

Unit 11

Landscape & Climate Change
Adaptation in Education

Plants as partners in the challenge of climate change

SHORT INTRODUCTION:

Too warm, too much particulate matter, too little humidity: plants are particularly important for atolerable climate. They are important partner in the challenge of climate change.

AGE GROUP

6–11 years

TIME REQUIRED

5 lessons
(45 min each)

LINKS TO CURRICULUM

Biology and environmental studies

Geography and economics

Legend

Layout orientation

Head with logo

Unit number

Unit name

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for teachers

for students

references

Phase of the Unit

gaining knowledge

analyzing

creating



Structure

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Plants as partners in the challenge of climate change

Plants are just as much a part of the urban environment as houses and streets, parking lots and bus stops. Plants are essential elements in urban areas with many different important functions. The term “urban green”, which is often used today, goes far beyond trees, shrubs and perennials and refers to plants in all possible forms: privately on balconies or publicly on the grass verges of streets, carefully planned in flower beds or as spontaneous wild growth in disused factories, in cemeteries and soccer pitches, on ivy-covered house facades and railroad lines, on riverbanks or in pedestrian zones.

Plants are a decisive element in both rural and urban areas, they are natural components in ecosystems and people use them as design elements, living building materials, as objects of cultivation and production and much more.

Plants create a positive microclimate and regulate the climate at local and regional level by retaining water and increasing humidity, providing shade, fresh air and helping to build soil, etc. Most of the time plants are able to adapt to different climatic conditions. But they can also suffer — and fall victim — to climate change by being stressed by drought, parasites and natural hazards. These are challenges for humans to protect, support and strengthen plants from climate change in order to create good living conditions for them.

AGE GROUP

6–10 years old

ENVIRONMENT

*Classroom/School Garden/
Surrounding of school*

TIME REQUIRED

5 lessons (45 min each)

LINKS TO CURRICULUM

*Biology and environmental studies:**Comprehensive basic concept:**“Structure and function; control and regulation; variability; material and energy conversion” “Ecology and environment: Development of a basic ecological understanding of energy and material cycles”**Geography and economics:**Comprehensive basic**concept: “Human-environment relationships”*

KEY WORDS

*Green infrastructure,
microclimate, functions of plants,
needs of plants,
analysing landscape*

GOALS FOR STUDENTS

- Students understand the crucial role of plants for the climate and society from the local to the global level. Different plant species have extensive effects on the climate due to their characteristics and traits. Students understand the different effects of grasses, shrubs and trees and their diverse abilities to adapt to climatic conditions.

INTENT

- Interdisciplinary (subjects involved: biology, art & design, language), research-based learning, group work, outdoor explorations; semi-open, self-organized learning (learning circles, station learning, group puzzles, learning workshops)
- The unit uses the students' surroundings and living environment as a field of research and requires active engagement with the topic and critical reflection. Pupils are encouraged to use the knowledge they have acquired to solve the formulated tasks. Systemic development of knowledge and use and linking of this knowledge with other areas of knowledge. The lesson begins with an input (= conceptualization of the role of plants), continues with perception, analysis and design and ends with a joint reflection in class.
- Plants are essential elements in urban areas with many different important functions. The term “urban green”, which is often used today, goes far beyond trees, shrubs and perennials and refers to plants in all possible forms: privately on balconies or publicly on the grass verges of streets, carefully planned in flower beds or as spontaneous wild growth in disused

factories, in cemeteries and soccer pitches, on ivy-covered house facades and railroad lines, on riverbanks or in pedestrian zones.

- There are often more different animal and plant species in small-scale settlement areas than in the immediate surroundings, which are characterized by the large-scale monocultures of industrial agriculture. However, urban green spaces are not only important for biodiversity, but also for people's health: It provides better air, binds fine dust and CO₂ and cools. Plants improve the climate because they provide natural cooling by allowing the water absorbed at their roots to evaporate through their leaves. In this way, street trees mitigate the coming hot summers from which they themselves suffer. The high proportion of sealed surfaces such as buildings, roads and parking lots leads to overheating in residential areas. Greenery in the city is also important for another consequence of climate change. They store rainwater, which is particularly important during heavy rainfall. For decades, the premise was to transport the rain out of the city as quickly as possible, from the roofs and streets directly into the sewage system. Now there is a change in thinking and as much rain as possible should seep into the ground, be temporarily stored by plants and released into the environment as evaporative cooling before it reaches the sewer system. To achieve this, concreted areas need to be reopened, sidewalks made more permeable and more green spaces created. Even a house can be a sponge if the roof is greened. For the simplest variant, a ten centimeter thick layer of growing medium is sufficient. It mainly accommodates low-maintenance plants such as stonecrop and other members of the sedum genus, which can store a lot of water with their fleshy leaves. The next stage is walkable green spaces on rooftops — or vertical

gardens in the form of green façades, which also have a social function as a neighborhood meeting point.

