



Manual - copy for testing

List of Lessons:

1. What is permaculture? Ethic and design principles
2. Permaculture Analysis – 5 Elements Analysis
3. Permaculture analysis - Sector analysis
4. Permaculture analysis - Functional analysis
5. My school garden as a community garden
6. Small green spaces
7. Indigenous and non-indigenous planting and considering the right plant for the right location
8. Soil, creation and regeneration
9. Composting
10. Waste management
11. Transition - social action
12. Making decisions in groups - Decision making by consent
13. Water in urban environments
14. Bioraznolikost
15. Good economy
16. Wellbeing

What is permaculture? Ethic and design principles

Duration: 2x45 minutes

Introduction to permaculture and presentation of the benefits of the permaculture way of thinking and approach to the analysis and design of different spatial and social situations. An introductory lesson that serves as preparation for all other lessons that come in this program.

Uvod u permakulturu i predstavljanje koristi permakulturnog načina razmišljanja i pristupa analizi i dizajnu različitih prostornih i društvenih situacija. Uvodna lekcija koja služi kao priprema za sve ostale lekcije koje dolaze u okviru ovog programa.

Goal

Getting to know the term permaculture, the context in which it was created, the permaculture approach to solving the social and environmental challenges we encounter.

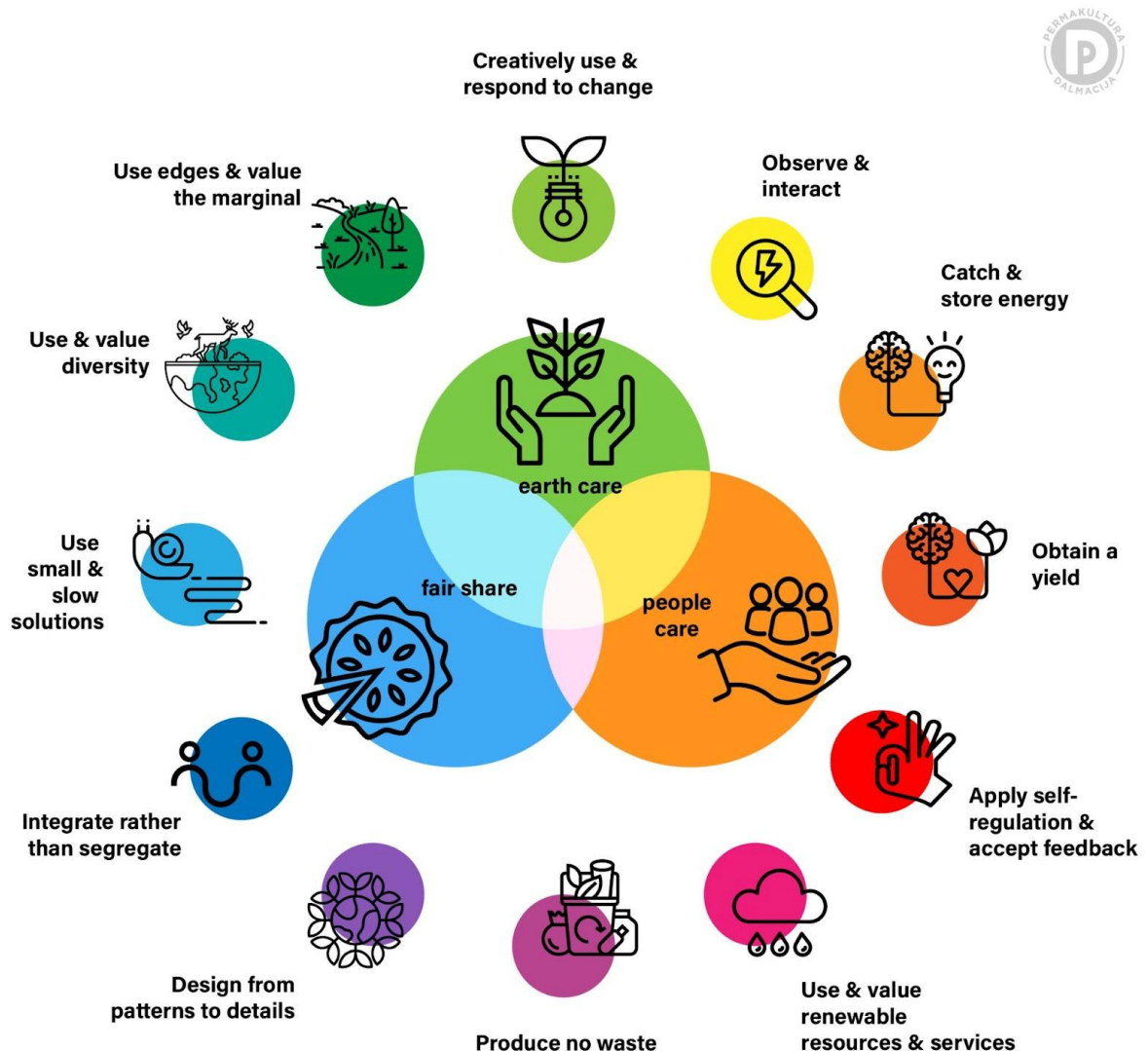
Introduction

Permaculture was created as a reaction to the social and ecological crisis of industrial food production and the unsustainability of exploiting limited resources for the functioning of the global economy. Originally conceived as permanent agriculture due to its holistic approach to the analysis of social reality and the systemic solution of perceived problems, the original name was shortened to include its universality and thus the term permaculture was born.

Since the emergence of permaculture as a new paradigm, various practitioners have found new ways and areas of application as well as new techniques and tools that they used. Thus, permaculture can be applied in different climates, social and political contexts, but also natural and social conditions. Permaculture ethical principles "care for the earth, care for man and fair distribution provide an ethical basis for testing the correctness of practices and actions. Design principles and tools adapt to and respect the different contexts in which they are applied. Thus, permaculture can be used to design and regenerate larger agricultural areas for food production, rural households and communities, but also as a response to specific urban problems. It always includes the personal component of the person or persons for whom it is made and for whom the specific design is intended, without forgetting the impact on the wider community and the world as a whole.

