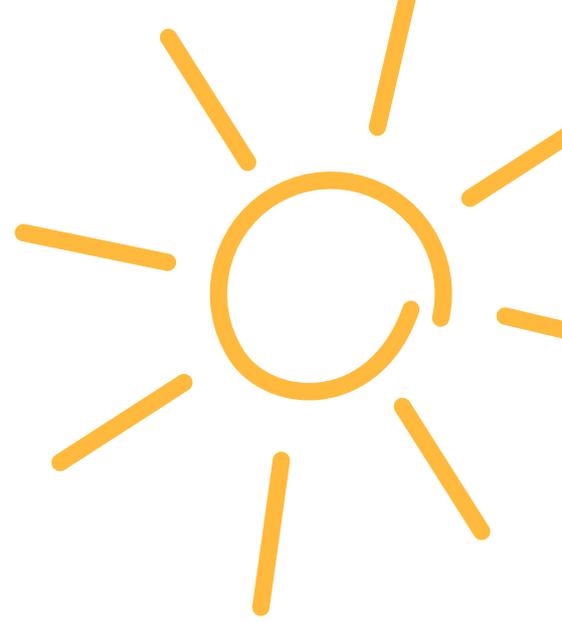
Once a year, everyone can occupy parking space for one day and use it however they want.

Source: Ökolöwe – Umweltbund Leipzig e.V.



The Spot 4MKE in Milwaukee, US:
Parking Space got transformed into a community center
Source: *Courtesy of Project for Public Spaces*

Alternative uses of rooftop spaces:



Greenbriar Rooftop Garden, Houston, US:
Transformation of a hospital parking garage rooftop into a garden for its patients



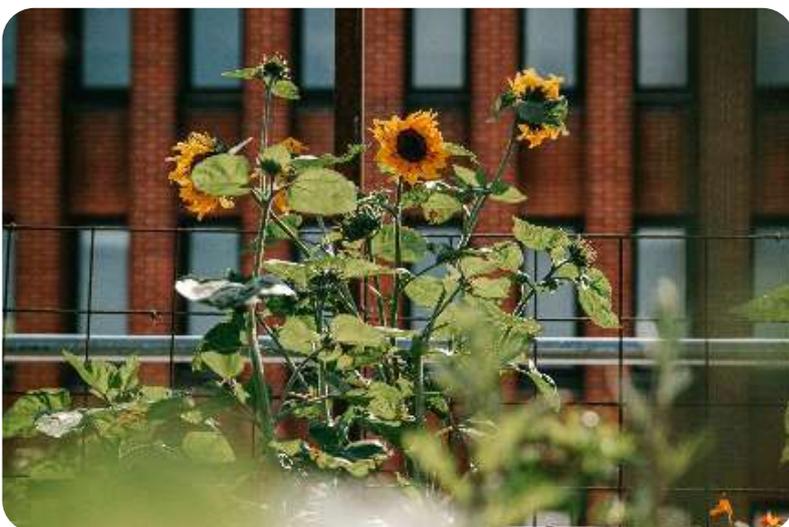
CopenHill by BIG Architects:
A Copenhagen waste incineration plant simultaneously serves as a center for urban mountain sport.

Source: Skiing in Amager Bakke, Copenhagen by Kallerna on Wikimedia Commons



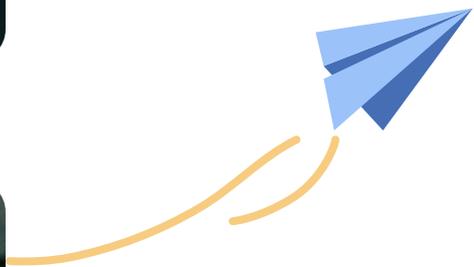
Ostergro community garden, Copenhagen, Denmark

Source: Simon Krabbe



Camping on a rooftop in the Warehouse District of Minneapolis, Minnesota

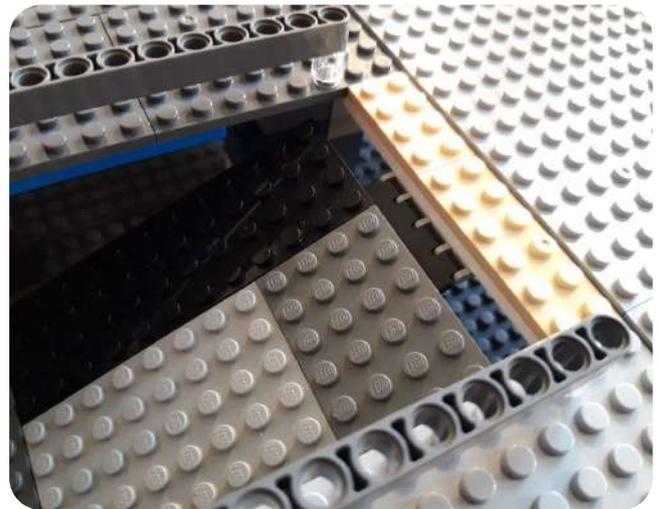
Source: Bradleyjohnson on Flickr



Module 3 // Activity 1 // Annex 2:



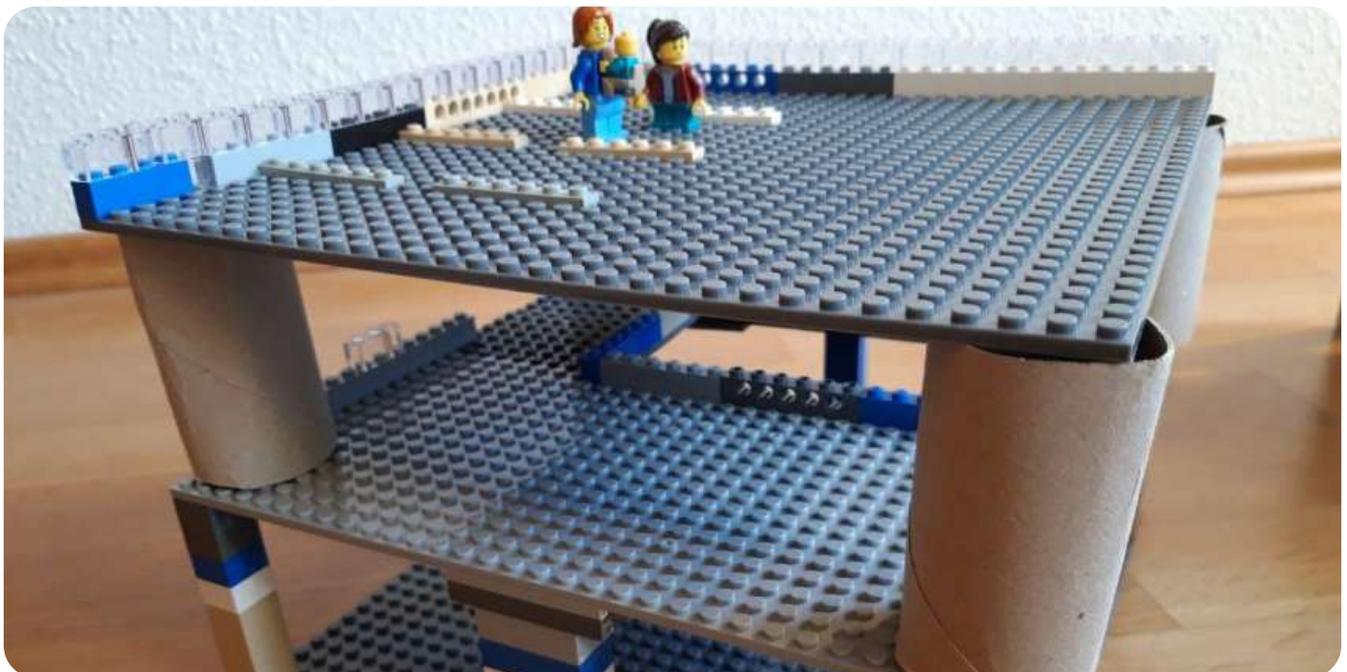
- Build a simple structure that can be transformed by the learners.
- Stick to neutral like grey, beige, white and black to mimic the appearance of concrete.
- The LEGO scale is around 1:42 (1cm in the LEGO-model are 42cm in reality).
- The height of 8 LEGO bricks equals about 3,20m ceiling height.
- Build in segments, so that learners can work in groups.



- If you can, include details like railings and descents.
- An easy way to do this is to use smaller LEGO boards and connect them to the floor with flexible hinges.



- A good way to illustrate the scale (1:42) is to mark some parking spaces.
- With the LEGO scale, the adult in the picture would have a height of ca. 1,80m and the child 1,55m
- A parking space in the model is 7 x 14 studs, which roughly equals the minimal size of a parking space of 2,50m x 5m.



- If you do not have the LEGO resources to build a complete parking garage, you can use other materials.
- A good way to mimic the columns is to re-use toilet roles.
- For the parking decks you could also use firm cardboard and let learners built their ideas on small LEGO boards and have them fix them on the cardboard with double-sided tape.



MODULE 3: **Urban Mobility, Health** **Benefits of Urban Ecology** **and Human-Nature Connection**

ACTIVITY 2: Your Way to School

Topic

How do learners get to school? Especially in the early school years, it is usually not up to the children to decide how to get to school. The transportation mode is chosen by the parents and is subject to various considerations that are partly pragmatic and partly habitual. But as those decisions are consequential to the children's lives, we want to encourage learners to reflect those modes and assess them against the background of their own needs.

Research has shown (see further reading) that children who walk to school or take their bike have much richer experiences than children being brought to school by car. This got obvious when children as part of the study were asked to draw their way to school: Children who walked or biked to school had recollection of a great variety of details including plant and animal life along the route, whereas children who got a lift mostly remembered car infrastructure like traffic lights and roadways.

Apart from the experience being richer, getting to school without a car also has a lot of other benefits, for example:

- Children establish a connection to their urban environment.
- They train their orientation and their competences to interact with traffic safely.
- Regular movement in the outdoors improves health and fitness as well as concentration capacity.

This activity animates learners to review their own way to school. Depending on how they get to school there will be a range of activities to reflect upon how to enhance this routine through transformation of the environment, better public transport infrastructure, more multi-sensual experiences and a setting that allows more social interaction.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Reflect on their own way of getting to school
- Assess what they like about their way to school and what they don't
- Express their vision through LEGO model building



Duration

2 hours or more



Teaching methods

Learner-centered inquiry
Game-based learning



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Place-based learning
Field trip alternatively active / movement game
Art-based exploration / Visual Recording
Model building



Guidelines

Through three steps learners are encouraged to reflect on their own way to school, to explore alternative ways and to design an urban infrastructure for independent movement:

1. Learners reflect on their own way to school.
2. Learners develop ideas on how to improve their way to school.
3. Learners transform a street model according to their earlier discoveries.

Step 1 (30 minutes or more):

The first step of the activity aims at encouraging learners to reflect on how they get to school. Depending on your school context, you could accomplish this by one of the following ways:

a) Learners are asked individually to draw their way to school. This could also be done as a homework in preparation of the session. The teacher asks the learners to present their picture and asks questions like “What part do you like best about your way to school?”, “By what transportation mode do you get to school?”, “What part is boring? Why?”, “What part feels dangerous? Why?”, “Who do you meet on your way to school?”, etc.

b) Alternatively, teachers can also take their learners outside to explore the street block around the school. Learners can point out special places or share situations they have experienced. To record the findings the class can use the visual recording technique described for Act. 1. For older learners the teacher can also provide a simple map of the block (preferably in A2 or A1) and mark the spots with colors, symbols or emojis. Be aware though that reading maps might prove difficult for younger learners.

c) To get a new perspective, which is often a great entry point to getting creative, learners could, as a homework, interview their parents about how they got to school and then visualize this through a drawing. If the school has a partnership with another school abroad, learners there could also be asked to share their way to school. This opens up minds about different options of getting to school. Maybe a parent had to cross a creek to get to school or a students in a partner school always pick up several other students on their way to school.

Step 2 (20 minutes):

Back in the classroom you gather around the drawings / pictures / maps and brainstorm about what else they would like to do on their way to school. What activities would they like to be able to do (e.g. skateboard, play)? What would they like to smell on their way to school? Who would they like to meet on the way to school? What would they like to hear? What would they like to discover? What animals would they like to see? What plants would they like to see? What should the ground look like? What do they want their bus stop to look like? What do they want their bike stands to look like? Who do they want to share their way to school with? Etc.

With every contribution the learners draw one icon on a poster/ the board, so that we end up with a collection of aspects of how learners would like their way to school to be.

Step 3 (60 minutes) :

The learners are then distributed into groups. Each group gets a LEGO-built street section that looks like a typical street around the school. This can be adopted strongly to the real-life-environment, but can also be executed in a more general matter (see Annex 1). The learners are asked to transform that street according to their visions. The teacher can support the groups by pointing out aspects that were mentioned before. In the end of the lesson the learners put together their segments and gather around it. Each group can share their built ideas and learners can point out what they like about their peers' work.

Tips

- Often there are specific situations that complicate independent movement for children around your school. This could be a multilane main road that a lot of learners have to cross or a missing bike lane on their way to school. If you are aware of those kind of real-life issues, it is a great idea to concentrate on those and let learners find solutions for those specific situations.
- You can also use this activity to introduce the concept of 'walking school buses'. This is a great way of increasing social connection and creating a safer way to school. For more on this, find a link below in the section Further Reading.
- The built results can be a great conversation starter for a parent-teacher-conference. The visual results paired with their children's testimony about their way to school could make them overthink their mobility choices. If the learners' models deal with a real-life issue, you could invite city legislators to an exhibition presenting the children's solutions.

Assessment

In step 3 the teacher should monitor the learners' progress and guide their creations by pointing out to them their findings of step 1 and 2, so learners take into account their peers' perspectives as well. Give time at the end of the lesson for peer-assessment. The leading question here can be whether learners feel that the built model would encourage their independent movement in public space.

If the built LEGO-models allow for that, you can also point out various parameters of sustainable cities as explained in the curriculum, like corridors for animal migration or street trees to cool down temperatures in cities.

The teacher should also refer back to the class's findings of step 1 and step 2 to see if the built models consider the learners' own demands. At this point, the teacher can also point out that expectations of different people can also differ a lot, therefore good urban design is always multipurpose design. A ramp that might serve someone to move in a wheelchair can also be a skateboard ramp.



Material

- Possibly large map of the school surroundings (Din A2 or A1)
- Possibly green and red picture frames as described in Activity 1
- Camera or several cameras or smartphones
- White Board or poster
- LEGO street model



Handouts

Annex 1: Instructions for teachers of how to build a simple LEGO street model.

Annex 2: Examples of Superblocks in Barcelona as child-friendly and pedestrian-friendly transformed streets.

Adaptation for 10+ children

- Older children often travel longer to reach secondary school. Therefore they are often dependent of public transport. Instead of designing their way to school, learners could assess and redesign public transport, may it be the bus stop, the metro station or the vehicles itself. The overall question being: How could public transport become more attractive and easier for young people of all abilities to be used independently?
- For Step 2: 10+ learners could visualize what they would like to experience on their way to school through Comic Boarding. This is a technique where you give an empty comic template to the children that is framed with an initial panel (at home) and a closing panel (arriving at school) and the panels in between are left blank for learners to fill in.
- Fictional inquiry is a collaborative participatory design technique that could also be applied in the classroom context to create innovative ideas for public transport. The inquiry is set in a fictional situation that requires certain parameters to be considered when creating a design vision. For example: Aliens land in your neighbourhood and are admitted to your school. The aliens have no eyes and the class has to design ways for them to get to school safely. Through this strategy, real-life obstacles and obvious solutions get bypassed for the benefit of more visionary approaches.



Alternative spaces

School surroundings or classroom

Useful links/Further reading

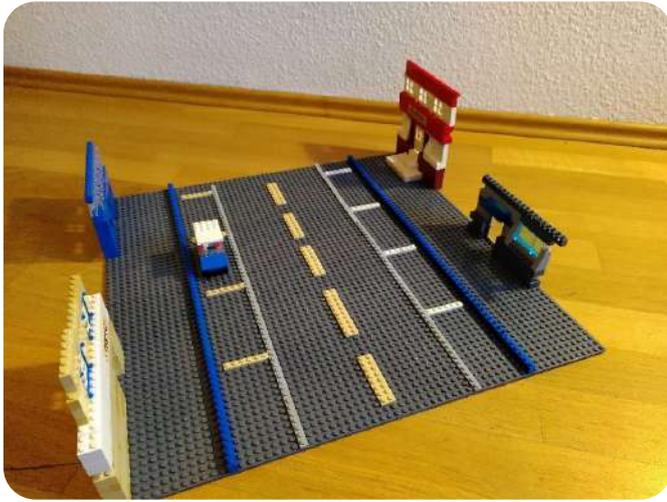
Rissotto, A. and Tonucci, F. (2002). Freedom of Movement and Environmental Knowledge in Elementary School Children. *Journal of Environmental Psychology*. March 2002 (22/1-2).

Starting a Walking School Bus: The Basics:

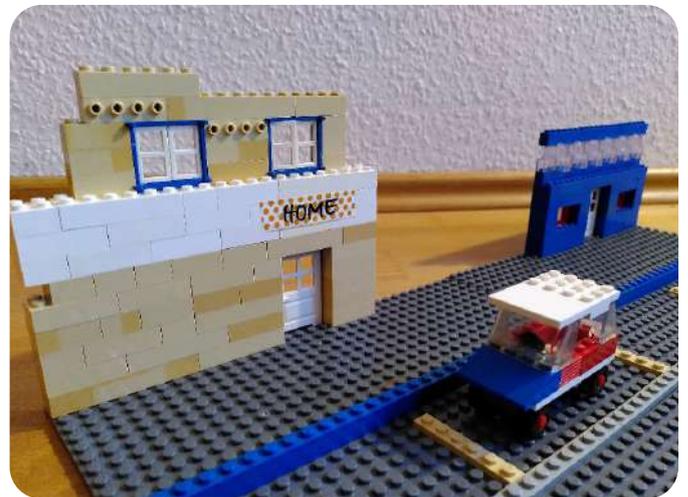
http://www.walkingschoolbus.org/WalkingSchoolBus_pdf.pdf



Module 3 // Activity 2 // Annex 1:



- Build a street in segments, so that different groups can build parts of it and then put them together afterwards to have a big street model, either the complete width of the street or half a street as seen in the examples.
- For reference put a car in and set pieces of fascades.



- You can define one building as “home” and one as “school”



Module 3 // Activity 2 // Annex 2:

Superillas – Superblocks in Barcelona
Source: Ajuntament de Barcelona







MODULE 3: **Urban Mobility, Health** **Benefits of Urban Ecology** **and Human-Nature Connection**

ACTIVITY 3: Your Green School Yard

Topic

School yards are often designed by the principle of low maintenance. What would a school yard look like that builds bonds between children and nature? Let's ask them! By learner-centered inquiry this activity draws the learners' focus on how they experience the natural world and what aspects they like about it. They also assess their own school yards according to those parameters and get the opportunity to create a new design for it that could deepen their connection to the natural world and strengthen their ecological identity.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify how they can experience nature in their close environment.
- Identify how it can serve their well-being and provide opportunities to play.
- Assess their school environment for opportunities to experience nature.
- Express their vision of a green school yard with LEGO model building.



Duration

120 minutes



Teaching methods

Learner-centered inquiry
Game-based learning



Target ages

6 - 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Place-based learning
Child-led tour
Movement Game
Art-based exploration / Visual
Recording
Model building

Guidelines

Through three steps this activity gives learners the opportunity to explore how the natural world can enrich their everyday experiences:

1. Learners explore what facilities their current school yards offers to foster their bond with nature.
2. Learners explore how natural features can enrich the children's experience of the school yard.
3. Learners visualize with LEGO-model building a biophilic school yard design.