MATERIALS & AID (enclosed)

Info sheets and info cards on the functions of plants

Tokens with different values

- Tokens in different colors, with each color representing a different type of plant. Depending on the function, each token has a different value (points).
- **cardboard box in A2 format and 4-6 cardboard boxes in A3 format**
- Copy template: craft sheets for cutting out the different plants and tokens
- Speech bubbles
- Exhibition “We have needs too” about the needs of plants, 3 posters
- Criteria catalog for inventory
- Instructions for a role play: local council meeting

MATERIALS & SUPPLIES (provided by the school)

- Researcher's diary
- 3 pin boards

Plants as partners in the challenge of climate change

CHALLENGES AND EXPECTATIONS OF PLANTS



Activity 1

Challenges and expectations of plants

The units first lesson is an input on the different functions of the various plants in our habitat and their needs in habitats with changed living conditions due to climate change.



Activity 3

Basic knowledge

In activity three the students learn about the needs of our green partner and possibilities how to support and strengthen them.



Activity 2

Designing and shaping landscape

Based on the information they got in lesson 1 the students transform an empty parking slot into a liveable space by the help of plants.



Activity 4

Analysing landscape

The students analyse their school environment and examine how climate fit it is.



Activity 5

Designing and shaping landscape

In order to improve the climate in the school environment, the students develop suggestions on how they can support suffering plants, where they could plant more plants or how sealed areas could be converted into unsealed areas. As part of an in-depth discussion, the class (or school) could implement some of these suggestions as a school project.



Session 1

**Motivation + acquisition
of basic knowledge**





Aktivity 1

**SCHOOL SUBJECT:**

Biology, Geography

AGE GROUP:

6–10 years

AIM:

The pupils know the different and diverse functions of plants

TIME REQUIREMENT:

25 minutes

MATERIALS & RESOURCES:

1 A2 cardboard box, copy template: craft sheets to cut out, information sheets on the functions of plants, information cards on the functions of plants, 3 pinboards

Plants as a design element and green infrastructure

Methods: Discussion with the help of a model and pocket cards

Description:

The pupils sit in a circle.

The teacher introduces the project and prepares the pupils for the following learning units (see introduction).

After the introduction, one student places the A2 cardboard in the middle of the circle, which represents an empty space, e.g. a parking lot without cars (it should be a landscape from the students' everyday life).

The teacher describes the situation: “Imagine you are standing in this place on a sunny Sunday, July 2023, 2 pm, in the parking lot at 36 degrees. It's as hot as a desert. People avoid standing there.”

A student places a tree in the middle of the square. Another tree, some grasses and three bushes.

Question: What changes do the plants represent? What is different now? And why?

What functions do the plants currently perform in this place?

The pupils are asked to answer, all answers are written on the board.

Now one of the pupils is asked to read aloud the information on the information sheet about the tree. The information is discussed based on the question formulated at the beginning. Then another pupil reads out the information (information sheet 2) about the shrub and then the different functions of grasses, perennials, mosses and lichens (information sheet 3). The class discusses the different functions of the plants and the teacher passes on the additional information from the information cards.

Reflection and summary:

The teacher puts up three pinboards — one for each plant species (1) tree, (2) shrub, (3) grasses, perennials, mosses and lichens. The information sheets are attached to the respective pinboard. In this way, the information about the plants is visible to all pupils.

**Didactic information for the teacher**

The teacher obtains all the information by reading the info cards; in preparation for the unit, around 50 plants must be cut out of the craft sheet and the info sheets on the plants printed out in A3 format.



Activity 2

**SCHOOL SUBJECT:**

Biology, Geography

AGE GROUP:

6–10 years

AIM:

The pupils know the different and diverse functions of plants

TIME REQUIREMENT:

45 minutes

MATERIALS & RESOURCES:

six A3 cardboard, copy template: cut-out sheets, Info sheets on the functions of plants, speech bubbles, tokens with different colors and values

Changing living conditions and discussion

Methods: Model building and discussion

Description:

- Form working groups (3–5 pupils each)
- Each group has the task of redesigning the square with the help of plants and evaluating the value of the new square in comparison to the unplanted parking lot. Each group receives a cardboard box and one of the speech bubbles with tasks such as “There are 20 trees available for your new space. What kind of space can you create with them? Give reasons for your design. Use the tokens and the pocket cards to show the value of your new space.”

Further rules:

- 1 tree, 25 shrubs, 25 perennials
- 20 shrubs
- 10 trees, 10 shrubs, 10 perennials
- The pupils use the information sheets about the functions of the plant and the tokens to evaluate their new places.
- Each group presents their new place and its value.
- Final discussion
- What have we learned?
- Reference to the concept of ecosystem services.
- The planning proposals and models are presented and placed in front of the pinboards.