Through a design process with a clear structure of the process, we act in a planned and deliberate manner to meet needs, respecting natural and social circumstances. We strive to achieve a result that meets our needs without neglecting the needs of others who are part of the system we are designing.

12 principles of permaculture design according to David Holmgren.



Learning objectives / Ciljevi učenja

Learn the concepts of permaculture and permaculture design

Get to know permaculture ethics and principles

Gain insight into various applications of permaculture with an emphasis on urban solutions.

Preparation/materials/tools

Blackboard/magnetic board, chalks/markers

Projector and projection screen

Educational cards - Ethics and principles

Step by step/how to

1. Presentation – Origin and concept of permaculture / Permaculture ethics and principles / Positive examples of permaculture in the world (the emphasis is on examples from urban areas and examples in which students participate)
2. Group work - Divide the students into four groups and give each group three cards with one permaculture principle. Each group receives three cards with one stated principle of permaculture ethics.

We choose one or more examples that we presented during the presentation, which we consider to be relevant for the group of students to whom we are addressing, and in which they can clearly recognize the application of permaculture ethics and design principles.

The students have the task of recognizing and explaining how a particular principle was applied when satisfying a need or solving a problem that was stated in the specific example, and how the ethical principles were satisfied.

The representative of each group presents common conclusions and each is discussed and examples of alternative solutions or applications in different situations are given.

Insights from the joint task of recognizing the application of permaculture ethics are compared. In particular, the dichotomies of personal/societal impact, local/global action and private/public good are discussed.

Reflection questions

- What are the environmental and social problems we face?
- What can we do to address these issues? Personally and as a society?
- What is permaculture and how was it created?
- What are the principles of permaculture ethics?
- Where can I apply permaculture in my school and my city?