Step 1 (30 minutes):

Everyone gathers in the school yard. In groups learners get equipped with cards in different colours with questions on it (Annex 1). With the questions learners explore...

... what elements of natural habitats their current school yard provides.

... what aspects of play with nature can be practiced in their current school yard.

... in what way the current school yard can enhance well-being and social interaction.

The learners are asked to only distribute the cards that they can find a spot for (Instruct them to put little rocks on the cards, so they don't fly away!). When everyone is finished, the whole class makes a tour of the school yard and examines all the spots where learners left cards. Learners can show how they run, what they discover, how they lie on the ground and look into the sky, etc.

Step 2 (30 minutes):

Back in the classroom you gather around the Back in the classroom (or outdoors) the teacher points out what learners didn't feel they could find in their school yards, e.g. no good place to hide. Each group then gets assigned one of those aspects and gets material to make a collage design for this place (alternatively a drawing or a combination of both, depending on the abilities). The learners then present their drawing directed by the teacher (E.g. Place to hide: And why can't anyone see you there? How many people can hide there? Etc.).

Step 3 (60 minutes):

After the presentation of all learners' ideas, they are asked to build their dream school yard in groups. The teacher could provide simple models of the factual school yard or they get empty LEGO boards, if this is too much prep work for the teacher. In both cases, the teacher should walk around and point out aspects that were discussed before. The visual collection of step 2 serves as a collective idea hub for the learners. At the end of the lesson all learners gather around all models. Each group can share their built ideas and learners can point out what they like about their peers' work. They can also ask each other questions to get explanations of specific elements. The teacher stresses though that there is no right or best way to do it, rather encourages to compliment each other on what they like about their peers' work.

Assessment

In step 3, the teacher should monitor the learners' progress and guide their creations by pointing out to them their findings of step 1 and 2, so learners take into account their peers' perspectives as well.

Give time at the end of the lesson for peer-assessment. The leading question here can be whether learners feel that the built model will provide opportunity for all aspects of step 1.

If the built LEGO-models allow for that, you can also point out various parameters of sustainable urban space as explained in the curriculum like corridors for animal migration or trees to cool down temperatures in cities.



Material

- Annex 1: 1 set of cards for each group
- Annex 2: LEGO model of actual school yard or 1 empty LEGO board per group
- Annex 3: Examples of transformed green school yards



Handouts

Annex 1: Question cards for Step 1 of the activity.



Alternative spaces

Step 1 preferably in the school yard, step 2 and 3 can also be done in the classroom

Tips

- If there is an actual spot on the school yard that will be undergoing renovation in the near future, this activity is a great way for co-creation and participatory practices. The LEGO-models can be a starting point for a discussion within the school community.
- For a more collaborative approach, the school yard can also be divided into multiple sections represented by small LEGO boards. Each group of learners will then contribute a piece of the envisioned school yard and the whole model will then represent a collective result.

Adaptation for 10+ children

- The focus of the activity described above is focused on the individual experiences and demands of the learners. With older students you could also include other aspects into the questions of step 1, which are rooted in their science lessons and are closely connected with other aspects of a sustainable infrastructure like: Where can water be absorbed after a heavy rain fall? How can insects migrate from one end of the school yard to the other? Etc.

Useful links/Further reading

The OASIS approach. OASIS schoolyards as a driver for Healthier & Cohesive Neighbourhoods:
https://www.youtube.com/watch?v=FC_GmeQwHUI

Green School Yard Movement:

https://static1.squarespace.com/static/57682b81725e25259d8396e3/t/578578fa29687ff48a7c42ea/1468365053369/GSA-1-Danks-CNN-WhyGreenSchoolyards_4-16-15rs.pdf

What is a green schoolyard? From Children & Nature Network:

<https://www.youtube.com/watch?v=T3HmUZPf2FQ>

Module 3 // Activity 3 // Annex 1:



WHERE DO YOU LIKE TO RUN?



WHERE CAN YOU DISCOVER SOMETHING THAT YOU HAVEN'T SEEN BEFORE?



WHERE DO YOU LIKE TO HIDE?



WHERE DO YOU LIKE TO CLIMB?



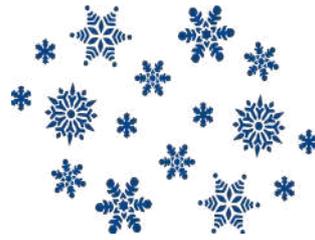
WHERE CAN YOU OBSERVE MUSHROOMS GROW?



WHERE CAN YOU OBSERVE ANIMALS?



WHAT PLANTS DO YOU LIKE?



WHICH SPOT IS NICEST IN WINTER?



WHERE DO BIRDS NEST?



WHERE DO YOU GET A LOT OF SUN?



WHERE CAN YOU PLAY IN THE DIRT?



WHERE CAN YOU EXAMINE TREES?



WHERE DOES IT SMELL GOOD?



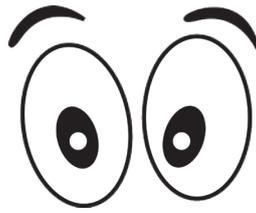
WHERE CAN YOU GET SHELTER IN THE SUMMER HEAT?



WHERE CAN WILD BEES FIND POLLEN?



WHERE CAN YOU DO ROCK CLIMBING?



WHERE CAN YOU LOOK ON THE YARD FROM ABOVE?



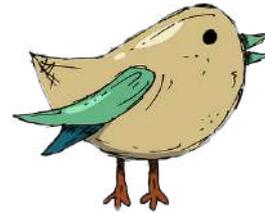
WHERE CAN YOU CHILL ON YOUR OWN?



WHERE CAN YOU FIND EDIBLE PLANTS? (CAUTION!)



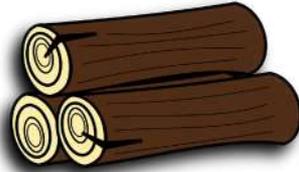
WHERE CAN YOU HEAR THE WIND IN THE LEAVES OF A BUSH OR TREE?



WHERE CAN BIRDS DRINK?



WHERE CAN ANIMALS HIDE?



WHERE CAN YOU BUILD SOMETHING?



WHERE CAN YOU MEET FRIENDS?



WHERE WOULD YOU LIKE TO LIE ON YOUR BACK AND OBSERVE THE CLOUDS?



WHERE HAVE YOU NEVER BEEN ON THE SCHOOL YARD?



WHERE IS YOUR FAVOURITE SPOT IN THE SCHOOL YARD?



WHERE CAN YOU PRACTICE BALANCING?



WHERE CAN YOU SLIDE?

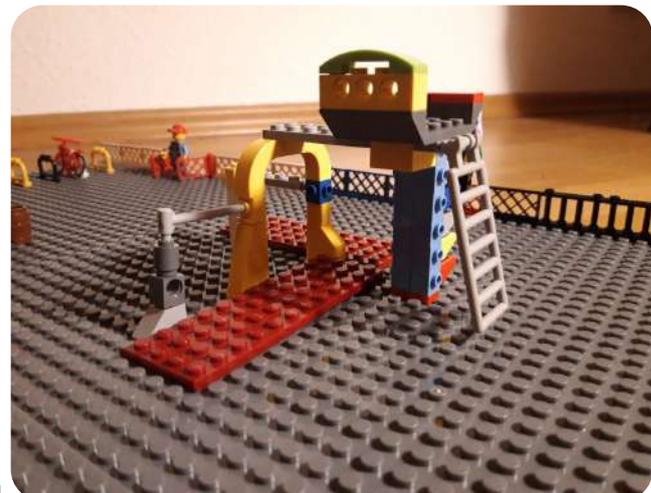
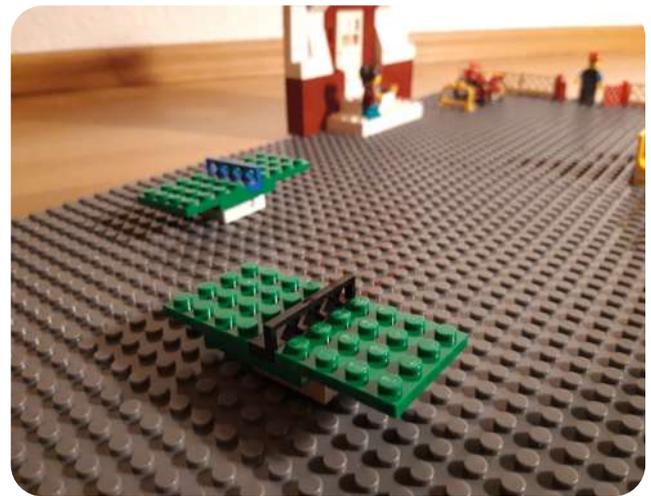


WHERE CAN YOU EAT YOUR PACKED LUNCH?

Module 3 // Activity 3 // Annex 2:



- For this activity, you could always just prepare empty boards and leave everything for the learners to create.
- You could also prepare a simple and standard school yard like the one above with some details like the entrance of the school, ping-pong tables, sandbox, climbing scaffold, benches etc.. It will be easier then to get ideas for the transformation.



Module 3 // Activity 3 // Annex 3:

Green School Yards in Thüringen, Germany

Source: Daria Junggeburth / Deutsche Umwelthilfe (DUH)





MODULE 4: **Caring for Water**

ACTIVITY 1: Water Pollution

Topic

Two thirds of the surface of the Earth is covered with water. Water is the main condition for life as human, animal and plant life are deeply dependent on it. Still many people in the world live without access to clean water.

Background: Water is a crucial resource for humanity. However, changes in water cycle patterns caused by climate change are making it more difficult to access and ensure safe drinking water. The rising sea levels are causing the fresh

water to become salty, and the raising temperatures can cause bacteria in freshwater resources. At the same time, local problems such as agricultural farming, industries and people's daily habits can cause our water supplies to be polluted.

In this activity, the children will learn about different sources to pollution of drinking water and work with solutions to these challenges.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify different types of water pollution and their characteristics.
- Identify different causes to water pollution.
- Have an awareness and understanding of the importance of protecting our drinking water.
- Use their knowledge and creativity to build LEGO-models to illustrate these issues.



Duration

120 minutes



Teaching methods

Project based learning
Sensory learning
Game-based learning
Learner-centered inquiry



Target ages

6 - 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Class discussion
Photo analysis/description
Work in groups
Building models with LEGO bricks



Guidelines

Through 3 steps, the participants will become aware of the importance of clean drinking water, what can cause water pollution and what pollution looks like.

The children will use this knowledge to build LEGO brick models of small neighborhoods that prevent water pollution.

Preparation of the activity

- Read the theory for module 4 in the Curriculum.
- Provide tables and chairs for the participants.
- Prepare the different materials for the activity (see «Material» below)

Introduction: (15 minutes)

The introduction will start the activity with a sensorial play where children become aware of the characteristics to (clean) water. This leads to a talk about why water is important to us, where we get our clean water from, what happens if water gets polluted etc.

1. Gather the children in a circle on the floor or on chairs and give each participant a glass of fresh cold water. Avoid using disposable cups (plastic cups) and instead choose transparent glasses. This will give the children the possibility to observe the water better and it's important to teach the children from an early age that we should avoid the use of plastic when possible.
2. Tell the children to simply hold the glass and not to drink from it yet. Start a talk with the children, asking them the following questions:
 - Describe what is in the glass, its temperature, its colour etc.
 - What do we use water for?
 - Where can we find water?
 - Which types of water can we find in the world? (salt water, fresh water...)
 - How much water do you drink during a day?
 - What happens if we don't drink enough water?
 - Where does the water from our water taps come from?
 - What happens if we drink water from the taps which is dirty?
3. The conversation will hopefully lead to the topic 'water pollution'. If the children don't know the word, please explain it to them with a simple explanation, such as:
Water pollution is when something enters the water that makes it unsafe for people (and sometimes animals and plants) to drink.
4. Afterwards the children are allowed to drink the water.

Step 1: (15 minutes)

To make the children aware of different sources to water pollution, show the pictures from annex 1 and ask the children in what way they think that the different activities on the images can affect our drinking water. Explain it further.

Step 2: (30 minutes)

The purpose of step 2 is to start reflecting on the different types of pollution by letting the children visualize polluted water.

1. Divide the class into 4 groups and let each group choose which kind of pollution they wish to illustrate in the water bowl: City pollution, pollution from farms, gardens, factories etc. Give each group 1 glass bowl with clean water, different fruit colors and different objects to pollute the water (see «Material»). Each group must now try to illustrate the pollution.
2. When all the groups are done mixing the pollution, the other groups need to guess where the pollution comes from.
3. Ask the children if they can think of any ways to avoid water pollution.
For instance: How can we keep our cities clean? What can we do in our gardens? How can we save more water in our daily lives?

Step 3: (60 minutes)

The purpose of step 3 is to let the children reflect on and demonstrate different solutions to water pollution by the use of LEGO bricks.

1. Distribute LEGO bricks at each table and give the groups the task description (annex 2). If the children are very young, explain the exercise instead.
2. The exercise is to build a house or a small community in LEGO bricks with groundwater running underneath the surface of the ground. They should build in solutions to prevent water pollution. Ideas could be:
 - give the people access to differentiate their garbage
 - recycling stations where people can deposit chemicals and dangerous garbage.
 - build bird cases/nest-boxes and bat boxes. Both birds and bats can help eat the insects which eat the vegetables in the gardens. This can help minimize the use of pesticides or even avoid the use of it completely.Allow the children to use their free imagination. The solutions don't have to be realistic. The important thing is that they get creative and reflect on how water can get contaminated.
4. At the end of the session, all groups present their LEGO models and explain what measures they have taken to prevent the water from getting polluted.



Assessment

- Distribute annex 3 («Match the letters with the numbers»). Let the children work in pairs.
- Afterwards, correct the paper with the children and talk with them about today's lesson and what they have learned. Have they learned something they did not know before?



Material

- Tables and chairs
- LEGO bricks and LEGO plates
- Glasses with fresh cold water for each participant.
- Small transparent glass bowls filled with water for each group
- Cleaning wipes and paper towels (for the water bowls and fruit colors)
- Tiny objects which can be used as pollution the seas and lakes, for instance: Pieces of plastic bags, metal pieces from soda cans, etc.
- Natural fruit colors (for baking)
- Coarse salt (to illustrate pollution of drinking water from the ocean)
- Batteries, plastic bags etc. (to illustrate city garbage)



Handouts

- Annex 1: Pictures of sources to water pollution
- Annex 2: Task description
- Annex 3: Match the letters with the numbers
- Annex 4: Solutions (for the teacher)
- Annex 5: Interview about drinking water



Alternative spaces

An additional exercise to do with the children after this activity would be to take them outside to visit a local waterwork.



Adaptation for 10+ children

- Interview about drinking water (Annex 5): If you are working with older children, an additional exercise would be to let the children interview a classmate or their parents on the topic drinking water. This assignment encourages the children to be curious about the water and the water quality in their own homes. It can help start a conversation with their friends or parents about the topic and enhance a consciousness of clean drinking water as something not to be taken for granted.
- The journey of the water: Another exercise to do with older children is to show them a short cartoon (in English), which illustrates the journey from the water source to the tap, as well as the risks of pollution: <https://www.youtube.com/watch?v=-bvZCdMecEo>.
(This requires access to a screen or a tablet.)
- You can pause the video once in a while and ask the children what they think the video illustrates. If the children's English skills are not that advanced, you can explain the content and answer their questions. The video can still give them a basic understanding of the journey of water and the problem with water pollution.

Tips

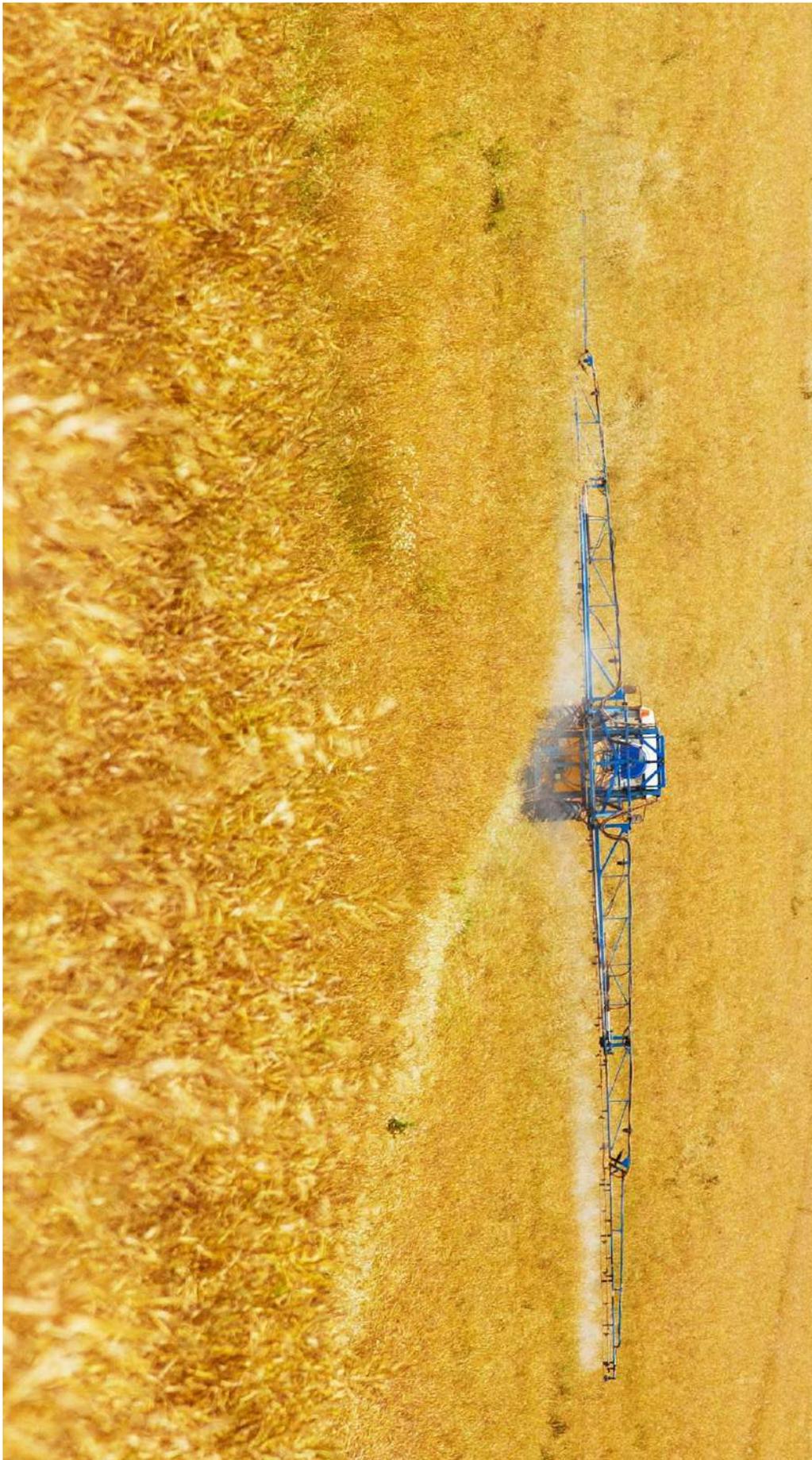
- The building exercise can be quite complex. It's a good idea to help the groups during their process and talk to them about solutions to prevent water pollution. Their solutions don't have to be realistic as long as they reflect an awareness about water as something we need to protect.
- If you don't have a lot of green LEGO bricks that represent vegetation, you could also encourage learners to complement their LEGO brick model with natural materials in order to incorporate green space into their vision.
- Make an exhibition of the children's LEGO brick models for other children, teachers and parents to see.