Didactic information for the teacher

The teacher receives all the information by reading the info cards. In preparation for the unit, it is necessary to print out the A3 card 6 times, cut out approx. 50 plants and the tokens from the craft sheet and prepare the speech bubbles. As an alternative to the paper plants (from the copy template), the pupils can also build their plants with wire.



Activity 3

**SCHOOL SUBJECT:**

Biology

AGE GROUP:

6–10 years

AIM:

The pupils know the different needs of plants

TIME REQUIREMENT:

25 minutes

MATERIALS & RESOURCES:

Information for the teacher (poster with information on the needs of plants)

Exhibition “We have needs too” about the needs of plants, three posters, research diary

Plants also suffer from climate change and we must support them in their fight against climate change

Methods: Exhibition and summary in the researcher’s diary

Description:

- Input: The teacher explains that plants also suffer. He/she explains what needs plants have, why they suffer and what the consequences are if their needs cannot be met. The students also learn how the needs can be met. In addition, there are some measures taken by people or communities to help suffering plants.

Exhibition “We have needs too” about the needs of plants

- Set up three stations in the classroom using the pinboards with the information collected so far in activity 1 and 2: 1) trees, 2) shrubs, 3) grasses, perennials, mosses and lichens
- Adding the posters to the pinboards.
- The students visit the stations and collect information about the needs of plants, stress factors for plants, ways to support plants.
- The pupils have the task of summarizing their findings in their research diary.

Reflection:

- The exhibition can be set up in the school auditorium. The pupils could guide other classes through the exhibition by explaining the posters and the information on the pocket cards with the help of their model.

Didactic information for the teacher

You can get all the information by reading the poster, for the preparation of the unit the poster has to be printed. For this unit, the students need the researcher’s diary.



Session 2

**Mapping of the field
+ analysis, problem
definition**





Aktivity 4

**SCHOOL SUBJECT:**

Biology

AGE GROUP:

6–10 years

AIM:

The pupils know the different and diverse functions of plants and are aware of the condition of the landscape around the school.

TIME REQUIREMENT:

90 minutes

MATERIALS & RESOURCES:

Map of the school grounds, list of criteria, research diary

How climate-friendly are my school grounds?

Methods: City walk & city game

Description:

Input: The knowledge gained from activities 1 to 3 has implications for urban areas.

Plants create a positive microclimate and regulate the climate on a local and regional level by retaining water and increasing humidity, providing shade, fresh air, helping to build soil, etc. Plants are able to adapt to different climatic conditions.

Plants can also suffer – and fall victim – to climate change by being stressed by drought, parasites and natural hazards. Humans face the challenge of protecting, supporting and strengthening plants from climate change in order to create good living conditions for them.

During a tour of the school environment, the pupils apply the knowledge acquired in activities 1 to 3 and carry out an analysis and documentation of the landscape around their school.

They pay particular attention to:

- Ratio/size of sealed and unsealed ground green spaces in the school area and the quality of these green spaces (size, connection to other green spaces)
- sunny and shady areas, in particular: proportion of areas shaded by trees are shaded by trees
- Condition of the unsealed areas:
Number of plants in these areas or size of unsealed areas with large trees, small trees, shrubs, grasses or perennials, green facades
- Plant species on the school grounds
- Type of plants: old or young, native or exotic
- Green facades and their condition: size, connection to the ground...
- Plants that appear stressed
- Indicators that there is already support for stressed plants



The pupils carry out the analysis in small groups. They evaluate the school environment (this can be a street, a park, the school garden...) according to the elements and criteria mentioned above and summarize the result in a short text.

Each group gets an impression of the quality of the landscape around the school and its impact on the local climate. Finally, each group presents its results.



Session 3

**Solution development
+ shaping/reflection**





Aktivity 5

**SCHOOL SUBJECT:**

Biology

AGE GROUP:

6–10 years

AIM:

The pupils develop projects to improve the school grounds

TIME REQUIREMENT:

45 minutes

MATERIALS & RESOURCES:

Role play:

Local council meeting

Agenda for a meeting of the local council

IMPROVING MY SCHOOL GROUNDS, LOCAL COUNCIL MEETING

Methods: Role play**Description:**

- The class convenes a meeting of the local council.
- On the agenda for the meeting are suggestions for improving the ecological value of the school grounds. Suggestions can include planting new plants, supporting suffering plants, creating additional areas for new plants, opening up sealed areas and much more...

Result

- The project with the highest approval rating will be implemented in the school area. This could be a larger project with in-depth discussion during a semester or school year. This could be a strong contribution to the sustainable upgrading of the school environment!

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