Nuggets:

https://drive.google.com/file/d/13UGKbs_fbPJwD71JLB2hJFOMwbxAyrSB/view?usp=sharing

Literature:

Bill Molison: Permaculture: A Designers' Manual

David Holmgren: Permaculture: Principles and Pathways beyond Sustainability (ima besplatnih priručnika na internetu na više jezika)

Neki pitki uvod u permakuturu (po mogućnosti linovi na besplatne knjige ako postoje)

Permaculture Analysis – 5 Elements Analysis

Duration: 135 minutes / *Trajanje 135 minuta*

Students will learn about the importance of applying different types of analysis before starting to design. The analysis of 5 elements will be discussed in more detail, which will be approached through environmental observation, but also other forms of data collection, such as the use of maps and online resources and the interview method.

Goal

Emphasize the importance of conducting detailed and complete analysis before starting to design and implement the design. Point out the complexity of the environment and the need to collect data through a simple method that can be useful when designing.

Introduction/background

Permaculture design is the result of a complex process that includes respect for permaculture ethical principles, design principles and the application of specific tools that we use to get a result - a design that is achievable, efficient and meets the needs of the user.

Various methods help us to encompass the complexity of the environment we are designing and not to miss important characteristics for us and for the final design.

The most frequently used tools for permaculture design are 5 element analysis, sector analysis, zoning, functional analysis, designing according to patterns from nature...

The analysis of the 5 elements is useful as a graphic representation of the elements that we find as a method of describing the world as far back as the Ancient Greek philosopher Empedocles, who described the world through four elements: fire, water, earth and air (ether), and he mentioned love as the force that connects the elements.

In the application of permaculture, these elements during analysis represent energy (fire), water, air, soil (food) and, as the fifth element, society.

We analyze not only the existing situation, but also the potentials that the area of analysis offers us, as well as the various needs for which we need the listed elements in order to satisfy them.

It was already mentioned in the previous lesson that permaculture was created as a response to the global crisis, which is illustrated through these elements (5

disasters), and with this analysis, our goal is to respond and offer a solution (both locally and globally) to the established problems

With this analytical procedure, we can reduce all needs to one or more elements, and when performing this lesson, we try to collect as much data as possible, which in the next step we systematize into units that we connect into systems during design.

When conducting the analysis, the following should be taken into account:

Water

– includes terrain analysis, sources (natural and artificial - connections to the water supply system), streams and stagnant waters, rainfall, groundwater and terrain slopes and elements that can collect and store water

Need: water for household and irrigation

Potential problems: disposal of black and gray water

Air

- winds - direction, strength, air flow, air quality, smells

Potential problems: air pollution, noise

Soil

- type and characteristics of the soil, existence of organic matter and biomass, plants

Potential problems: pollution, soil unsuitable for some purpose - for example, gardening

Energy

- connections, sun, wind, biomass, communication and roads

Society/community

- who are the users and with whom they are connected, who is needed for the realization of the goal, neighborhood, animals (domestic and wild animals), organizational structure and relationships, ownership and management

Learning objectives

Getting to know the concept and function of analysis.

Getting to know the concept of 5 element analysis.

Understanding the purpose of conducting the analysis.

Learning to apply the analysis of 5 elements on a concrete example.

Preparation/materials/tools

Blackboard/magnetic board, chalks/markers

Projector and projection screen

Table for entering insights

Step by step/how to

A. Needs analysis (45 minutes)

Goal: Determine what we need in order to realize the goal we have set (the goal can be the establishment of a school garden, a vertical garden or the establishment of a school cooperative)

Question for students: What all needs to be ensured in order to successfully achieve our goal and ensure its functioning?

The participants (divided into groups of 4-6 members) write down on a common sheet of paper a list of needs and conditions that they consider essential for the realization of the goal and the successful performance of the function of that goal.

Briefly present the topic of the lesson - analysis of 5 elements and draw a "permaculture flower" on the board, in the petals of which we write 5 elements (we leave the middle of the flower empty for now and use it at the end of the lesson to repeat permaculture ethics).

The representative of each group presents the terms that they wrote down together, and in communication with the other students, we write them down next to the petal (or more) to which the term refers). In this way, let's record all the concepts/needs presented and try to think together if there is something we missed to mention. (In the preparation of the lesson, it is necessary to make a detailed needs analysis and add to the student's suggestions)

We conclude that we have made a needs analysis, which we have grouped according to 5 elements that we will further analyze on the very field we want to design.