Useful links/Further reading

- Short cartoon showing the journey from the water source to the tap and the risks of pollution (in English):
<https://www.youtube.com/watch?v=-bvZCdMecEo>

Module 4 // Activity 1 // Annex 1: Pictures of sources to water pollution



Picture 1: A farm/agricultural fields



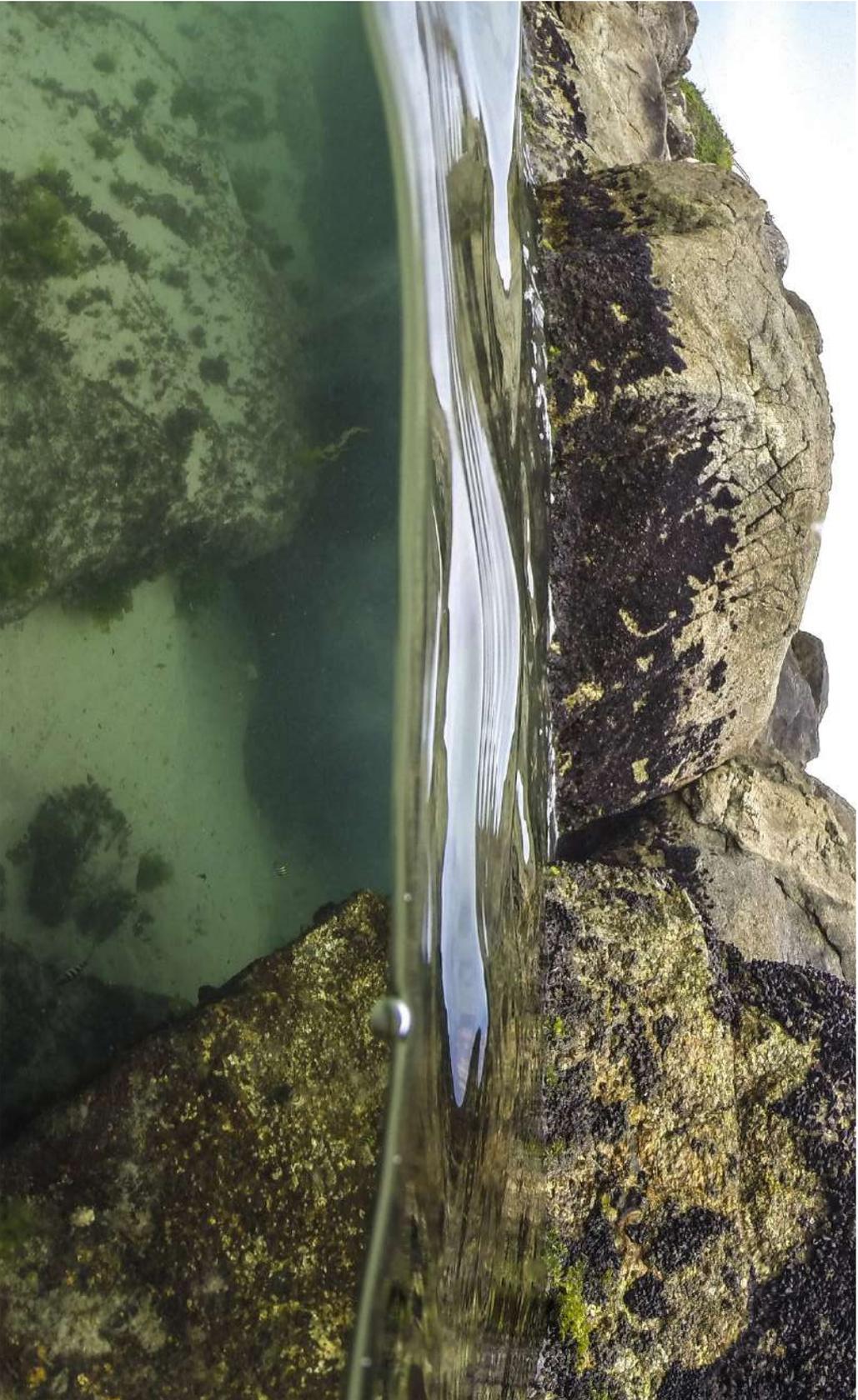
Picture 2: A factory



Picture 3: City garbage



Picture 4: Sewer



Picture 5: Sea water



Picture 6: Plant pesticides in the garden



Picture 7: A waterwork

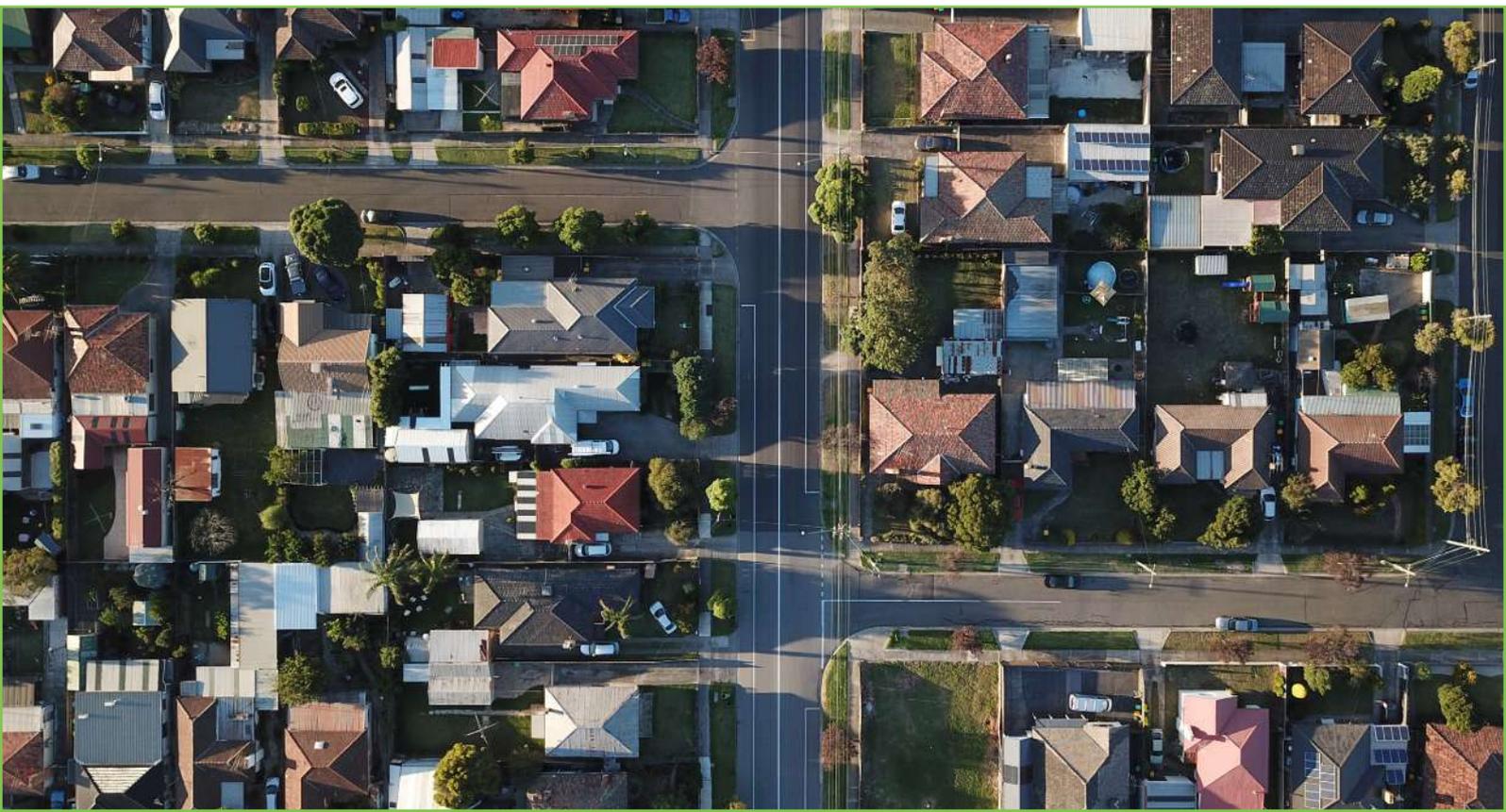
Module 4 // Activity 1 // Annex 2: Task description

Build a house or a small neighborhood with the use of LEGO bricks. Think of solutions to avoid water pollution and add these to your model.

For instance:

- Make sure people have access to waste containers
- Various bins to differentiate garbage
- Avoid plant pesticides in the gardens – what can people use instead?
- Build bird cases (the birds can help eat the insects which eat the vegetables in the gardens. In this way you can avoid pesticides)
- Build a recycling station where people can drop batteries, chemicals etc. for recycling

Make sure to illustrate the soil and the ground water that runs underneath your house or neighborhood.



Module 4 // Activity 1 // Annex 3: Match the letters with the numbers

A) A <u>waterwork</u> is...	1) Farms, factories, garbage, pesticides, sea water
B) Water pollution is...	2) when something enters the water that makes it unsafe for people (and sometimes animals and plants) to drink.
C) Things that can cause water pollution are...	3) a system which collects and purifies the water so that we can drink it in our houses.
D) Sources that we get our drinking water from can be...	4) Groundwater, rivers, lakes
E) Things we can do to prevent water pollution are...	5) Pick up garbage from the ground, minimize the use of pesticides, protecting the drains etc.

Module 4 // Activity 1 // Annex 4: Solutions (for the teacher)

Assessment:

$$A = 3$$

$$B = 2$$

$$C = 1$$

$$D = 4$$

$$E = 5$$

Module 4 // Activity 1 // Annex 5: Interview about drinking water



Talk with your family at home or a classmate about the following questions:

a) Do you know where you get the water from in your home? If not, how can you find out?

b) What do you use water for in your home?

c) Do you drink water from the tap or do you buy water in bottles from the supermarket?

d) Would you drink the water from the tap in public places? Why/why not?

e) Do you know how water can become contaminated?

f) What happens if you drink contaminated water?



MODULE 4: **Caring for Water**

ACTIVITY 2: Drought and Water Scarcity

Topic

What happens during a drought and why are droughts becoming more frequent around the world? And what can we do as individuals to protect our water better?

Background: As climate change continues and as the world's population grows bigger, droughts and water scarcity are becoming more frequent and more severe. Some communities, especially in the Middle East and in North

Africa, are forced to migrate and leave their homes in order to find new water resources.

The purpose with activity 2 is to make the children more aware of water as a limited resource which we need to take care of in our daily lives. With LEGO bricks they will demonstrate different creative solutions to recycle and safe water in a sustainable way.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Have a basic knowledge of the challenges of global weather changes which can cause droughts and water scarcity.
- Understand the damage which droughts and water scarcity can cause to people and to the environment.
- Use their knowledge and creativity to build LEGO models that illustrates ideas of how to protect our water resources in our daily lives.



Duration

90 minutes



Teaching methods

Project based learning
Sensory learning
Game-based learning
Learner-centered inquiry



Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Sensory play
Photo analysis/
description
Class talk
Work in groups
Building models with
LEGO bricks
Quiz



Guidelines

Through 3 steps the children will learn about droughts and water scarcity and reflect on different ways to protect water resources.

1. Learners will be introduced to the two phenomena droughts and water scarcity.
2. Learners will reflect on water scarcity and how it affects people and animals.
3. Learners will build a village with alternative and green solutions to recycle and protect the water.

Preparation of the activity

- Read the theory for module 4 in the Curriculum.
- Provide tables and chairs for the participants.
- Prepare the different materials for the activity (see «Material»)

Step 1: (15 minutes)

Step 1 is a sensory play with different objects and elements which can be used as a way start the conversation about the importance of water for people, plants and animals.

1. Gather the class in a circle, sitting on the floor. Ask the children to close their eyes and send the following materials around:
 - Dry sand
 - Dry soil
 - Dry leaves
 - An empty water bottle
 - A piece of dry clay (if that's available to you)
 - A dried apple or other dried vegetables or crops
 - A dead plant
2. Ask the children to keep their eyes closed and ask them what comes to mind and what is missing. When the materials have been sent around, ask the children to open their eyes and look at the objects. Guide the talk towards the topics drought and water scarcity.

Step 2: (15 minutes)

In step 2 the participants will be presented to different scenarios where lack of water is causing damage to people and the environment. Show the pictures of droughts and water scarcity (Annex 1) and ask the children questions such as:

- What do you see on the picture?
- What place in the world do you think the picture is from?
- What can cause droughts?
- What can happen to people, animals and plants during a drought?
- What does water scarcity mean?
- Why is water so important to us?
- In which countries do you think water scarcity is a problem?
- What can we do in our daily lives to protect the water?

...and so on

Step 3: (60 minutes)

The purpose of step 3 is to let the children think of different ways to save and protect the water in a city. The project is inspired by the Danish city, Nye, which uses surface water for toilets and washing machines to limit the consumption of groundwater resources. Rain and surface water from roofs, roads and the surrounding green areas is led through drains and canals and into a rainwater lake. From there the water is led into a wastewater treatment plant which purifies the water and then distributes clean water to the toilets and washing machines in the city through a separate water pipe system.

The children don't necessarily need to hear about the example of Nye. The main purpose of this step is to let them play with LEGO bricks, find creative solutions and use their free imagination.

1. Divide the children into 4 groups. Each group builds 1 or 2 houses with a garden. (At the end of the activity, you put all the houses together and create a small village/city.)
2. Distribute LEGO bricks to each group and hand out the printed task from annex 2 or read the instructions aloud.
3. Once all the groups have finished building their models, gather around one table, put the houses together to make up one big city. Let all groups present their houses and solutions.

If you have the possibility, you can give the children more time for this step and let them go into details with their model.

Assessment

- Distribute annex 3 («Match the letters with the numbers»). Let the children work in pairs or on their own.
- Correct the paper with the children and talk to them about today's lesson and what they have learned. Have they learned something they did not know before?



Tips

- While the children work on their models, it's important to go around and help the groups with their solutions, giving them suggestions but also letting them come up with all kinds of ideas. It's a quite complex topic and it's important that the children use their free imagination. Their solutions don't have to be realistic as long as they get into the process of thinking of the importance of protecting our water.
- If you don't have a lot of green LEGO bricks that represent vegetation, you could also encourage learners to complement their LEGO brick model with natural materials in order to incorporate green space into their vision.
- Make an exhibition of the children's LEGO brick models for other children, teachers and parents to see.



Material

- Tables and chairs for each group
- LEGO bricks and LEGO plates



Handouts

- Annex 1: Pictures of drought and water scarcity
- Annex 2: Task description
- Annex 3: Match the letters with the numbers
- Annex 4: Solutions (for the teachers)

Adaptation for 10+ children

- With older children, you can ask the children to write down how many minutes they let the water run per day while: a) taking a shower b) making dinner c) brushing their teeth.
- Another suitable and fun exercise for older children is building a wildlife pond in their schools as a school activity or in their back yards as a family activity. Wildlife ponds are very important but threatened habitats. They are both a high biodiversity habitat, as well as essential for the reproduction of many plants and animals. They also contribute to flood control, CO2 sequestration and other ecosystem services.
You can find a guide for this activity available online on <https://imprintplus.org/documents/section/1> (Report Part III - page 24).

Useful links/Further reading

Learning Video for children about drought and water scarcity:
<https://www.youtube.com/watch?v=O5a6yHSI0L0>

Module 4 // Activity 2 // Annex 1: Pictures of drought and water scarcity



Picture 1: Drought and vegetation



Picture 2: Water scarcity in Bangladesh



Picture 3: Empty water bottles



Picture 4: Wildfire



Picture 5: Animals and water scarcity



Picture 6: Water scarcity in Africa



Picture 7: Dry fields



Picture 8: Water use in houses

Module 4 // Activity 2 // Annex 2: Task description

A group of 4 families dreams of building a small village where everybody cares about protecting the water. They want everyone (people, animals and plants) to have enough water, even during the summer. Help the families build the city in LEGO bricks and think about the following questions:

- What can the families do to collect water during the year so that they have enough for the dry periods?
- What can they do to use as small amounts of water as possible?
- Where can the animals (birds, insects and bigger animals) drink water during the summer?

Pictures for inspiration:



Picture 1: Rainwater barrel



Picture 2: Green rooftops and balconies



Picture 3: Toilet flush using rainwater



Picture 4: Washing machines using rainwater



Picture 6: Birdbaths

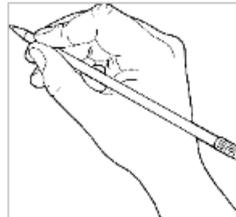


Picture 5: Outdoor toilets with no flush

Module 4 // Activity 2 // Annex 3: Match the letters with the numbers

Match the left column with the right column by drawing a line from the letters to the numbers

A) A drought is...	1) The lack of fresh water resources
B) Water scarcity is...	2) Climate changes
C) Risks during a drought are that...	3) Africa and the Middle East
D) One of the main reasons for droughts are...	4) Rainwater and waste water
E) Water which we can use for recycling are...	5) When it hasn't rained for a long time and the landscape gets very dry.
F) Parts of the world where droughts are a big problem	6) Crops, plants, animals and people can die from dehydration



Module 4 // Activity 2 // Annex 4: Solutions (for the teacher)

Match the letter with the numbers - solutions

$$A = 5$$

$$B = 1$$

$$C = 6$$

$$D = 2$$

$$E = 4$$

$$F = 3$$



MODULE 4: Caring for Water

ACTIVITY 3: Flooding

Topic

Flooding is the most frequent type of natural disaster, resulting in loss of life and damages to personal property and critical public health infrastructure.

Background: Flooding occurs when an overflow of water submerges land that is usually dry. Floods can be caused by heavy precipitation, rapid melting of snow or ice or by large storms or tsunamis. They can be extremely damaging and have severe social, economic and environmental consequences. The three most common types of flooding are flash

floods, river floods and coastal floods which have intensified due to climate change.

In this activity learners will be introduced to the different types of flooding. They will also be encouraged to think of creative and green solutions to prevent the phenomenon which will be visualized in LEGO brick models.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify the different types of flooding and what characterizes them.
- Have a basic understanding of the threats and damages that are related to flooding .
- Use their knowledge and creativity to build models out of LEGO bricks to illustrate solutions to prevent flooding.



Duration

120 minutes



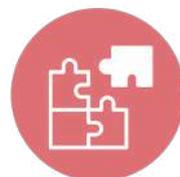
Teaching methods

Project based learning
Sensory learning
Game-based learning
Learner-centered inquiry



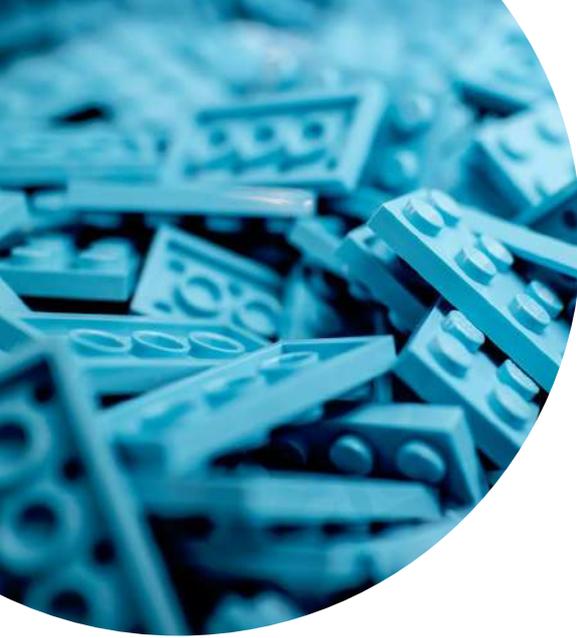
Target ages

6 – 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

Class discussion
Photo analysis/
description
Work in groups
Building models with
LEGO bricks
Quiz



Guidelines

Through 3 steps the children will learn about flooding, their origin, and their consequences.

1. Learners are introduced to different types of flooding.
2. Learners will think of ways to prevent flooding by working with LEGO bricks.
3. Learners will test the solutions with a water experiment which will illustrate what happens during the different types of flooding.

Preparation of the activity

- Read the theory for module 4 in the Curriculum.
- Provide tables and chairs for the participants.
- Prepare the different material for the activity (see «Material»)

Step 1 (20 minutes):

1. Gather the class in a circle on the floor or on chairs. Start by showing the pictures from Annex 1 of the different types of flooding.
 2. Ask the children what they think can cause the different types of flooding (see suggestions below) and talk about how climate change contributes to these events.
- Note - picture 1: Pluvial floods
Causes: extreme rainfall which creates a flood that is not linked to an overflowing water body, heavy rain for longer periods of time, heavy rain in short time, poor drainage systems in the city, lack of green areas in the cities to absorb the water.
 - Note - picture 2: Coastal floods
Causes: heavy storms, melting ice from icebergs, tsunamis, broken dams, lack of green areas in the cities to absorb rain.
 - Note - picture 3: River floods
Causes: heavy rain for longer periods of time, melting ice from the mountains and glaciers. Lack of green areas in the cities to absorb rain.

Step 2 (60 minutes):

The purpose of step 2 is to let the children come up with solutions to prevent flooding in the cities, based on their knowledge about different types of flooding. The children are allowed to be creative and do not need to have very detailed information about flood control. However, the teacher can help the groups with ideas and help them during their process. (See task description in Annex 2)

1. Divide the children into three groups. The groups can sit on a cushion on the floor or at the tables. Distribute LEGO bricks, an empty plastic box and 1-2 large construction bricks or tiles for each group
2. Give the groups the tasks described in Annex 2. The annex can be printed and distributed to the groups or read aloud to them.
3. The three groups will create a LEGO city each that prevents respectively pluvial floods, coastal floods and river floods.

Step 3 (40 minutes):

The third step will let the children test their LEGO models with real water to illustrate what happens during flooding. The solutions of the groups do not necessarily function perfectly. The main purpose is to illustrate flooding and the idea behind flood prevention. Please note that you can also do this exercise as a simple talk with the groups about their solutions and what they think will happen in case of flooding.

1. Once all the groups have finished building their models, ask them to gather around a larger table where you have placed a big empty plastic box in the middle.
2. **Group 1** (pluvial floods) places their model in the empty plastic box and starts pouring water on their model with a watering can, illustrating what happens during a pluvial flood. Will the model prevent a flood from happening? Discuss the outcome.
3. After the 'water test', group 1 removes their model again, leaving room for **group 2**. Group 2 (sea floods) now places their model on a large construction brick inside the plastic box (or on something that prevents the model from touching the bottom of the plastic box). They can add water in the box so that the model and the «sea» is almost on the same level. With their hands, the children will now start making waves in the water, illustrating a storm or a tsunami. Will the the model prevent a flood from happening? Discuss the outcome.
4. Afterwards, **group 3** (river floods) places their two parts of the town on two large construction bricks inside the plastic box – on each side so that the 'river' runs through the town. Now the group places a handful of ice cubes in the water (to illustrate a melting glacier) or starts pouring water into the box with the watering can (to illustrate heavy rain). Will the solutions prevent the flood? Discuss the outcome.



Assessment

- Distribute annex 3 («Match the letters with the numbers»). Let the children work in pairs or on their own.
- Correct the paper with the children and talk to them about today's lesson and what they have learned. Have they learned something they did not know before?



Material

- Tables, cushions and chairs
- LEGO bricks and LEGO plates
- 1 large transparent rectangular plastic box (approximately 45 x 35 cm). It should be large enough to contain a LEGO plate.
- 1-2 large construction bricks or something that will lift up the LEGO models
- Ice cubes
- 1 large watering can with water
- Towels



Handouts

- Annex 1: Pictures of different types of flooding Annex 2: Task description
- Annex 3: Match the letters with the numbers
- Annex 4: Solutions (for the teachers)



Tips

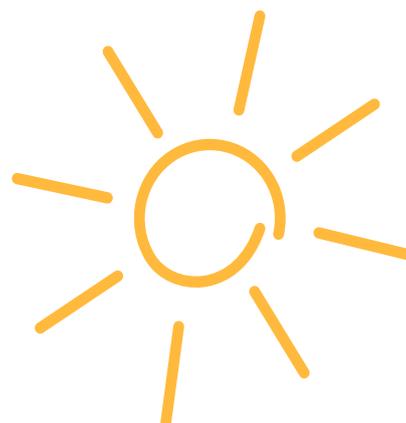
- Step 2 and 3 can also be done without the water experiment. The children can illustrate the concept of their flood control, simply by presenting their models. The water test is only to make the exercise more fun for the children, however it requires access to more equipment.
- If you don't have a lot of green LEGO bricks to build trees and vegetation, you could also encourage learners to complement their model with natural materials in order to incorporate green space into their vision.
- Make an exhibition of the children's LEGO brick models for other children, teachers and parents to see.

Adaptation for 10+ children

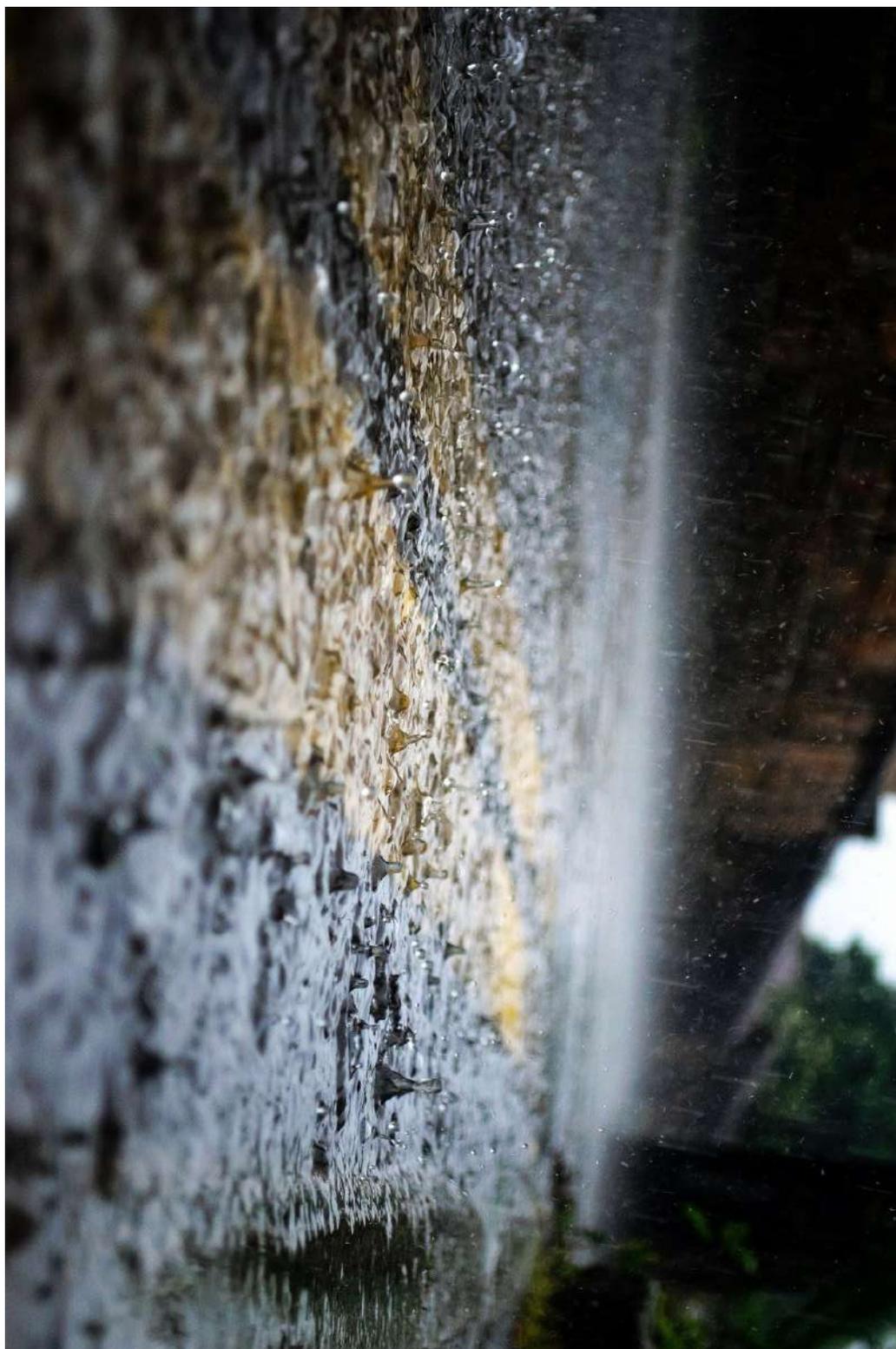
You can make the activity more challenging for older children by going deeper into the topic of global warming.

Useful links/Further reading

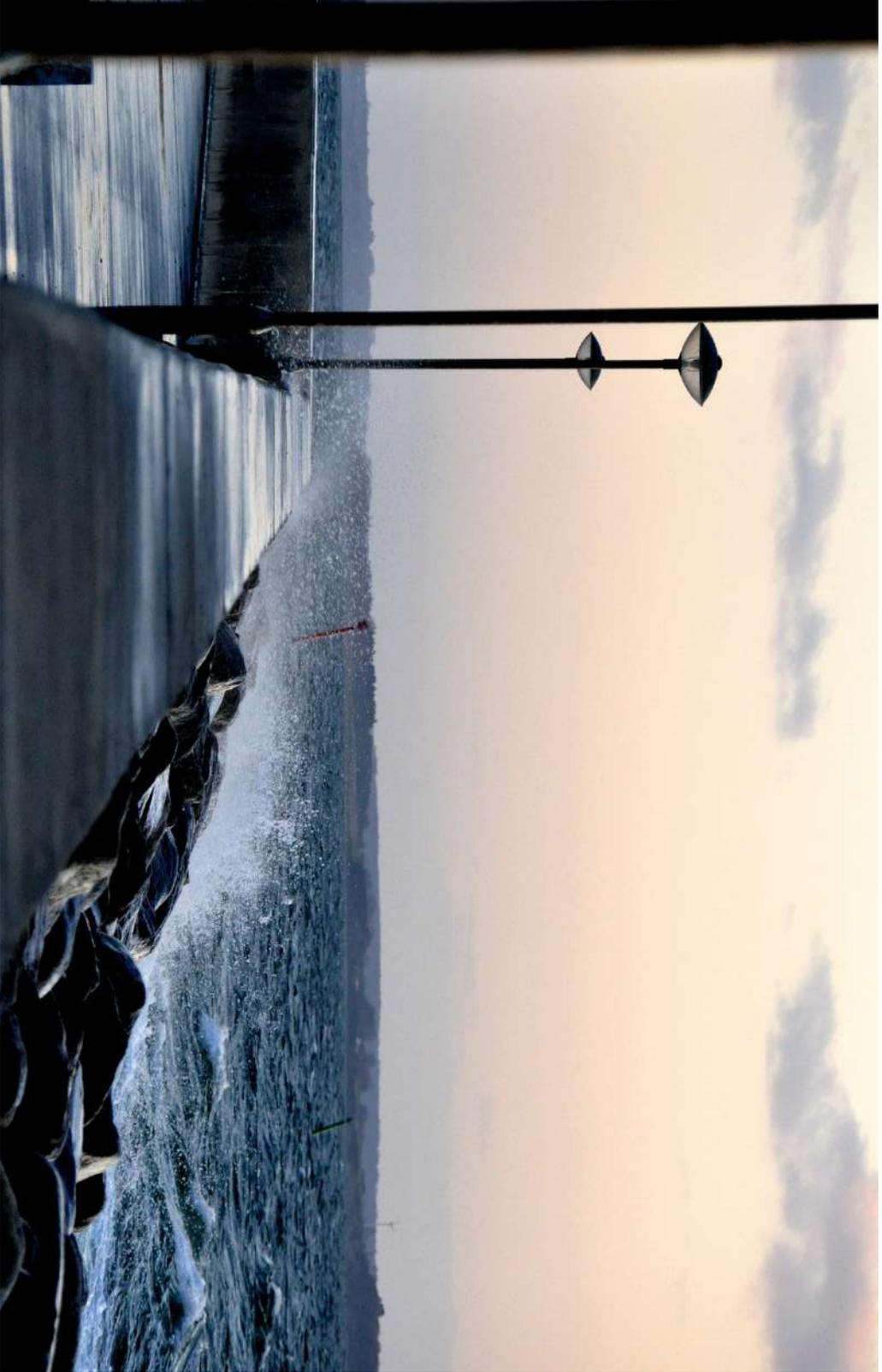
Video for children about different types of flooding:
<https://www.youtube.com/watch?v=udRNUBHbEOo>



Module 4 // Activity 3 // Annex 1: Pictures of different types of flooding



Picture 1: Pluvial Floods/Flash floods



Picture 2: Sea floods (coastal floods)



Picture 3: River floods

Module 4 // Activity 3 // Annex 2: Tasks description

Group 1: Pluvial floods

Build a small city and protect it from pluvial floods during heavy rain.

What can you add to your model to prevent the water from flooding the city?

Group 2: Sea floods

Build a small city at the coast and protect it from sea floods.

What can you add to your model to prevent the water from flooding the city?

Group 3: River floods

Build a small city and protect it from flooding caused by the river. Build the city in two parts on two smaller LEGO plates, so the river can run through the city.

What can you add to your model to prevent the water from flooding the city?



Module 4 // Activity 3 // Annex 3: Match the letters with the numbers

Match the left column with the right column by drawing a line from the letters to the matching numbers

A) Pluvial flood	1) Floods by the sea
B) Levee	2) Climate change
C) A green solution to floods	3) Planting trees
D) One of the global reasons for floods	4) Flood caused by heavy rain
E) Coastal floods	5) A glacier
F) A big mass of ice	6) An embankment built to prevent floods

Module 4 // Activity 3 // Annex 4: Solutions (for the teacher)

Match the letters with the numbers - solutions

$$A = 4$$

$$B = 6$$

$$C = 3$$

$$D = 2$$

$$E = 1$$

$$F = 5$$



MODULE 5 : **Connectivity** **and Animal Migration**

ACTIVITY 1: Migratory Birds in My Community

Topic

Animal migration is the relatively long-distance movement of individual animals, usually on a seasonal basis. It is the most common form of migration in ecology and is found in all major animal groups, including birds, mammals, fish, reptiles, amphibians, insects, and crustaceans. This activity investigates the phenomena of animal migration among birds, its causes and how human activities influence migration patterns.

Background: Animal migration occurs because it allows animals to exploit resources where and

when they are most abundant by moving seasonally between habitats. Where humans have come to exploit, enjoy or otherwise benefit from migratory species, we too are capitalizing on the seasonal bounty of distant ecosystems.

This activity aims at teaching the learners the importance of migratory birds in the community and urban areas. In the children's creative work the activity also focuses on raising an awareness of the importance of reusing materials.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify the possibilities of reusing materials for creating bird figures
- Identify the importance of migratory birds in the community and urban areas
- Developing working memory, fine motor skills, imagination and visual perception



Duration

Approximately 1 hour and 30 minutes



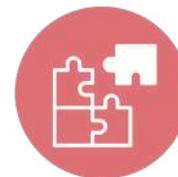
Teaching methods

- Interactive methods
- Inductive learning method
- Demonstration-replication methods
- Game-based learning



Target ages

6– 10 years For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Sensory play
- Workshop
- Building with LEGO
- Photo analysis/description

Guidelines

Through the following steps this activity gives learners an insight into the importance of migratory birds in urban areas:

1. Learners will be introduced to why birds migrate and why it is important for the environment.
2. Learners will use this knowledge to make replicas of migratory birds with LEGO bricks and recycled material.
3. Learners will reflect on why it is important to protect birds in urban/rural sites.



Preparation of the activity:

- For conducting this activity, you will need to prepare beforehand the following material for 20 participants: printed pictures of your local migratory birds, LEGO bricks, cardboard, markers or other materials for painting, scissors, sticks and glue.
- Before you do this activity, contact the parents of the children so they can bring as much as they can of recycled material. (see «Materials»)
- Before the activity you can choose which type of migratory birds that are important for your local context you can use (it's also one possibility on how to divide the participants into groups, another possibility is by random colors).
- See the powerpoint presentation, you can prepare yourself for delivery of activity, or you can use it for introduction of activity to the students. You can adjust taking the consideration of their ages./ Annex 1
- Prepare the room, divide areas for 4 groups of about 5 children and set the materials for each group.
- Print out examples of local migratory birds that you can find in Annex 2 or show them on laptop, PC or projector.

Introduction (20 minutes):

Give an introduction. Before starting the activity, point out to the children the importance of migratory birds in the environment and for the urban biodiversity, what are the threats and risks for them and how we can assist/help them (see Annex 1)

Gather the full group, and divide the children into 4 groups (you can use random division or you can divide them by color, bird etc.). 2 groups will work with LEGO and 2 groups will work with reusable materials. Ask the children and open the following discussion:

- Why are birds important for us and for the environment;
- Why are they important in the urban areas,
- What is the migration of birds and why do birds migrate?
- Which types of migratory birds are in our community?
- How can we protect the migratory birds?

Show examples of migratory birds from your local context (see Annex 2) – you can print them out or have them on a PC/Laptop. Verify the basic knowledge children have on the topic, in order to adjust the concepts used in the activity.

Delivery of the activity (45 minutes):

1. Before starting the activity, instruct the children to be careful when using the materials so that they do not get hurt and to follow your directions carefully.
2. Before starting the activity, point out to the children that from the existing materials it is necessary to make replicas of the migratory birds from their community.
3. Distribute printed versions of the birds to the groups.
4. If the weather outside is ok, print the birds on paper and put them outside and move the group work outside (if not, continue indoors).
5. During the activity, encourage teamwork.
6. For groups working with LEGO bricks, point out that using LEGO bricks is necessary to create migratory birds from the printed templates. Let them design and create and help other groups.
7. For groups working with recycled materials (cardboard) first indicate that they need to draw the bird from the printed version.
8. Then, using the markers and other coloring material, they need to color the bird as it should be in real life
9. Once they have done so, give them direction to cut the bird out of the cardboard, stick it on a stick and place it in the surrounding gardens or areas in school.
10. After the groups that work with LEGO bricks do the same place the birds in the school area and together with all the children, go out in the yard where the birds will be placed and discuss again the importance of the migratory birds and their protection.

Conclusion (15 minutes):

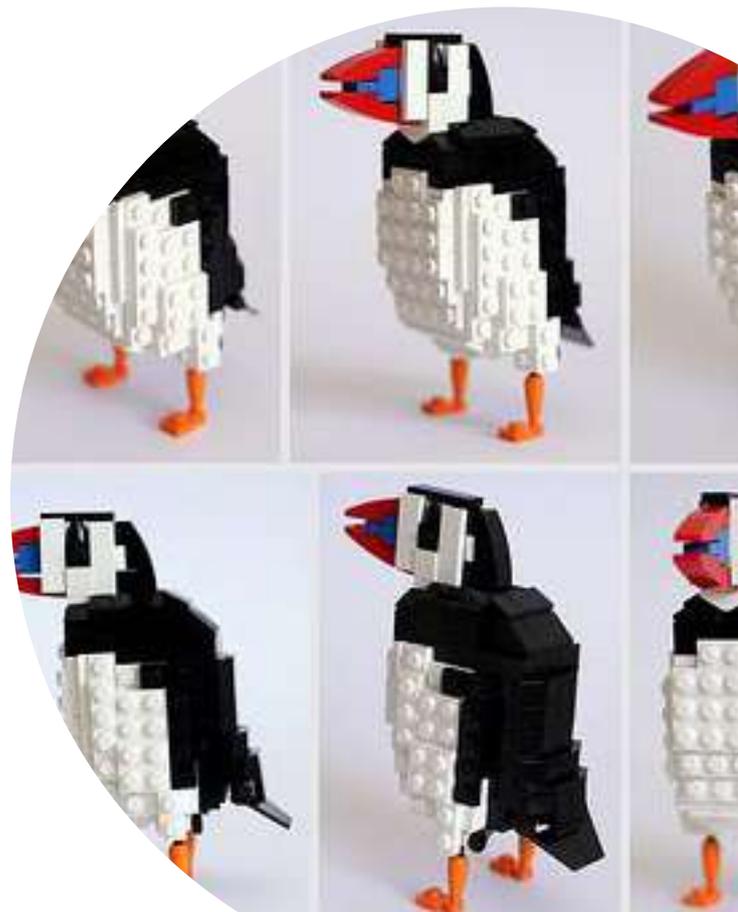
1. Do a recap of the topics covered, ask the children why it is important to protect birds in urban and rural areas.
2. Assessment – ask the children what they think about the activity, is it useful, practical, etc.
3. Closure

Assessment

The teacher performs the assessment of the activity “Migratory birds in my community” asking the children to answer questions using the method of unfinished sentences:

- During the activity I acquired, learned...
- Today my most important discovery was...
- The material/information I acquired during the activity will help me/will be useful...
- I would also like to learn, acquire...