B. Field analysis (45 minutes)

Goal: Getting to know the terrain we want to design and using all the senses to gather information from the space.

If there is a possibility, we go out to the field that we want to design.

Before going out into the field, we enter the grouped needs from the previous exercise in the needs section of the table, which is organized so that each of the 5 elements has three sections: needs - situation on the ground - potentials/obstacles.

The students are divided into groups and in the remaining sections of the table (prepared paper version) they enter the data they observe in the field. Although the needs themselves and the name of the element itself will direct the attention of the students to look for things and phenomena that respond to the needs, we give the instruction to enter as much information as possible obtained by all senses (sight, hearing, smell, touch) during the analysis. On a separate sheet, students draw a map of the terrain and draw what they have observed with a legend and comments.

We introduce the students to other ways of gathering information, such as reading maps, analyzing data such as sunshine and rainfall, wind rose, and interviewing people who can provide us with useful information that we cannot obtain by our own insight.

C. How to meet needs in a real environment? (45 minutes)

Goal: Comparison of needs with the situation on the ground and determination of which can be met under existing conditions and which can be met with additional activities and the introduction of additional elements.

We analyze the collected data in such a way as to mark in green the ones that are useful for satisfying certain needs and combine them with the need they satisfy. For those needs that we do not have elements with which we can satisfy them, or for which we determine that there is a problem for its satisfaction, we propose solutions using the existing situation on the ground or introducing new elements. In the "potentials/obstacles" column, we write down what we have observed and indicate how we will use a certain potential or find a solution for a certain obstacle.

Reflection questions

- Why is it important to set clear goals?
- Why is it important to identify needs?
- What is analysis and what kind of analysis can it be?
- What is the 5 elements analysis for?
- In what cases can I apply the 5 element analysis?
- What would happen if we started implementing the design without conducting an analysis?

Nuggets:

1. https://drive.google.com/file/d/1cXkKh33A0cbtlfve2J9XtfxQJIsMM_vZ/view?usp=sharing

2. <https://drive.google.com/file/d/1Yrh1iMlIW-dw15ZPdSKCzGZpyvECROVg/view?usp=sharing>

Permaculture analysis - Sector analysis

Duration: 90 minutes / Trajanje: 90 minuta

Learning sector analysis and its importance before the design process in order to get to know the space we are designing better and to offer solutions to design elements that effectively match our wishes and needs.

Goal / Cilj

Carrying out a sectoral analysis that allows us a graphic and visually clear presentation of the impacts that we can expect on a certain area that we design - whether it is about desirable or undesirable impacts.

Introduction/background

Sectoral analysis is a tool used in permaculture as part of the information gathering process used in design. It is supplemented with other analytical procedures, such as the analysis of 5 elements mentioned in the previous lesson in a way that gives us additional information about the direction of influence of various natural and social phenomena from the environment on the selected space that we want to design.

Before conducting the sectoral analysis, we select a reference point in space (or a certain, not too large, area of space) for conducting the analysis. The analysis can be carried out for several points in space if the space we are designing requires it.

From the selected point, we observe all the external influences that act on it, and they are important because they affect the future use of the space. We look at the impacts from all directions, which means that the analysis area covers a full circle of 360 degrees around the reference point. The influences themselves can come from one or more directions as well as from a wider area.

Influences are recorded (and most often visually displayed as lines or slices of a circle) in that part of the circle from which they influence the observed area.

Influences can be:

- The area of influence of the summer and winter sun.*
- The area of influence of each individual wind from the wind rose.*
- Direction of air, water or erosion pollution.*
- Direction of noise pollution.*