Children also can write on post-it notes words or phrases they learned from this activity and then they put them on the board.





Material

- 10-15 printed pictures of your local migratory birds. (There are migratory birds (same species all over Europe) that can be used as examples)
- LEGO bricks (5 kg)
- 10 cardboards
- Markers and color pencils
- Scissors
- Sticks
- Glue



Handouts

Annex 1: Power Point Presentation

Annex 2: Examples of Migratory Birds



Alternative spaces

If the weather outside is not good, the birds can be set up in the classroom, in appropriate space (simulate a tree or a nest).

Adaptation for 10+ children

- Tell the children to conduct research of what types of nests the migratory birds in your community use
- Create nests and bird feeders using recycled materials
- Give them presentation time to present the final results

Useful links/Further reading

LEGO ideas - Birds.

<https://ideas.lego.com/projects/73dec92c-e4f4-4e38-8c6e-82bf1e51a28b>

Inspiration YouTube video - Lego Speed Build:

https://www.youtube.com/watch?v=6v_4DQiuI2E

Migratory birds - YouTube:

<https://www.youtube.com/watch?v=yUtdC4QPcns>

Tips

- Introduce the children to the steps before the activity begins
- This activity can be connected to the activity Mini gardens for pollinators and you can merge the products.
- Organize a safe work environment
- Be careful not to injure anyone and keep track of time
- Pay attention to the weather if you need to do the activity outdoors
- Create a pleasant atmosphere and involve all children in the discussion
- During the activity, encourage teamwork
- This activity is complementary with the activities «Hotel for Bees» and «Mini Garden for pollinators»



Migratory birds

Bird migration is one of the great wonders of the natural world. A huge variety of birds make the journey.

What is bird migration?

Bird migration is the regular seasonal movement, often north and south along a flyway, between breeding and wintering grounds. Many species of bird migrate. Migration carries high costs in predation and mortality, including from hunting by humans, and is driven primarily by availability of food



Why Do Birds Migrate?

Birds migrate to move from areas of low or decreasing resources to areas of high or increasing resources. The two primary resources being sought are food and nesting locations.



3

Motivating factors:

Birds that nest in the Northern Hemisphere tend to migrate northward in the spring to take advantage of burgeoning insect populations, budding plants and an abundance of nesting locations.

As winter approaches and the availability of insects and other food drops, the birds move south again. Escaping the cold is a motivating factor but many species, including hummingbirds, can withstand freezing temperatures as long as an adequate supply of food is available



4

General types of Migration:

Short-distance migrants make relatively small movements, as from higher to lower elevations on a mountainside.



Medium-distance migrants cover distances that span a few hundred miles.



Long-distance migrants typically move from breeding ranges to wintering grounds.



The pattern of migration can vary within each category, but is most variable in short and medium distance migrants.

5



Different Patterns of Migration for Different Bird Species

•**Seasonal:** This well-known and widespread migration is predictable based on seasonal changes, as birds move between breeding and non-breeding ranges. The height of these migration periods is during spring and fall, though in some areas the change between wet and dry seasons are migration indicators.

•**Latitudinal:** This migration is between areas of different latitudes from north to south and vice versa. This is the most common migration type with many birds that migrate from the Arctic to the tropics. The exact direction of migration is often determined by geographic features, however, such as mountain ranges, coastlines, and available habitats.

•**Longitudinal:** Similar to latitudinal migration, this type of movement is a change between different longitudes from east to west or west to east. This is a common type of migration for many birds in Europe, where geographic features encourage birds to move longitudinally rather than latitudinally.

6



Different Patterns of Migration for Different Bird Species

Altitudinal: Birds that breed in tall mountains often exhibit altitudinal migration. This type of migration is the move to lower elevations in winter, when harsh weather and deep snowfall may make staying at upper elevations impossible. Birds that use altitudinal migration may not venture far in terms of overall mileage or distance, but just a few hundred feet of elevation can make a great difference in habitats and available resources.

Loop: Birds that follow an annual circle are loop migrants. This migration includes two distinctly different routes to and from breeding grounds, often taking advantage of varied resources at different times of the year. For example, rufous hummingbirds follow a coastal route in spring on their way from Mexico to Alaska but take advantage of mountain wildflowers on an interior southbound route in autumn. Loop migration is also common with many seabirds and shorebirds as they use seasonal variations in wind patterns to aid their flight.

7



Different Patterns of Migration for Different Bird Species

Nomadic: This movement is less predictable and can be erratic depending on available food and water resources. Nomadic birds tend to stay within the same general range but may be completely absent from parts of that range when resources are scarce. They will return, however, when the habitat becomes more suitable, such as after rainfall, when prey is more abundant, or when crops ripen. Types of birds that migrate nomadically include waxwings, phainopeplas, zebra finches, and black swans.

Irruptive: Bird irruptions are highly unpredictable but spectacular migrations that bring large numbers of birds into unusual areas, most often in winter. Unlike nomads, irruptive birds may be found far outside their expected ranges during this type of migration, but the reason is the same: the search for suitable food and water resources. Types of migrating birds that exhibit irruptive patterns include redpolls, varied thrushes, evening grosbeaks, crossbills, and snowy owls.

8



Different Patterns of Migration for Different Bird Species

Dispersal: While not always considered a true migration, bird dispersal is nonetheless relatively predictable and seasonal, though only once in a bird's lifetime. In this migration, juvenile birds are forced away from their hatching grounds and must seek out their territories as their parents continue to use the same range. This is more common among birds that are year-round residents of the same range and will defend their territories throughout the year, such as woodpeckers.

Leap Frog: A leap frog or skip migration is a unique pattern where a northern population will migrate a greater distance to skip over a sedentary population of the same species. A year-round range is thus occupied in between the breeding and wintering grounds of the leapfrogging population, but the individual populations do not extensively mix.

9



Different Patterns of Migration for Different Bird Species

Reverse: Reverse migration is an aberration among migratory birds. It is most often seen in autumn when young birds can become confused or disoriented and instead of migrating along the expected route go in the opposite direction. These lost birds end up as vagrants far from their traditional locations. This is not usually seen with large numbers of birds but is more likely with individuals and isolated sightings, some of which can be quite spectacular.

Molt: Some birds migrate only to accommodate their annual molting periods. During a molt migration, birds will leave an established range to stay at a safe, secure range while they are vulnerable and less capable of flight, even during brief flightless periods. After the molt is complete, they will return to their regular range regardless of season or breeding readiness. This phenomenon is seen among a wide range of duck species but is not common with other types of birds.

10



What Triggers Migration?

- ✓ The mechanisms initiating migratory behavior vary and are not always completely understood. Migration can be triggered by a combination of changes in day length, lower temperatures, changes in food supplies, and genetic predisposition.
- ✓ For centuries, people who have kept cage birds have noticed that the migratory species go through a period of restlessness each spring and fall, repeatedly fluttering toward one side of their cage. German behavioral scientists gave this behavior the name *zugunruhe*, meaning migratory restlessness. Different species of birds and even segments of the population within the same species may follow different migratory patterns.

11



Flyways

When travelling between their breeding and wintering grounds, birds don't choose their paths at random. They follow set routes that include suitable habitats where they can stop to rest and refuel along the way. Many different species share broadly similar routes, which have been loosely split into eight major flyways – think of them as bird super-highways across the sky.



How Do Birds Navigate?

Migrating birds can cover thousands of miles in their annual travels, often traveling the same course year after year with little deviation. First-year birds often make their very first migration on their own. Somehow they can find their winter home despite never having seen it before, and return the following spring to where they were born.

The secrets of their amazing navigational skills aren't fully understood, partly because birds combine several different types of senses when they navigate. Birds can get compass information from the sun, the stars, and by sensing the earth's magnetic field. They also get information from the position of the setting sun and from landmarks seen during the day. There's even evidence that sense of smell plays a role, at least for homing pigeons.



How Do Birds Navigate?

Some species, particularly waterfowl and cranes, follow preferred pathways on their annual migrations. These pathways are often related to important stopover locations that provide food supplies critical to the birds' survival. Smaller birds tend to migrate in broad fronts across the landscape. Studies using eBird data have revealed that many small birds take different routes in spring and fall, to take advantage of seasonal patterns in weather and food.



Migration Hazards

Taking a journey that can stretch to a round-trip distance of several thousand miles is a dangerous and arduous undertaking. It is an effort that tests both the birds' physical and mental capabilities. The physical stress of the trip, lack of adequate food supplies along the way, bad weather, and increased exposure to predators all add to the hazards of the journey.

In recent decades long-distant migrants have been facing a growing threat from communication towers and tall buildings. Many species are attracted to the lights of tall buildings and millions are killed each year in collisions with the structures.



Which bird is famous among migratory birds?

Bar Headed Goose is the highest flying bird in the world and migrate to India every in winter season. The bar headed migrates over the Himalayas and spend their winter in Assam to Tamil Nadu states of India. This bird is one of the most common winter season visitor found in large wetlands of India.

Their powerful and constant flight helps generate body heat, which is retained by their down feathers. Such heat helps keep ice from building up on their wings when flying over mountains.

These geese also have a special type of hemoglobin that absorbs oxygen quicker than other birds; they can also extract more oxygen from each breath than other birds can.

These geese are able to migrate more than 1609 km (1,000 mi.) in a single day.

Scientists believe the geese's yearly migration is triggered by an environmental signal that allows them to miss the summer monsoon season and the worst winter storms.

Module 5 // Activity 1 // Annex 1: Power Point Presentation

Video:



[Migratory Birds | The Dr. Binocs Show | Learn Videos For Kids - YouTube](#)

Resources:

<https://www.allaboutbirds.org/news/the-basics-how-why-and-where-of-bird-migration/>

<https://www.birdlife.org/migratory-birds/>

<https://www.thespruce.com/types-of-bird-migration-386055>

Module 5 // Activity 1 // Annex 1: Examples of migratory birds







MODULE 5 : **Connectivity and Animal** **Migration**

ACTIVITY 2: Hotel for Bees

Topic

Pollinator species are responsible for approximately 1/3 of the food we consume each day. Yet pollinators are at a critical point in species survival. There are many reasons for this steep decline, but experts agree that planting more native nectar and pollen sources will positively impact their health and survival rate.

Background: Pollinators are animals that move from plant to plant while searching for protein-rich pollen or high-energy nectar to eat. As they go, they

are dusted by pollen and move to the next flower, fertilizing the plant and allowing it to reproduce and form seeds, berries, fruits and other plant foods that form the foundation of the food chain for other species-including humans.

This activity aims at teaching the learners about the importance of bees for the ecosystems by creating hotel for bees. The activity invites the learners to use their creativity as well as being aware of the importance of reusing materials.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify the possibilities of reusing materials for creating hotel for bees
- Identify the importance of bees in the environment
- Developing working memory, fine motor skills, imagination and visual perception



Duration

1 hour and 30 minutes



Teaching methods

- Direct instruction
- Interactive methods
- Demonstration-replication methods



Target ages

6- 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Pedagogical activity
- Workshop
- Building activity

Guidelines

Through the following steps this activity gives learners an insight into the importance of bees in the environment:

1. Learners will be introduced to why bees are important for the environment.
2. Learners will use this knowledge to homes for bees with LEGO bricks and recycled material.
3. Learners will reflect on why it is important to protect and help bees.



Preparation of the activity:

- For conducting this activity, you will need to prepare beforehand the following material for 24 participants: LEGO bricks (5kg), Medium size cans – 750 ml (5-6 pieces), 10 rolls of toilet paper (empty), Sheets of paper, Kid friendly glue, Tape, Paint for the tin can (optional), Markers, pencils
- See the powerpoint presentation (Annex 1). You can prepare the activity yourself or you can use the powerpoint to introduce the activity to the students. You can adjust it the age of the participants.
- Before you do this activity, contact the parents of the children so they can bring as much as they can of recycled material.
- Prepare the room, divide the area for 6 groups and prepare the materials for each group.
- Print out examples of DIY hotels/homes for bees that you can find in Annex 2 or show them on a laptop, PC or projector.

Introduction (20 minutes):

Give an introduction. Before starting the activity, point out to the children the importance of bees in the environment and for the urban biodiversity, what are the threats and risks for them and how we can assist/help them.

Gather the full group and divide the children into 6 groups (you can use random division or you can divide them by flowers etc. (3 groups that will work with LEGO and 3 groups that will work with reusable materials – plastic)

Ask the children and open the following discussion:

- Why are bees important in the environment,
- Why are they important in urban areas?
- How can we use Lego bricks and plastic to create hotels and homes for bees?

Show examples of hotels/homes for bees (Annex 2). You can print them out or show them on a PC/Laptop. Verify the basic knowledge children have on the topic, in order to adjust the concepts used in the activity.

Before continuing the activity, point out to the children the importance of urban biodiversity and bees, how it will help the development of biodiversity in urban areas but also the possibility of reusing materials/plastics in the development of environmental solutions.

Delivery of the activity (45 minutes):

1. Before starting the activity, instruct the children to be careful when using the materials so that they do not get hurt and to follow your directions carefully.
2. Before starting the activity, point out to the children that from the existing materials it is necessary to make hotels and homes for bees, that when combined, will make a bee community.
3. Distribute printed bee homes/hotels versions to all groups and ask the children to imagine how to create their own bee home.

4. Give the children guidelines to create the Lifesize version of the bee home (if it's possible).
5. For groups working with LEGO bricks, point out that using LEGO bricks is necessary to make bee homes large enough or similar size to fit real life bees. Let them design and create and help other groups.
6. The groups working with LEGO should firstly get the instructions to create the base of the beehive, after that, to create the walls and to finish with the roof of the beehive. If it is possible and there are enough blocks, they can create the inside of the beehive.
7. For groups working with recycled materials, give instructions to paint the cans in different ways.
8. Measure the length of each can and cut your paper in a way that the length of the paper roll will fit inside the can.
9. The band of paper should be half the length of a sheet of A4? paper. The goal is to have a roll of 5 layers minimum. Cut the paper as efficiently as you can and instruct the children to do the same.
10. Roll the paper around a pencil to get the right shape, then tape the edge of the paper band to the roll to keep the diameter, remove the pencil. You will need an average of 25 rolls, depending on the size of your tin can and paper rolls.
11. After you finish with the rolls, you can apply a thin layer of glue at the bottom of your can. Place your toilet paper rolls where you wish inside the can and fill up the empty space with your paper rolls.
12. Once done, shake your can slightly and make sure that everything stays in place. Add more glue at the bottom or more paper rolls to keep things sturdy if needed.
13. After you have done all this, together with all the children, go out in the yard and place the created bee homes together and create a bee community.

Conclusion (15 minutes):

1. Do a recap of the topics covered, ask the children why it is important to protect and help bees, point out to the children the importance of urban biodiversity and bees, but also the possibility of reusing materials / plastics in the development of environmental solutions.
2. Assessment – ask the children what they think about the activity, is it useful, practical etc. As well, ask them questions relevant to the topic, for example: what is the importance of bees, what is the life cycle of bees, why pollination is important, how can we help the bees etc.
3. Closure

Assessment

The teacher performs the assessment of the activity “Hotel for bees” asking the children to answer questions using the method of unfinished sentences:

- During the activity I acquired, learned...
- Today my most important discovery was...
- The material/information I acquired during the activity will help me/will be useful...
- I would also like to learn, acquire...

Children also can write on post-it notes words or phrases they learned from this activity and then they put them on the board.





Material

- LEGO bricks
- Medium sized cans (5-6 pieces)
- 10 rolls of toilet paper (empty)
- Sheets of paper
- Kid-friendly glue
- Tape
- Markers and pencils
- Paint for the tin can (optional)



Handouts

Annex 1: Power Point Presentation

Annex 2: Examples of Hotels for Bees

Tips

- Introduce the children to the steps before the activity begins
- Organize a safe work environment
- Be careful not to injure anyone and keep track of time
- Pay attention to the weather if you need to do the activity outdoors
- Create a pleasant atmosphere and involve all children in the discussion
- During the activity, encourage teamwork
- This activity is complementary with with the activities «Migratory birds in my community»



Alternative spaces

If the weather outside is not good, the bee homes can be set up on covered terraces.

Adaptation for 10+ children

- Tell the children to conduct research of what types of nests the migratory birds in your community use
- Create nests and bird feeders using recycled materials
- Plan a bee garden (with native flowers) can also be a good add-on for older children – in connection with the pollinator garden activity
- Give them presentation time to present the final results

Useful links/Further reading

How to Make a Honey Bee House With Plastic Bottles

https://www.youtube.com/watch?v=S7gAbu5_6U0

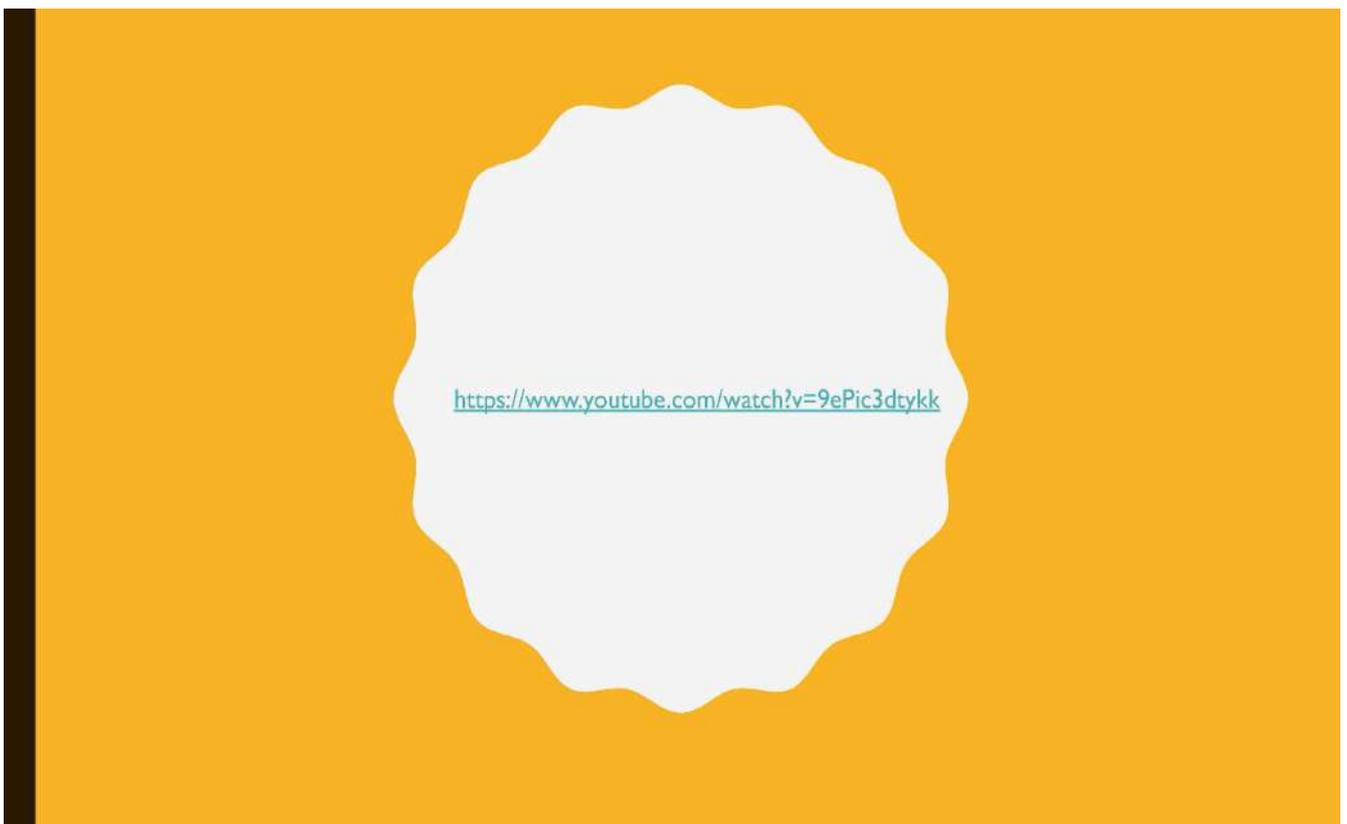
Inspiration video - Real Beehive Built From LEGO bricks:

<https://www.youtube.com/watch?v=BFh3cO8KrgY>

Inspiration video - Beehive Made of Legos Houses 30,000 Bees:

<https://www.youtube.com/watch?v=xQYQCQ5ujqPU>

Module 5 // Activity 2 // Annex 1: Power Point Presentation



WHAT ARE BEES?

 Bees are insects with wings closely related to wasps and ants, known for their role in pollination and, in the case of the best-known bee species, the western honey bee, for producing honey.

 Bees are a monophyletic lineage within the superfamily Apoidea. They are presently considered a clade, called Anthophila. There are over 16,000 known species of bees in seven recognized biological families.

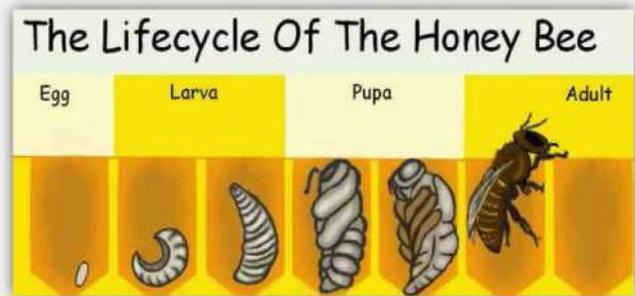
 Some species – including honey bees, bumblebees, and stingless bees – live socially in colonies while most species (>90%) – including mason bees, carpenter bees, leafcutter bees, and sweat bees – are solitary.



Life cycle:



The life cycle of a bee, be it a solitary or social species, involves the laying of an egg, the development through several moults of a legless larva, a pupation stage during which the insect undergoes complete metamorphosis, followed by the emergence of a winged adult. Most solitary bees and bumble bees in temperate climates overwinter as adults or pupae and emerge in spring when increasing numbers of flowering plants come into bloom. The males usually emerge first and search for females with which to mate. Tropical bees may have several generations in a year and no diapause stage.



Worker bees:



Most of the bees in a hive are female worker bees. At the height of summer when activity in the hive is frantic and work goes on non-stop, the life of a worker bee may be as short as 6 weeks; in late autumn, when no brood is being raised and no nectar is being harvested, a young bee may live for 16 weeks, right through the winter.



Over the course of their lives, worker bees' duties are dictated by age. For the first few weeks of their lifespan, they perform basic chores within the hive: cleaning empty brood cells, removing debris and other housekeeping tasks, making wax for building or repairing comb, and feeding larvae. Later, they may ventilate the hive or guard the entrance. Older workers leave the hive daily, weather permitting, to forage for nectar, pollen, water, and propolis.

Worker bees/ Work activity:

Period	Work activity
Days 1–3	Cleaning cells and incubation
Day 3–6	Feeding older larvae
Day 6–10	Feeding younger larvae
Day 8–16	Receiving nectar and pollen from field bees
Day 12–18	Beeswax making and cell building
Day 14 onwards	Entrance guards; nectar, pollen, water and propolis foraging; robbing other hives

Why pollination is important?

 Virtually all of the world's seed plants need to be pollinated. This is just as true for cone-bearing plants, such as pine trees, as for the more colorful and familiar flowering plants. Pollen, looking like insignificant yellow dust, bears a plant's male sex cells and is a vital link in the reproductive cycle.

 With adequate pollination, wildflowers:

Reproduce and produce enough seeds for dispersal and propagation

Maintain genetic diversity within a population

Develop adequate fruits to entice seed dispersers





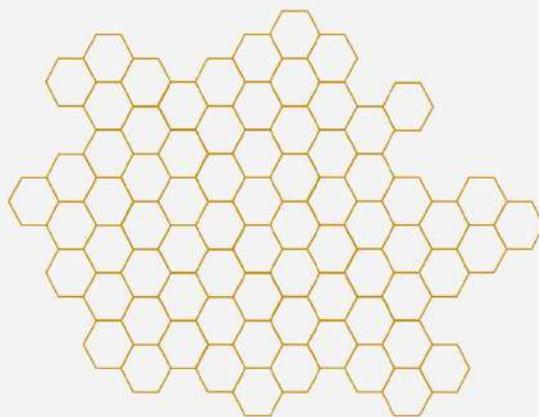
BEEKEEPING:



Beekeeping (or apiculture) is the maintenance of bee colonies, commonly in man-made hives, by humans. Most such bees are honey bees in the genus *Apis*, but other honey-producing bees such as *Melipona* stingless bees are also kept.



A beekeeper (or apiarist) keeps bees in order to collect their honey and other products that the hive produce (including beeswax, propolis, flower pollen, bee pollen, and royal jelly), to pollinate crops, or to produce bees for sale to other beekeepers. A location where bees are kept is called an apiary or "bee yard".

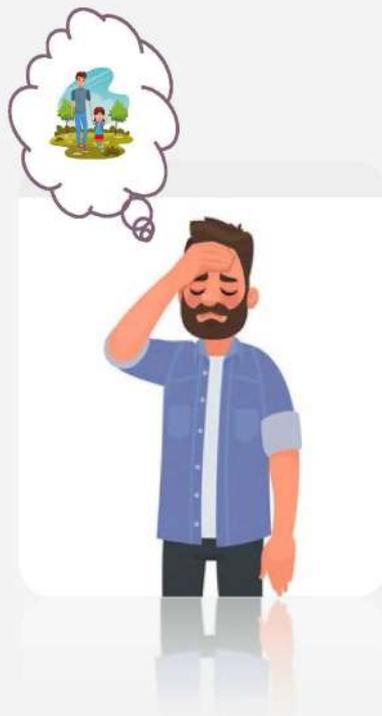




Humans have kept honey bee colonies, commonly in hives, for millennia. Beekeepers collect honey, beeswax, propolis, pollen, and royal jelly from hives; bees are also kept to pollinate crops and to produce bees for sale to other beekeepers.



Depictions of humans collecting honey from wild bees date to 15,000 years ago; efforts to domesticate them are shown in Egyptian art around 4,500 years ago.[.



**WHERE HAVE
ALL THE
BEES GONE?**

LET IT BEE

Everything You Need to Know

Almost 90% of wild plants and 75% of leading crops depend on animal pollination.



One out of every three mouthfuls of our food depends on pollinators. Crops that depend on pollination are five times more valuable than those that do not.



Farmers who are informed about the importance of pollination and pollinators to fruit quality are more likely to take up measures to benefit pollinator population and reduce pesticide impacts.

There is increasing scientific evidence that wild bees are negatively affected by certain insecticides and fungicides, particularly neonicotinoids, through persistent sublethal effects that are not being picked up by current environmental risk assessments of pesticides.



...BUT WHY DO BEES MATTER?

HOW CAN WE HELP THE BEES?

Plant a Bee Garden

Go Chemical-Free for Bees

Provide Trees for Bees

Provide an oasis

Build Homes for Native Bees



Module 5 // Activity 2 // Annex 2: Examples of Hotels for Bees





MODULE 5 : Connectivity and Animal Migration

Activity 3: Mini Garden for Pollinators

Topic

„Imagine if every garden, park and school grounds had bee-friendly flowers, and we grew wild flowers on our roundabouts and road verges; our towns and cities could become huge nature reserves for pollinators.“

-Bee expert, Prof Dave Goulson

Background: Bee populations are under severe stress. Since the Second World War, we've lost 97% of our wildflower meadows, a vital habitat which pollinators depend on for food and shelter. It has therefore become extremely important to restore

these habitats by planting flower fields and urban gardens.

This activity aims at establishing an awareness of the importance of bees, plants and gardens among young learners. Most important is to protect existing natural habitats, and it's important to teach the children that even a small step in that direction can help restore the biodiversity. Another benefit from this is that green spaces has a positive impact on our mental and physical health and well-being.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify the possibilities of reusing materials for creating gardens for pollinators
- Identify the importance of plants and pollinators in the environment
- Developing working memory, fine motor skills, imagination and visual perception
- Create different types of urban solutions for mini urban gardens



Duration

1 hour and 30 minutes



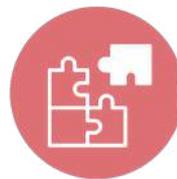
Teaching methods

- Direct instruction
- Interactive methods
- Demonstration-replication methods



Target ages

6– 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Pedagogical activity
- Workshop
- Building activity

Guidelines

Through the following steps this activity gives learners an insight into the importance of plants and pollinators in the environment:

1. Learners will be introduced to why plants and flowers are important for the environment.
2. Learners will use this knowledge to make a mini urban garden.
3. Learners will reflect on why it is important to create mini urban gardens for pollinators.



Preparation of the activity:

- See the powerpoint presentation (Annex 1). You can prepare the activity yourself or you can use the powerpoint to introduce the activity to the students. You can adjust it the age of the participants.
- For conducting this activity, you will need to prepare beforehand the following material for 24 participants: soil for planting, LEGO bricks, flowers/plants for planting (see Annex 1), plastics bottles, markers or other materials for painting, scissors, cardboard, water, sticks and glue.
- Before you do this activity, contact the parents of the children so they can bring as much as they can of recycled material.
- Before the activity you can choose which type of flowers you will use (This could also be a way to divide the participants into groups).
- Prepare the room, divide the area for 6 groups and prepare the materials for each group.
- Print out examples of pollinator flowers/plants (see Annex 2).
- Print out examples of mini gardens (see Annex 3) or show them on laptop, PC or projector.

Introduction (20 minutes):

Give an introduction. Before starting the activity, point out to the children the importance of urban biodiversity, plants, flowers and how it will help the development of biodiversity in urban areas but also the possibility of reusing materials/plastics in the development of environmental solutions. (See Annex 1) Gather the full group, and divide the children into 6 groups (you can use random division or you can divide them by flowers, etc.). 3 groups will work with LEGO and 3 groups will work with reusable materials – plastic.

Ask the children and open the following discussion:

- Why are flowers and plants important in the environment?
- Why are they important in urban areas?
- Which types of endangered animals and insects are using the flowers and why?
- How can we use Lego bricks and plastic to create mini urban gardens?

Show examples of pollinator flowers and plants (Annex 2) and show examples of mini gardens (Annex 3). You can print them out or show them on a PC/Laptop.

Make sure to verify the basic knowledge that the children have on the topic, in order to adjust the concepts used in the activity.

Delivery of the activity (45 minutes):

1. Before starting the activity, instruct the children to be careful when using the materials so that they do not get hurt and to follow your directions carefully.
2. Before starting the activity, point out to the children that from the existing materials it is necessary to make flower pots which, when combined, will make a mini urban garden.
3. Distribute printed garden versions to all groups and ask the children to imagine a pot that they want to create. Give them paper and pencil/colors to create it on paper.

4. Give the children guidelines to create the Lifesize version of the pot.
5. For groups working with LEGO bricks, point out that using LEGO bricks is necessary to make pots large enough to put soil inside and plant or sow flowers. Let them design and create and help other groups.
6. For groups working with recycled materials, first indicate that they need to cut the bottle in half (help them with that.)
7. Then, on the lower parts of the bottle, with the help of scissors, it is necessary to make holes so that excess to water can flow out . (It is useful and safer if the educator helps them and make the holes for the children)
8. Once they have done so, give them direction to decorate the bottles (pots) with materials that are available.
9. After all the groups have finished creating the pots, instruct them to put soil in the pots and plant the flowers/plants which they have in the groups together. It is important to clarify which plant species are planted/sowed and why; and how to take care of the garden afterwards
10. Then, on small sheets or cards, write down what flower is planted, stick it on a stick and place it in each pot.
11. After you have done all this, together with all the children, go out in the yard and place the created pots together and create a mini urban garden.
12. Water the flowers together with the children.

Conclusion (15 minutes):

1. Do a recap of the topics covered and ask the children why it is important to create mini urban gardens. Point out to the children the importance of urban biodiversity, plants, flowers and how it will help the development of biodiversity in urban areas but also the possibility of reusing materials/plastics in the development of environmental solutions.
2. Assessment – ask the children what they think about the activity: is it useful, practical etc. Additionally, you can prepare a quiz (individually or in the team) related to the topic. For example: what is biodiversity, why biodiversity is important, what pollination means, to tell some facts about some of the pollinators etc. The quiz can be in written form or orally using the sticky notes.
3. Closure

Assessment

The teacher performs the assessment of the activity “Mini Garden for pollinators” asking the children to answer questions using the method of unfinished sentences:

- During the activity I acquired, learned...
- Today my most important discovery was...
- The material/information I acquired during the activity will help me/will be useful...
- I would also like to learn, acquire...

Children also can write on post-it notes words or phrases they learned from this activity and then they put them on the board.





Material

- LEGO bricks
- Flowers for planting for 15-20 pots (use pollinators and suitable flowers for bees)
- Plastic bottles and water
- Cardboards
- Kid-friendly glue
- Scissors and sticks
- Markers and pencils
- Paper
- 20 printed handouts/examples of mini gardens/pots



Handouts

Annex 1: Power Point Presentation

Annex 2: List of Pollinator Flowers/Plants

Annex 3: Examples of Mini Urban Gardens



Alternative spaces

If the weather outside is not good, the pots can be set up in the classroom. Additional materials that must be used in this case are plates for base of the pots (for the water).

Adaptation for 10+ children

- Tell the children to conduct research of what types of animals/insects can live in this mini gardens
- Focus more on using recycled materials
- Give them presentation time to present the garden and its role

Useful links/Further reading

MINI DIY LEGO PLANTERS: FUN PLANTING PROJECT FOR KIDS

<https://www.hellowonderful.co/post/mini-diy-lego-planters-fun-planting-project-for-kids/>

Inspiration video - How to Make mini Potted Plants from LEGO bricks:

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

Inspiration video - Recycling Plastic Bottles into Small Garden Planter Pots:

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

Tips

- Introduce the children to the steps before the activity begins
- Organize a safe work environment
- Be careful not to injure anyone and keep track of time
- Pay attention to the weather if you need to do the activity outdoors
- Create a pleasant atmosphere and involve all children in the discussion
- During the activity, encourage teamwork
- This activity is complementary with with the activities «Migratory birds in my community» and «Hotel for Bees»



WHAT IS BIODIVERSITY?

The term biodiversity (from “biological diversity”) refers to **the variety of life on Earth at all its levels**, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life.

POLLINATORS ENCOURAGE LOTS OF VARIETY OF LIFE!

WHY IS BIODIVERSITY IMPORTANT?

Provides a variety of foods and resources.

Defends against diseases and pests.

Provides ecological services, such as: pollination.

THREATS TO BIODIVERSITY

Extinction

Loss of natural habitat

Spread of non-native species and diseases

Climate Change

WHAT IT MEANS POLLINATION?

Pollination is the process that allows plants to reproduce. In some cases, the wind and rain blows pollen between plants, which causes pollen to transfer to the female reproductive part of the plant. However, most plants need bees and other insects to pollinate from one plant to the next. When a bee or other insect lands on a flower, small particles of pollen stick to its legs.

As the bee flies to the next plant, it transfers the pollen over with it. Plants rely on bees and other insects to make this happen. If they ever stopped pollinating, it could damage the plants that bear fruit and produce oxygen. People need the bees, the plants, and food they provide to survive and preserve the planet.



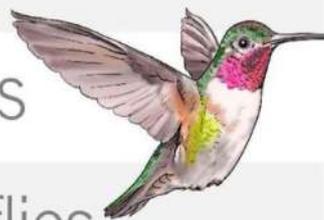
Bees



Butterflies



Beetles



Birds



Bats

WHO ARE THE POLLINATORS?

Pollination is an example of an ecological service provided by many different groups of animals, including insects and birds, that supports many lives on Earth by providing food and other resources.

Facts About Bats

- Do you like eating bananas and mangos? Bats help pollinate these fruits and more.
- In fact, it is believed that bats play a role in pollinating more than 500 different types of tropical plants.
- Because bats migrate and fly quite a distance before they drop seeds, they play an important role spreading plants and in helping diversify growth in areas.
- Bats tend to like flowers that give off strong scents or are white/pale colors.
- Bats have long tongues that help them reach nectar in flowers.



Facts About Ants

Ants are pollinators too and they love nectar!

Flowers that ants visit are low growing, usually have small inconspicuous flowers and have flowers that are close to the stem.

Many tropical plants have nectar outside of their flowers to attract ants. These plants rely on defensive capabilities of the ants to protect them from other insects.

Ants can lift 20 times their own body weight!

It is believed that there are more than 35,000 ant species in the world!



Facts About Butterflies

- Butterflies have a weak sense of smell and taste with their feet!
- Butterflies have good vision and can see the color red (bees can't).
- Butterflies help pollinate many flowers, but are less efficient than bees because their long thin legs pick up less pollen.
- Butterflies are attracted to flowers that provide landing platforms and are brightly colored (red, yellow and orange).
- Butterflies probe for nectar with their long proboscis (the technical term for butterfly mouthparts).



Facts About Flies



Flies have many beneficial functions such as decomposers, soil conditioners, water quality indicators and pollinators!

Flies visit flowers to eat nectar and lay their eggs.

Flies most often visit flowers that emit a strong or offensive odor.

Do you love chocolate? Chocolate depends on tiny flies (called midges) to pollinate its small flowers along its trunk.

Facts About Wasps

- Wasps are pollinators! But, they are less efficient than bees because they are not generally covered with hairs that help carry pollen from flower to flower.
- Do you like fig newtons? Wasps are responsible for pollinating fig crops. Figs are unusual fruits, as the flowers are actually inside the immature fruit. Fig wasps are typically very small, about 0.06 inches in length. Without one another, neither the fig nor fig wasp can complete their life-cycle.
- Almost 100 species of orchids rely on wasps for pollination.



Facts About Beetles

Flies have many beneficial functions such as decomposers, soil conditioners, water quality indicators and pollinators!

Flies visit flowers to eat nectar and lay their eggs.

Flies most often visit flowers that emit a strong or offensive odor.

Do you love chocolate? Chocolate depends on tiny flies (called midges) to pollinate its small flowers along its trunk.



Facts About Humans

- Plant breeders pollinate some crops by hand to control the crosses and select for plants that produce desired characteristics.
- Plant characteristics can include flower color, improved flavor, increased yield, or disease resistance to name a few.
- Hand pollination is usually an option only on a small scale.