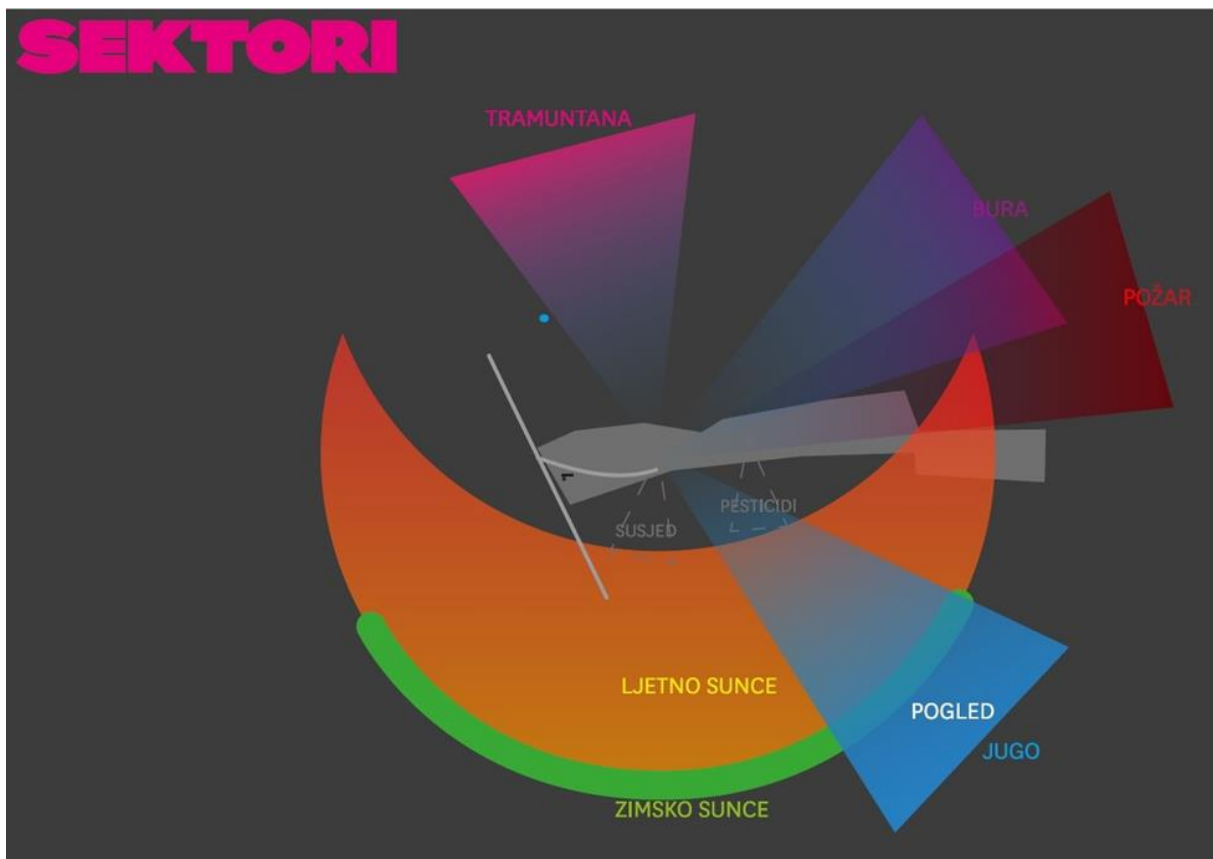
- Direction of water entry.
- Direction of movement (approach) of animals, birds, insects.
- Direction of approach of people and vehicles.
- The direction of fire danger.
- Area of desirable or undesirable view.
- ...

Sectors of influence are also considered to be all external influences that cross the observed space (regardless of the point of observation), which can be a road/road that passes or a stream that flows through the space we are analyzing.

In order to be able to best use the information gathered through the sector analysis, it is necessary to know what we want to use the space for and what conditions are necessary and desirable for that.

We leave those influences that we consider desirable and want to continue to use their positive characteristics to work or even encourage them and open up to them by removing obstacles to their influence. We want to remove unwanted influences or at least reduce their effect, so we create obstacles to their effect with design elements.

Sector analysis helps us when deciding where and which design elements to place in the space.



Learning objectives

- *Encourage observation and research of the natural and social impact on our plans.*
- *Familiarize yourself with the sectoral analysis and the method of its implementation*
- *Recognize the importance of knowledge about external influences on the area we are designing*

Preparation/materials/tools

A4 or A3 paper or terrain map

List of influences

Crayons

Ruler and compass

Compass

Step by step/how to

Sectoral analysis can be carried out in the classroom or on the field that we are analyzing.