Plants That Attract Pollinators

- Major agricultural pollinators include: Wild honey bees. Native honey bees are the most commonly known pollinator.
- In fact, pollinators are key to the transformative stages in plants that bring about beautiful flowers and tasty veggies. Since they are so vital to the ecosystem, we suggests a list of some flowers that attract bees, butterflies and hummingbirds.

TOP 30 plants that attract pollinators

Attracting pollinators and other beneficial insects is an important part for any thriving garden. That's why we've created this list of our favorite flowers that attract bees, butterflies and hummingbirds.

ANNUALS

- 1 **Floss Flower (Ageratum)**
ZONE 2-11
- 2 **Borage**
ZONE 2-11
- 3 **Cosmos 'Sensation'**
ZONE 2-11
- 4 **Mexican sunflower**
ZONES 3-11
- 5 **Milkweed**
ZONES 3-9
- 6 **Egyptian Star Flower (Pentas)**
Herbaceous Perennial
ZONES 10-11
- 7 **Pincushion flower (Scabiosa)**
ZONES 5-9
- 8 **Verbena**
Herbaceous Perennial
ZONES 7-11
- 9 **Zinnia**
ZONES 2-11

PERENNIALS

- 10 **Indian Paintbrush**
Early Season
ZONES 4-8
- 11 **Allium**
Early Season - Bulb
ZONES 5-9
- 12 **Bee Balm**
Midseason
ZONES 4-9
- 13 **Black-eyed Susan**
Midseason, Biennial
ZONES 5-7
- 14 **Hollyhocks (Alcea Rosea 'Nigra')**
Midseason, Biennial
ZONES 3-9
- 15 **Butterfly Weed**
Midseason
ZONES 5-9
- 16 **Giant Hyssop**
Midseason
ZONES 5-9
- 17 **Lavender**
Midseason
ZONES 5-8
- 18 **Linaria (Busy Star)**
Midseason
ZONES 3-8
- 19 **Lupine**
Midseason, depends on variety
ZONES 3-9
- 20 **Mint**
Midseason
ZONES 5-9
- 21 **Phlox**
Midseason, depends on variety
ZONES 2-9

- 22 **Purple Coneflower (Echinacea)**
Midseason
ZONES 3-8
- 23 **Red Valerian (Jupiter's Beard)**
Midseason
ZONES 5-8
- 24 **Yarrow**
Midseason
ZONES 3-8
- 25 **Aster**
Late Season
ZONES 5-10
- 26 **Globe Thistle**
Late Season
ZONES 3-8
- 27 **Goldenrod**
Late Season
ZONES 3-8
- 28 **Pineapple Sage**
Late Season
ZONES 8-10
- 29 **Joe-Pye Weed**
Late Season
ZONES 4-9
- 30 **Stonecrop (Sedum)**
Late Season, depends on variety
ZONES 3-8



All sources seeds: National Wildlife Federation, Gardener's Supply Company, New Jersey Audubon



22 **Purple Coneflower**
(Echinacea)
Midseason
ZONES 3-8



23 **Red Valerian**
(Jupiter's Beard)
Midseason
ZONES 5-8



24 **Yarrow**
Midseason
ZONES 3-8



25 **Aster**
Late Season
ZONES 5-10



26 **Globe Thistle**
Late Season
ZONES 3-8



27 **Goldenrod**
Late Season
ZONES 3-8



28 **Pineapple Sage**
Late Season
ZONES 8-10



29 **Joe-Pye Weed**
Late Season
ZONES 4-9



30 **Stonecrop**
(Sedum)
Late Season,
depends on variety
ZONES 3-8

Safer
BRAND

All sources used: National Wildlife Federation, Gardener's Supply Company, New Jersey Audubon



Module 5 // Activity 3 // Annex 2: List of pollinator flowers/plants



1. Allium

The Giant Alliums are like glowing lanterns for bees and butterflies. The flower captivates them to enhance garden pollination. They spread quickly in the garden, yet not so swift that they take over, so they can stand in the same area for years.



2. Aromatic Aster

Aromatic Aster (*Symphyotrichum oblongifolium*) are daisy-like perennials with a star-like shaped flower head. They are versatile, easy-to-grow ground cover for dry, sunny locations, and an indigenous perennial wildflower that grows from 1–3 feet tall.



3. Bee Balm

Their unique appearance can help you quickly identify a Bee Balm (*Monarda didyma*) plant. Basically, they are found in pink, red, and white colors. The plants are common herbaceous perennials.



4. Blue Wild Indigo

Blue Wild Indigo (*Baptisia australis*) is a group of large, long-lived perennials. They add a long season of interest from flowers and foliage, and species modify their height and width. Some species grow no more than 1 to 2 feet tall.



5. Bottonbush

Common Buttonbush (*Cephalanthus occidentalis*) is a multi-stemmed shrub that grows 6-12 feet or periodically taller, and trunks are often twisted. Their polished and dark-green leaves lack vital fall color. Moreover, they are long-lasting, and its one-inch globes and bizarre blossoms are white or pale pink. Afterward, rounded masses of nutlets linger over the winter.



6. Butterfly Bush

The butterfly bush (*Buddleja davidii*) is a choice among gardeners. The plant is uncomplicated to grow. In a well-drained ground, they can endure a full scope of climates, from very wet to intensely dry. They have a long flowering season, usually during spring and summer, reaching into the fall in warmer climates.



7. Catmint

Catmint (*faassen nepeta*) is a member of the mint family, but please don't rapidly send away this attractive perennial if you've had a concern with invasive mint in the past. This plant is much more natural to grow and a bonus for being well-behaved.



8. Clove Pink

Gardeners with little areas to fill and sunny locations would do well to try growing Clove Pink (*Dianthus caryophyllus*) flowers. Not only do the plants have an opaque feathery form, but the alluring, scented flowers have a long herbal history – both in medicine and as edible ornament and flavoring.



9. Cornflower

Cornflower (*Centaurea cyanus*) grow 1–3 feet tall with narrow gray-green leaves. They produce papery flower heads surrounded by bracts. The flower heads have blue, pink, or white ray flowers that are attractive to butterflies.



10. Daylily

Daylilies (*Hemerocallis citrina* Baroni) may be the coolest of all blooming perennials. The plants grow swiftly and are long-lived. They bloom in almost several classes of soil, will grow in sun or shade, and are seldom troubled by insect pests or disease.

Module 5 // Activity 3 // Annex 3: Examples of Mini Urban Gardens







MODULE 6 :

Urban Agriculture

Activity 1: Designing Ecofriendly Buildings in Urban Environments

Topic

Urban agriculture has become of great interest in finding new answers for how cities can master recent social, economic, and ecological challenges. Moreover, it is considered a livelihood strategy that enables and encourages citizens to sustain themselves.

Background: Nowadays, our cities are centres of information, ingenuity, and collaboration. We see new approaches to housing, employment, and service provisions (such as water, transportation, education, and healthcare) which creates a constant development and growth in the cities. However, meeting the Sustainable Development Goals and the growth limits in the cities, we need smart,

sustainable, and inclusive urban development. Urban agriculture is recognized on the international agenda as part of a comprehensive solution to the problems of the rampaging growth of cities. It can take many different forms. It includes, for example, household, school, and community gardens, as well as rooftop, vertical and indoor farms.

In this activity the learners will become aware of the importance of urban agriculture, green spaces and the natural environment and a deeper understanding of ways to create sustainability in cities.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

Incorporation of STEAM Educational Activities

SCIENCE:

- Have compassionate and respectful attitudes towards the natural and social environment.
- Develop energy efficient ways of building
- Distinguish the different sustainable ways of gardening and practically use them in the daily life

LANGUAGE:

- Comprehend texts with visual support.
- Interact with partner
- Develop a comprehensive vocabulary repertoire within context

ART AND ICT:

- Use computers, tablets, and online tools.
- Observe and think.
- Create and design.

21st CENTURY SKILLS:

- Learn innovation skills: to provide a solution through collaboration from students.
- Develop critical thinking: to conduct their own research to interpret the meaning of selected topics.
- Develop creativity and innovation: to encourage creativity and innovation by engaging students in various activities.
- Collaborate: to do group working



Duration

120 minutes



Target ages

8– 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Teaching methods

- Direct Instruction
- Inquiry-based Learning
- Game-based Learning
- Interactive methods
- Demonstration-Replication methods
- Kinesthetic learning: Crafts (models of aeroponic and hydroponic gardening systems), Building with LEGO bricks
- Peer to peer learning
- Modeling
- Learning with LEGO



Type of activity

- Research
- Completion
- Reading Comprehension
- Pedagogical game
- Workshop
- Quiz
- Building activity
- Modeling
- Designing
- Online games
- Hands on activities



Guidelines

Through the following steps this activity gives learners the opportunity to explore the concept of sustainable urbanization:

1. Learners will be introduced to the concept eco-friendly design of infrastructure.
2. Learners will design an eco-friendly sustainable building with the use of LEGO bricks.
Learners will reflect on advantages and disadvantages of designing homes with vertical gardens.
3. Learners will reflect on advantages and disadvantages of designing homes with vertical gardens.

Introduction (20 minutes):

1. Ask students what they understand by sustainable urbanization. Discuss with them using as a guide the relevant section («Urban Agriculture as a tool for Sustainable Urbanization») in Module 6 in the curriculum.
2. Have the students make a model of their house with LEGO bricks and ask them if they can point out any flaws in regard to the energy efficiency. For example, you can support students address the issue of the lack of eco design on infrastructure project development in Limassol, Cyprus. Show them Image 1 in Annex 1.
3. Show a picture of an eco-city and prompt the students to discuss and find out ways and systems for energy efficiency and ecofriendly housing. Show them Image 2 in Annex 1.
4. Bring into discussion the role of agriculture in eco-friendly housing, and how it can support the development of energy efficient and eco-friendly houses.

Delivery of the activity (90 minutes):

1. Show a video about the 6 most famous eco-friendly sustainable buildings with vertical gardens in the world: <https://www.youtube.com/watch?v=dK1NXVdRVag>
2. Introduce the tips for designing eco-friendly homes:
 - <https://www.salterspiralstair.com/blog/eco-friendly-home-design-ideas/>
 - <https://ecospaints.net/-impressive-green-design-tips-for-an-eco-friendly-home>
 - <https://www.homebuilderdigest.com/eco-friendly-home-tips/>
3. Discuss with the students the variables involved with the tips. Allow time for discussion.
4. Ask the students to design an eco-friendly sustainable building using LEGO bricks. Encourage them to go beyond the usual and think outside the box when designing their building.
5. Then assign students to groups of 3 or 4 and ask them to:
 - use their imagination to design an ideal home that is as eco-friendly as possible and includes elements of vertical gardening.
 - think of a home and rooms needed for a family of four, including size
 - Heating/cooling ideas, alternatives
 - Appliances inside the home, technology used
 - What will the home be built out of, materials used
 - System designed for recycling/reusing waste products.
6. Allow students to begin research and development using the Internet and other available sources, finding the energy savings versus regular homes. As students work, remind them to share and respect each group member's ideas and input, suggestions, etc. You may suggest that each group could assign a role for each member, such as 2 members responsible for design and drawing, others do research, etc.
7. Once students have completed the project, tell them to present the final eco-friendly home to the class during a presentation
8. Encourage students to vote for the Most Eco-Friendly Home based on the number of eco-friendly elements included in their design, as well as how they have use elements of vertical gardening that were discussed in the beginning of this activity. Students design the 1st voted building using LEGO bricks.

Conclusion (10 minutes):

- Discuss the advantages and disadvantages of designing eco-friendly homes with vertical gardens. Show them Image 3 in Annex 1.
- Distribute an exit-ticket. Print as many copies as needed (Annex 2).

Assessment

- Oral assessment
- Reflection questions
- Research
- Peer to peer work
- Individual assessment
- Exit tickets (reflective questions)





Material

- LEGO bricks
- Computers
- Internet
- Interactive Whiteboard
- “Minecraft Education Edition” - permission license needed



Handouts

Annex 1: Images

Annex 2: Exit Ticket



Alternative spaces

Access to new technologies: Provide permission to use “Minecraft Education Edition

Tips

- The teacher might assign students to think about their homes and to find at least 3 ideas or ways to immediately adapt their homes to becoming more eco-friendly.
- It is suggested to have access in Minecraft Education Edition. If this is not possible, then your students can simply draw their buildings.

Adaptation for 10+ children

In the development phase of this activity, after you assign students to groups of 3-4 and ask them to design an ideal building that is as eco-friendly as possible, you can explain to them that they must also create a detailed drawing of their ideal eco-friendly home in “Minecraft Education Edition” with labels showing the home’s eco-friendly features, details, etc. Also, the expectations for designing eco-friendly sustainable buildings will be more advanced.

Useful links/Further reading

Ecofriendly Home Designs:

<https://www.salterspiralstair.com/blog/eco-friendly-home-design-ideas/>

10 Impressive Green Design Tips for an Eco-Friendly Home:

<https://ecospaints.net/-impressive-green-design-tips-for-an-eco-friendly-home>

Energy Efficient Home: 8 Tips for Building an Eco-Friendly Home:

<https://www.homebuilderdigest.com/eco-friendly-home-tips/>

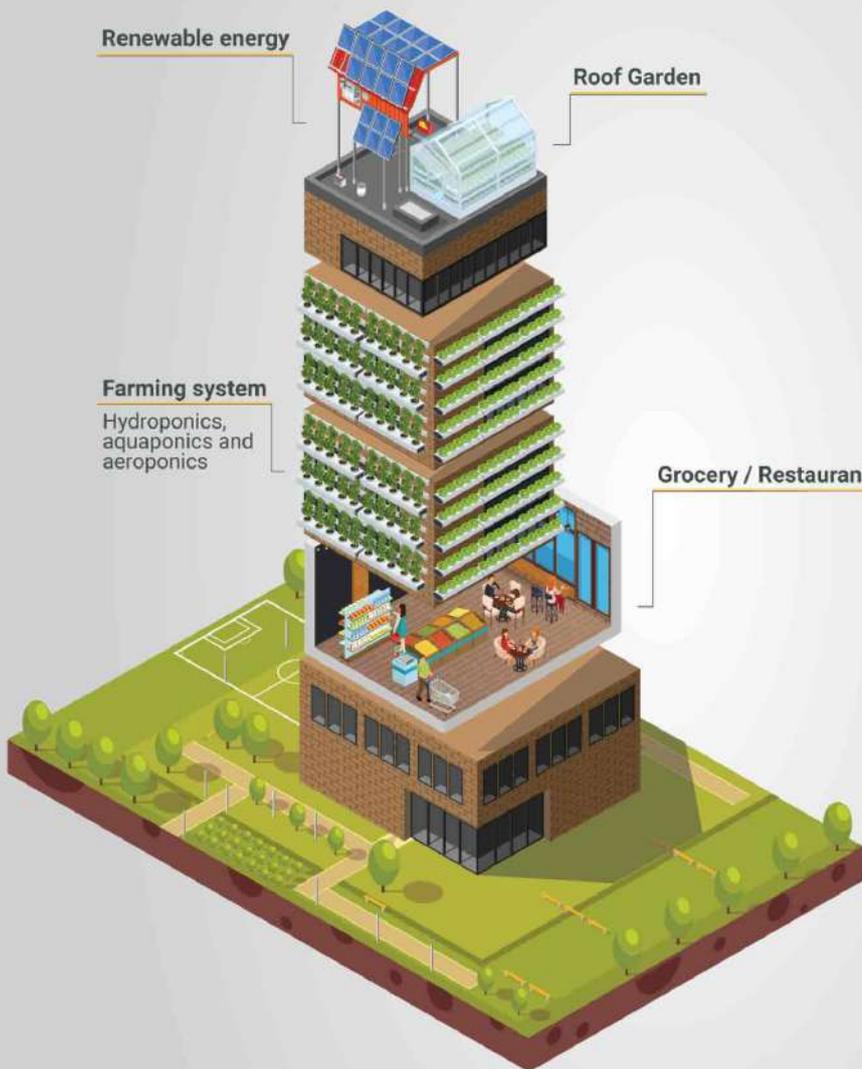
The 6 Most Famous Vertical Gardens in the World:

<https://www.youtube.com/watch?v=dK1NXVdRVag>

Module 6 // Activity 1 // Annex 1: Images



ADVANTAGES OF URBAN FARMING



	Weatherproof Crops grown in controlled environment.
	Year-round crop production No more "seasonal crops" - continuous production.
	No running out of land Indoor growing conditions eliminate the use of chemical pesticides.
	Environment-friendly No soil or new land required.
	Increased yield Produces the same yield as a traditional 4-6 acre farm.
	Water conservation Hydroponics uses 70% less water.

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson

exit

ticket

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson

exit

ticket

exit

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson



ticket

exit

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson



ticket

exit

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson



ticket

exit

Name: _____

Mention 3 benefits of vertical gardening

1. _____
2. _____
3. _____

Circle the emoji that best describes your understanding of today's lesson



ticket



MODULE 6 : Urban Agriculture

Activity 2: My Green LEGO City

Topic

Urban agriculture is anywhere and everywhere that people can find even the smallest space to plant a few seeds. It contributes to improved nutritional health, especially in poor families, and can free up some the income for other expenses such as education. Urban agriculture also includes commercial operations, producing food in greenhouses and other spaces but is more often small-scale and scattered around the city.

Background: There exist different types of urban agriculture, such as family gardens, allotment gardens, educational gardens, community gardens and recreational gardens. Many experts argue that

urban agriculture should be promoted in all schools across Europe, because, according to research because it boosts learning and engagement and create awareness among students about wellbeing and green issues.

In this activity the learners will identify what urban agriculture is, learn to distinguish the different types of agriculture and understand the benefits of it. They will carry out this knowledge by working creatively with LEGO bricks to illustrate sustainable cities.

Learning outcomes

By the end of this activity, the pupils/participants should be able to:

- Identify what urban agriculture is
- Identify the benefits of urban agriculture
- Distinguish between the different types of urban agriculture and their basic characteristics
- Acknowledge the importance of putting pressure for adopting urban school gardening and farming practices for experiential learning.
- Use inspiration from other cities around the world to include in their city planning
- Carry out research and identify ways they could further improve on their planning to create a more sustainable city



Duration

40 minutes



Teaching methods

- Introductory Video
- Pedagogical game/ challenge
- Building activity (with Lego)



Target ages

9– 10 years
For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan.



Type of activity

- Direct Instruction
- Inquiry-based Learning
- Game-based Learning
- Interactive methods (building with Lego)

Guidelines

Through the following steps this activity gives learners the opportunity to explore the concept of urban agriculture:

1. Learners will be introduced to the meaning of urban agriculture.
2. Learners will create their own sustainable city with urban gardens using LEGO bricks.
3. Learners will reflect on renewable energy sources, wildlife corridors and sustainable transport infrastructure.

Preparation of the activity:

- Get projector, speakers, and the following video ready: «Urban Farming Is for Kids.. Let's Get Growing!» on YouTube: <https://www.youtube.com/watch?v=JbB2Mqp2Lzw>
- Arrange the desks into groups. Students will be divided into groups of 3 or 4
- Put a set of LEGO bricks on each group's desk
- Have handouts printed and on your desk (one of each for each student)

Introduction (5 minutes):

Gather the full group into class and divide the students into groups of 3 or 4. Ask them to take their seats. Ask the children what we mean when we say, "Urban Agriculture" and elicit relevant definitions. Make sure to verify the basic knowledge that the children have on the topic, in order to adjust the concepts used in the activities.

Play the video «Urban Farming Is for Kids. . Let's Get Growing!» on YouTube. Give the students the handouts with the definitions (Annex 1) and discuss.