When conducting the analysis (in the field) we use all the senses: sight, hearing, smell, touch and/or information that we can get from sources such as the Internet, various applications or literature (atlases, encyclopedias, geographic and other maps). People who are familiar with the terrain we are designing can also be a source of information.

As an introduction to the exercise, we introduce students to the concept and purpose of sector analysis and define the task of the exercise - identifying and mapping sectors for the selected field.

- 1. The exercise begins by selecting the terrain, preparing or drawing a terrain map and defining the geographical position*
- 2. We draw a reference point on the terrain map*
- 3. Share the list of influences (sectors) and the task is to draw them on the prepared map*
- 4. Sectors that are recognized by the senses are drawn on the map*
- 5. Sectors that need to be explored through other sources (summer and winter sun, winds...) are drawn on the map.*

6. *We define which sectors we cannot recognize/map due to lack of information - we discuss how we can get to the source of this information*
7. *We ask the question if there is another important influence that we have not mentioned*
8. *When we determine that we have counted all the impacts we remembered, we discuss the desirability of each individual impact on the purpose and way of using the terrain*
9. *We provide suggestions on how to act on established impacts and concrete solutions and elements in the space with which we act on concrete impacts.*

Reflection questions

- *In sectoral analysis, what do we call external influences on the space we are analyzing?*
- *Why do we conduct a sector analysis?*
- *Why is it important to learn about influences?*
- *What are the methods of carrying out sector analysis?*

Nuggets:

<https://www.youtube.com/watch?v=3p2Rqm68ACA>

Permaculture analysis - Functional analysis

Duration: 45 minutes

Each element that is part of the design has its own function, which is why we integrated it into the design and placed it in a specific position in it. In this lesson, we will familiarize ourselves with the function that a certain element in the design performs and what is necessary for its efficient functioning by applying functional analysis.

Goal

The goal is to get to know the complexity of the system, each individual element in the system and its connection with other parts - elements of the system. By analyzing each element, its function, characteristics, needs for its functioning and the outcome of its action, we get useful information about how to find the optimal place for it in the system we design in order to achieve the best possible results with the least possible expenditure of resources and energy.

Introduction/background

The principles that guide us when designing are:

"Let one element perform several functions" which achieves efficiency and practicality and "Let essential functions be performed by several different elements" which is important for the safety and resilience of the system.

To be able to do that, we have to analyze the elements.

Each element has its own function, which is why we put it in the system. A garden bed is an element that represents the place where we will plant vegetables, a fruit tree allows us to get fruit trees, a faucet allows us to have a source of water... We meet the needs of users by planning elements that allow us to meet those needs. But often, when planning, we limit ourselves to only one, basic need that an element satisfies, and we don't take into account others that can also be fully or partially satisfied.

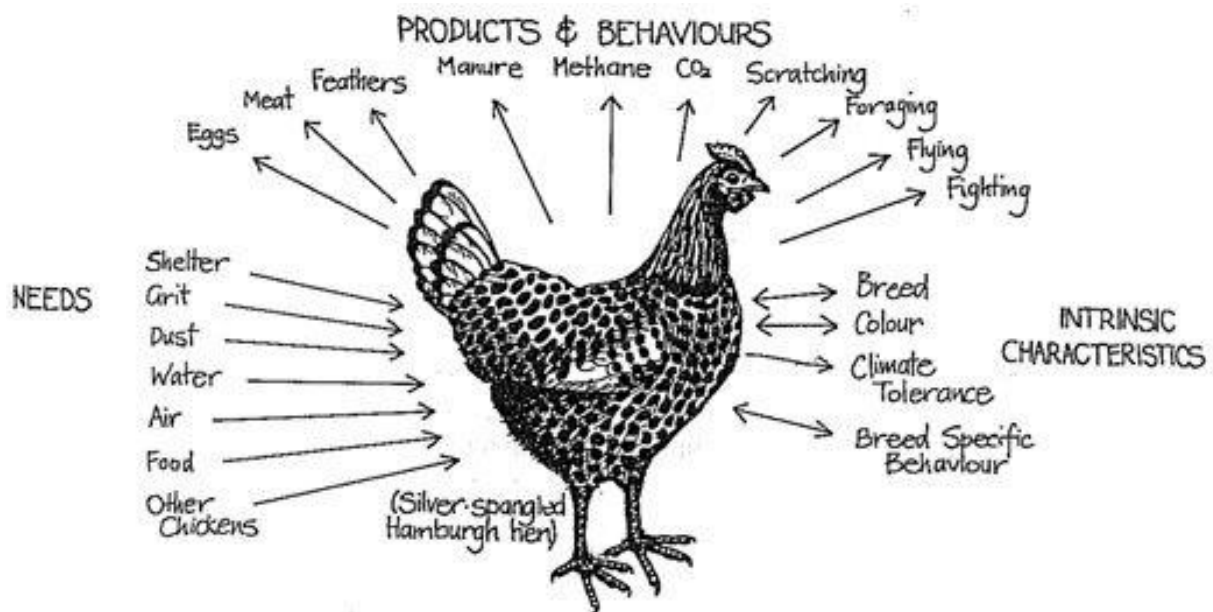
In order for the element to perform its function successfully, it is necessary to ensure certain conditions, the garden bed (a place for planting vegetables - the aim is to grow vegetables) must be favorably positioned towards the sun and winds, the soil must be of good quality with enough organic matter, so that plants need to be provided with enough water and nutrients to thrive...; we think in the same way when planting a fruit tree and when installing a faucet, which should be connected to a water source and should be practical and accessible...

When we think in this way, and list in detail all the conditions, needs, inputs that a certain element needs, we reduce the chance of not providing everything necessary for its optimal functioning and performance of its intended function.

Each element has its own peculiarities that affect both its needs and the result of its action, and these characteristics should be taken into account when choosing an element. It is important to know which breed of animal we will choose, which variety of vegetables to plant or choose a machine with different technical characteristics.

The waste that remains of one element can be a resource for the functioning of another. For example, we need kitchen and garden biowaste and paper waste from packaging for the functioning of the composter. Therefore, it makes sense to position the composter not far from the source that provides it with the raw material for work and also near the garden bed where we will process the produced compost.

Let's apply this logic of thinking when designing, and the information gathered through functional analysis helps us to establish the most efficient network of relationships and connect elements in space by connecting processes into logical chains.



Learning objectives

- Recognizing the needs, characteristics and function of individual design elements.
- Gaining insight into the complexity of the system.
- Recognizing connections between different elements of the system.
- Connecting elements for system optimization.

Preparation/materials/tools

Blackboard and writing utensils

Step by step/how to

1. We select the element that will be the subject of functional analysis.
2. We invite the students to tell us what we can get from the specified element (its function)
3. We ask them to tell us what is necessary for its functioning
4. And what are the characteristics/specificities of that element
5. We write down all the information on the board according to the example of the "permaculture chicken" illustration.
6. We select one element in the chain before and after the analyzed element and repeat the analysis on them
7. After we have three connected elements, we indicate other connections and the possibility of branching in different directions and further in the chain
8. At this point, let's present this method as a functional analysis tool and explain why functional analysis is important to us and what the obtained results are for.
9. Let's compare the system we are designing and the individual element and element assemblies as well as their position in space and in the system

Reflection questions

- What is a system element?
- What is a function?
- Why do we want one element to have multiple functions in the system?
- Why do we want more elements to perform important functions?
- How do we connect the elements in the system?

Nuggets:

<https://drive.google.com/file/d/1IIG11vkEcULLRlIrcIfqeMIsnJ0ziI09K/view?usp=sharing>

My school garden as a community garden

Duration: 90 minutes

In this lesson, students will learn about the concept of urban community gardens and how such gardens function in urban environments. How an urban garden is established and what are the possible forms of an urban garden with regard to its purpose and management method. The social aspects and function of urban gardening and its role in community building will be specially addressed. School open green spaces will be considered as sites for school/community urban gardens. The urban garden as an element of urban green areas will be analyzed through the prism of permaculture design, both in the analysis segment and in the elements of which it consists and their arrangement in space.