Delivery of the activity (30 minutes):

1. Ask students if they think that urban agriculture has beneficial points for the cities, individuals, or the world. Ask them to justify their opinion.
2. Introduce the class to the 'My Green Lego City' challenge.
3. Explain the three stages to the challenge
 - Pupils will be creating their own plan of a sustainable city with urban gardens/ farms
 - Pupils will be creating a 3D model for their city (using Lego)
 - Pupils will produce a city charter for the inhabitants of their city
4. Gather the pupils into their groups and ask them to work through 'Planning My Green Lego City' (Annex 2). This worksheet will help them learn what they need to include in their sustainable city, and what the inhabitants of their city need to live there.
5. Ask students to make a plan for their cities (using the A4 papers) and then to use their Lego bricks to create their Green Lego Cities.
6. Make sure to explain that their Green Lego Cities should:
 - Be powered using renewable sources of energy
 - Use urban agriculture to produce enough food for inhabitants
 - Have green areas and 'wildlife corridors'
 - Have sustainable transport infrastructure: Cars, buses, trains and trams, boats on rivers, walkways for pedestrians and lanes for cyclists are in balance
 - Recycling bins all over the city

Conclusion (5 minutes):

1. Recap of the topics covered. / Discussion.
2. Reflection. Have each group of students present their work to the class and have the class comment on it (positive and negative aspects).
3. Closure

Assessment

- After the end of the activity, tell students to write 3 benefits of urban agriculture.
- After the end of the activity, tell students to write 5 benefits of learning with Lego bricks.





Material

- 3-4 A4 papers
- 25 handouts (1.1)
- 25 handouts (1.2)
- Projector
- Laptop
- Speakers
- LEGO bricks



Handouts

Annex 1: Planning My Green LEGO city

Annex 2: Useful definitions



Alternative spaces

If you do not have the needed Lego sets, you can ask your students to design their cities on paper at first or even use the Lego Digital Designer software to do that digitally. In this case you are going to need tablets for the students.

Tips

- Make sure you give room for discussion and for students to share their own experience (i.e. if they have ever seen instances of urban agriculture, if they like gardening themselves etc.). This way they are going to be able to make a connection between the lesson and real life.

Adaptation for 10+ children

- You can extensively discuss the benefits of learning with nature and develop a side-project with the students. For example, establish one outdoors activity every week.

Useful links/Further reading

Website:

<https://www.lego.com/en-us/kids/city>

Software:

<https://www.bricklink.com/v3/studio/download.page#xlink>

Video:

<https://www.youtube.com/watch?v=JbB2Mqp2Lzw>

Material:

<https://resources4rethinking.ca/en/resource/my-green-city>

Module 6 // Activity 2 // Annex 1: Planning My Green LEGO City

How can you build a sustainable city?

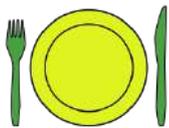
Your sustainable city must include plans to produce energy, provide inhabitants with food, handle waste efficiently, transport people and produce around the city, whilst ensuring that nature is welcomed and supported in your city.



1. Energy

People expect higher standards of living and the latest devices gobble up energy. We still use a lot of fossil fuels, like oil coal and gas. In the past 200 years we have used so much of the world's resources already and need to use more renewable energy.

How will you power your city?



2. Food

We all need to eat but in a world with more and more people, where will it all come from? Transporting food from far away is expensive and pollutes the environment.

We also waste a lot of food; in the UK alone about 30 % of all food gets thrown in the bin!

How and where will you grow enough food for your inhabitants?

How can you make sure you use as much of the food as possible without any waste?



3. Nature

We need to remember that humans are not the only living things on the planet and we need plants and animals to be able to survive. As you plan your city remember to include green areas in your city, and help wildlife move around your city on 'wildlife corridors'. Wildlife Corridors are areas of planting that help the green areas in your city link up for wildlife. It may be some plants on the edge of a road, or even people's gardens. Flowering plants help encourage pollinators in to your city; these will help your vegetables grow and increase your crop of food. It has also been proven that if people can see nature every day, and not just buildings, they are much happier and healthier.

Try and think of why you might need different plants and animals, this will help you make sure you have it in your city. **How will you make sure nature is encouraged into your city?**



4. Transport

The way your population moves around the city is crucial for city living. Movement in a place where so many people live and work is tricky so this needs to be carefully designed. Cars, buses, trains and trams, boats on rivers as well as walkways for pedestrians and lanes for cyclists, you need to make sure facilities are in place for the perfect balance of each. Some of the largest cities in the world have even moved their transport out of the way using underground trains and elevated monorail systems e.g. Las Vegas has motorways underneath its buildings.

Try to think of new ways that you could help with the infrastructure in your city. In many cities around the world the streets can become as famous as some of the buildings.

How will you help your inhabitants move around?



5. Waste

Throughout the world we dump over 2 billion tonnes of waste every year. A lot of this rubbish doesn't rot away and finding somewhere to put all is a serious problem.

We actually waste more energy by not recycling. For example: cans of drink are made from aluminium, 95% more energy is needed to make a new aluminium can compared to one made from recycling other cans. Also, recycling avoids a very expensive and polluting activity, that is the mining of aluminium.

How will you encourage people from your city to recycle more and reduce their waste?

Module 6 // Activity 2 // Annex 2: Useful Definitions

What is Urban Agriculture?

Urban Agriculture spans all actors, communities, activities, places, and economies that focus on biological production in a spatial context, which –according to local standards– is categorized as ‘urban’. Urban Agriculture takes place in intra- and peri-urban areas (i.e., within or on the fringe of a town, a city, or a metropolis), and one of its key characteristics is that it is more deeply integrated in the urban system compared to other agriculture. Urban Agriculture is structurally embedded in the urban fabric; it is integrated into the social and cultural life, the economics, and the metabolism of the city.

What is Urban food gardening?

Urban food gardening encompasses agricultural activities with generally low economic dependence on material outputs, while using the production of food for achieving other, mostly social, goals. In this case, a distinction has been drawn between areas for individual production, such as allotments and family gardens, and areas where more collective actions are performed, such as educational, therapeutic and community gardens.

What is Urban farming?

Urban farming refers to intentional business models taking advantage of proximity to the city by offering local or regional agricultural products or services. This concept does not apply to all farming that takes place in larger urban areas. In this case, the areas have been subdivided into different types, such as those linked to on-site services (for instance, leisure and educational gardens), and others that include local food farms. The latter foster a more direct link with their consumers and operate through short food-supply chains.



MODULE 6 :

Urban Agriculture

Activity 3: My School Garden

Topic

As urban areas grow in population, they expand outward, often overwhelming the natural environment, destroying ecosystems, and drawing resources from well beyond their defined limits. Learning about ecosystems and our impact on the environment from an early age is important if we want to change how we live in the cities. Introducing urban agriculture in schools is a great way of starting an awareness among young people and is of great educational as well as emotional value to children.

Background: Cities' dependence on imports of food, energy, and other resources from distant

areas, and often on exports of their wastes to those areas, has severe negative consequences for the environment and has long been a problem across the world. Although it will not solve the ecological problems of growing cities, urban agriculture can be an important way to rebalance and protect the environment.

This activity aims to familiarize pupils with the concept of urban agriculture and help them to imagine and design an educational garden for their school.

Learning outcomes

- Identify the basic elements of urban agriculture
- Distinguish between the different typologies of urban agriculture
- Express their thoughts and feelings about the ways that urban agriculture can help us have better and productive lives
- Collaborate and summarize together their main arguments
- Apply the new knowledge they acquired by using the Lego bricks
- Illustrate the new knowledge in their designs of their imaginary school gardens
- Analyze the benefits they can accumulate from this educational experience
- Point out how their school garden can enhance educational learning
- Synthesize and present their plan in front of others
- Appraise what they have learned from this activity



Duration

190 minutes



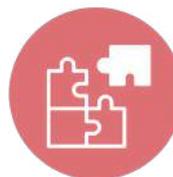
Teaching methods

- MDirect Instruction
- Inquiry-based Learning
- Interactive methods



Target ages

7– 10 years. For older children (up to 14 years), please refer to section 'Adaptation for +10 children' at the end of this Activity Plan



Type of activity

- Learning by doing
- Peer learning
- Building activity
- Fieldwork

Guidelines

Through the following steps this activity gives learners the opportunity to imagine and design an educational garden for their school:

1. Learners will reflect on how urban agriculture can help improve lives and everyday activities.
2. Learners will design and create an educational garden for their school with the use of LEGO bricks.

Preparation of the activity:

Carefully read module 6 in the curriculum to be able to facilitate the discussions.

Create stations for each group by putting two desks together. Make sure that there is a distance between the groups. Prepare all material in advance.

Introduction (35 minutes):

1. Gather the full group and start a discussion on what urban agriculture is. You can use the Module 6 Introduction and Unit 6.1 to facilitate this discussion.
2. Divide your pupils into groups of 3-4 persons and ask them to write and/or draw on colorful post-it notes and/or paper how urban agriculture can help us have better lives and everyday activities. Ask them some guiding questions that you all can discuss in the big group. For example:-
 - Imagine that close to your house/apartment there is a community garden where you can plant greens and flowers with your friends and neighbors. How does that make you feel?
 - Imagine that some of your relatives do not have a job and worry a lot about the fact that they won't be able to secure supply of food to their household. Do you think that a family garden or an allotment garden will make them develop a sense of their own worth and self-respect?
 - Imagine that you live in a block of buildings. Do you feel that if there was an urban (educational/ recreational/ environmental/ social) farm close to you, you would visit it often? What kind of activities would you be doing there?



Delivery of the activity (90 minutes):

1. Tell the pupils that they will be working in the groups you have already created in the introductory part of this activity. Each group will have a mission: to imagine, design, and develop an educational garden for their school using the LEGO bricks.
2. Gather the pupils together and tell them that you will go together to take a walk around the school premises. Tell them that they will be walking with their groups and should discuss between them why is it important to have an educational school garden and where they could create this garden.
3. After you return in the classroom, tell the pupils to start designing their educational school garden having in mind what they have discussed and noticed during their walk. Give Handout 1, as well as flipchart paper and colorful markers to each group and ask them to design and later build their garden following the suggested steps.
4. Then allow enough time for them to build their school building including the imaginary school garden by using the LEGO bricks.
5. After each group finishes, give them Handout 2 and ask them to complete it together with their group.
6. Following that, each group presents their educational school garden to the whole class using both Handouts as guide.
7. Encourage pupils in collating together all their opinions and feelings about the importance of having an educational school garden and deliver the final document to the school management authority and parent-teacher association/parent-guardian association in order to put pressure for the creation of a school garden.

Conclusion (30 minutes):

1. Create a collage of all opinions and feelings about the importance of having an educational school garden, including photos from both the designing and developing phase of the “new” school that has an educational school garden, while discussing important lessons learned.
2. Assess the new knowledge and skills acquired.
3. Close the activity thanking everyone for their participation and valuable ideas.

Assessment

- You can use the Impact Evaluation Questionnaire that will be developed by the project consortium in which pupils can mark how they feel about certain simple statements (1-5 Likert scale using emojis instead of numbers); note down what they have learned from the activity; reflect on the use of Lego to understand better the topics that they were taught; highlight what kind of problems/difficulties they came across during the implementation of the activity; write what they did not like; suggest improvements to this activity.





Material

- Colored post-it notes and/or A4 paper for the introduction to the activity
- Flipchart
- Markers
- Scissors and glue
- Colored paper that they can use to cut out pieces for their garden
- Printed copies of annexes (1 per group)
- LEGO bricks
- 1 A2 cardboard sheet for the final collage



Handouts

Annex 1: Checklist

Annex 2: My School Garden

Tips

- Keep maximum participants in each group to 4 pupils
- Allow pupils to express freely in the introduction of the activity but be mindful to facilitate the discussion based on the content of Module 6
- Make sure that all pupils share their opinions and are respected in the small groups

Adaptation for 10+ children

This activity can be replicated for +10 children as it is flexible to different learning needs and educational levels. For example, in the Introduction of the activity, you can discuss more complicated issues, such as the growing population in the big cities or the importance of urban agriculture for women's economic autonomy. All these issues can be found in Module 6 including numbers and geographic data.

Moreover, at the end of this activity, instead of the creation of a collage of opinions and feelings, you can draft together with your students a policy brief/policy recommendation paper and deliver it to school management authority.

Useful links/Further reading

You can use all links and bibliography suggested in Module 6. For example:

The following video is an intro video to urban farming and resilient gardening for and with children. It is very inspiring for you to use during your classes.

[Urban Farming Is for Kids... Let's Get Growing!](#)

The following essay by Kirsten Berhan can give you amazing insights on how to use the school garden as a teaching and learning tool: [«The Garden, A Master Teacher»](#)

Dive into the amazing world of [Life Lab!](#) Life Lab Science Program is a national leader in garden-based education is dedicated to developing and using school gardens as «living laboratories» where which students can integrate and apply what they are learning in the classroom.

A guide on [how to start a school garden](#).

Module 6 // Activity 3 // Annex 1: Checklist

Checklist to be advised when designing and building your garden

* The following list includes steps that you should take into consideration when you develop your model. After each step, write your thoughts and remarks in the box.

1. Form a Garden Committee: A garden committee makes decisions about how a school's garden will look, what it will be used for, and how it will operate. The committee should ideally consist of 5-10 members representing the following areas:

- Your school's administration
- Teaching staff
- Students
- Parents
- Community volunteers (municipality, NGOs, agricultural associations, etc)

Who will participate in your garden committee?

2. Determine Goals for Your Garden: Once you have your committee in place, determining goals for your garden is an important next step. Schools build gardens for different reasons. Here are some common goals and objectives.

- To provide outdoor, hands-on learning.
- To cultivate food for school programs.
- To send fresh fruits and vegetables home with students.
- To reduce school-generated food waste.
- To provide a therapeutic space for children and youngsters.

Identifying the goals for your garden will help you determine what size and style of garden you need.

Once you have a sense of your garden’s direction, consider the following questions to further hone your vision:

- Who will use the garden?
- How often will students use the garden? Who will be responsible for scheduling?
- Who else is needed to accomplish your goals?

What are your garden’s goals? Briefly answer the above questions to help you determine your vision.

3. Find Your Site: Now that you know the main purposes for your garden, review available sites and determine which one is right for your needs. REMEMBER our walk around school premises. Along the way, consider the following questions:

- How much space do you need to meet your goals?
- Is there enough sun?
- Where is your water access?
- What type of soil is on site?
- Is the site secure?

Briefly answer the above questions. Ask help from your teacher if you need it.

4. Plan and Design Your Site: Consider the following elements as you begin the design process. Which ones would complement your garden? Ask your teacher for any clarifications or questions and write in the box below how you imagine your garden. Use the flipchart and markers to draw it.

GARDEN COMPONENTS	DESCRIPTION
Teaching / gathering area	Small clearings with benches.
Fruit and vegetable beds	Raised or in-ground beds; horse trough beds; container gardens.
Annual and perennial flower beds	Butterfly and pollinator garden beds.
Trees and shrubs	Fruit trees, shrubs, and brambles.
Irrigation	Soaker hoses, drip irrigation, overhead sprinklers.
Storage shed	For storing tools, containers, seeds.
Composting area	Compost bins, tumblers, worm bins,
Sink	Washing station for cleaning up hands and harvest.
Special features	Bug hotel, bee condos, pond, bird houses, bat houses, theme beds, etc.

5. Consider Materials: With your new design in hand, consider what materials students and educators will need to make the most of your garden. This includes thinking about both the building and operational phases. Consider the following suggestions and write down your materials:

- If your garden will contain raised garden beds, what will those be made from? Recycled Plastic or Wood?
- Soil
- Fertilizers: Chemical fertilizers may give plants a quick fix, but they have been shown to deplete soil over the long term. Instead, feed your plants and your soil at the same time with an all-purpose organic fertilizer.
- Irrigation: Different irrigation systems are available to suit different garden designs.
- Tools: Since most gardens are designed for one class to visit at a time, the number of tools will usually reflect the average class size at your school. For example: Watering can (3); Hand trowels (25-30); Round shovel (2); Flat shovel (2); Garden hoe (2); Digging fork (2); Drinking water safe hose (1); Garden twine (1 200ft roll); Gardening gloves (25-30); Plant labels (50); 1 wheelbarrow; 1 spray nozzle
- Fencing: School gardens benefit from a secure fence. Wire mesh fencing with wooden or metal posts is usually more cost effective than wooden slat or picket fencing.



NOW YOU ARE READY TO START BUILDING YOUR SCHOOL GARDEN MODEL USING LEGO BRICKS!!

Module 6 // Activity 3 // Annex 2: My School Garden

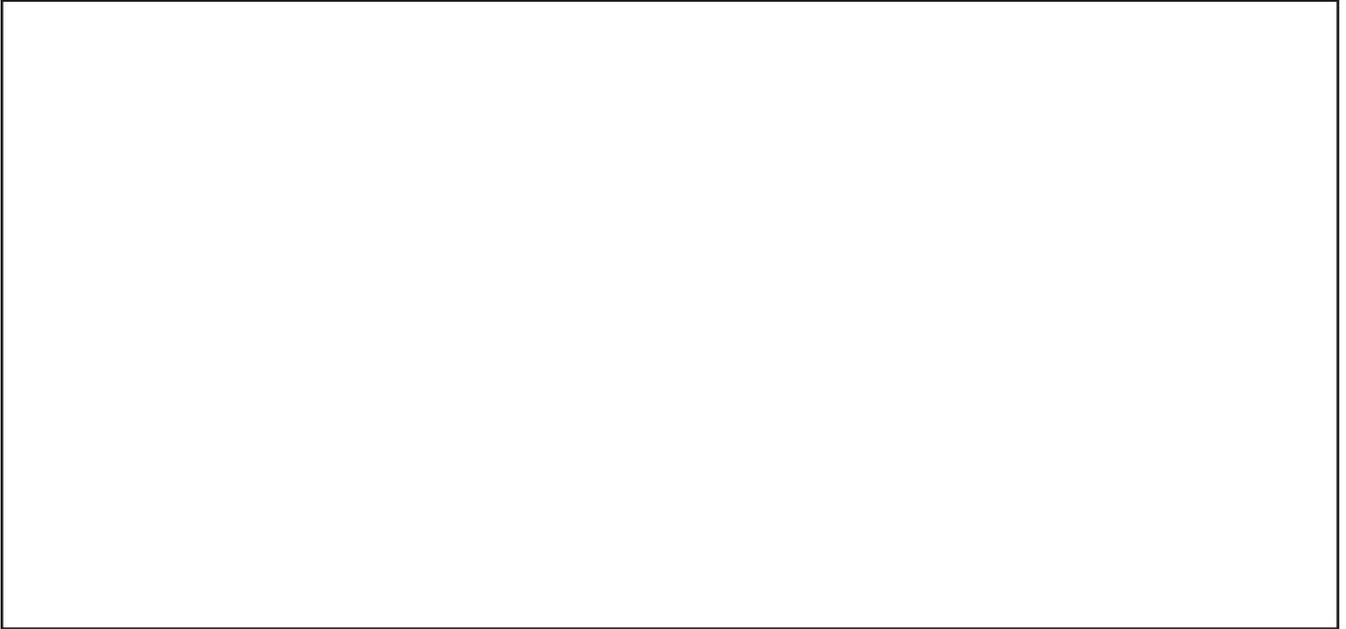


Reflections following the design and building of my school garden

1. What kind of elements did you add to your school garden? Vegetables, fruit trees, flowers? Why did you choose these elements?

2. Do you think that you could use your school garden to learn more about gardening and botany, nutrition, consumer education, and agriculture? How?

3. Describe a lesson that you could take/learn from your school garden. Think about learning in nature, observing with your classmates, using techniques to cultivate your garden, eat the produces, learn where our food comes from, learn how you can live a good life if you cultivate your own food, etc.



4. Do you feel that is important to have your own school garden? Why?