Goal

In this lesson, students will learn about the importance of school urban community gardens and the procedures essential for their establishment, management and participation in its work. They will be encouraged to join existing or establish new gardens and to connect with fellow students from their own and other schools as well as with the community (teachers, professors, parents, neighbors) that is part of or connected to their school. In all this, they will be encouraged to approach the problem from the position of a permaculture designer.

Introduction/background

In modern urban environments, citizens are faced with a lack of green areas suitable for rest and recreation. The global context of climate changes that lead to extreme climate events are particularly reflected in cities with special microclimatic conditions. The establishment of urban gardens answers several problems - by using existing or creating new areas, the city area, and in this case the school area, is used meaningfully for the purpose of green areas for food production, physical activity and socializing outdoors. Elements such as the quality of the space are improved - the aesthetic dimension and new functional green spaces, the improvement of soil quality - through the biogardening approach to soil renewal, the air quality and microclimate characteristics of the space are improved - through the planting of different plant species, the rainwater resource is absorbed and used, applied waste is reused through composting and upcycling methods, and social life is encouraged through the organization and self-organization of the school collective in participating in the work and management of gardens, and in general, efforts are made to reduce the ecological footprint.

Urban school gardens are a kind of polygons where all the benefits mentioned above can be realized and further promoted.

Successful practices of urban gardening can be found today in many European and world cities, and examples of models that should be analyzed and applied in the local context are given.

Learning objectives

Getting to know the concept and function of an urban garden.

Getting to know the problems that can be solved through the various functions of the urban garden.

Recognition of different models of use and management of the urban garden.

Awareness of the social component of self-organization and participatory decision-making.

Pointing to alternative forms of use of school spaces, especially green areas.

Learn how to apply a permaculture approach to urban gardening and urban gardens.

Preparation/materials/tools

Blackboard/magnetic board, chalks/markers

Projector and projection screen

Map of the school where education takes place (or some other location).

Photos of potential garden locations.

Literature on urban gardens - qualitative research based on user experiences.

Poster with a list of five elements analysis. (it is not bad if it is available during the entire course)

Papers, pencils and crayons.

Links to literature and literature on gardening, urban gardening and the organization of urban gardens.

Field work (2 hours)

A trip to the school's urban garden - if it exists and is available to visit.

Step by step/how to

A. **Presentation on good practices of urban gardening** (45 minutes)

Objective: To show the contexts in which urban gardens are created and to illustrate how urban gardens look and function in different cities. Different definitions of urban garden and different uses and groups of users are presented.

Before the start of the presentation, a question is asked about the benefits of community gardens, and the answers are written on the board, then during the presentation they are illustrated with examples and supplemented with other benefits:

- contribution to local self-sustainability - preservation of biodiversity - promotion of organic food cultivation - contribution to the preservation of local varieties and food sovereignty - reduction of the ecological footprint (personal and collective) - mitigation of the heat island effect - contribution to the restoration of the hydrological cycle - availability of healthy food - promotion of healthy eating and healthy eating - education - development of ecological awareness and worldview - personal development - contribution to a healthier environment - contribution to a more beautiful and richer image of the city - place of rest and recreation - encouragement of physical activity - improvement of psychophysical condition - connection with nature - development and strengthening of community and civic solidarity - therapeutic and rehabilitation dimension - inclusion of marginalized and vulnerable groups - inclusion of individuals with special needs - identification with space - development of a culture of cooperation and participatory decision-making

B. Visit to a school urban garden or a school location suitable for an urban garden (3 hours)

Objective: To see how an urban garden works in practice / the potential of space for the establishment of an urban garden.

B.1. A visit to the urban garden that includes communication with the manager of the urban garden and a presentation of the management and work organization model applied in the garden. A tour of the garden with a presentation of the elements that make up the garden and the activities/programs that take place in the garden. The visit also includes a conversation with to some of the users of the garden (students and school staff), through which participants will be introduced to the experiences of participating in and working in a community garden.

Optionally, participants can participate in some of the work activities that take place in the garden or participate in the preparation and consumption of meals if such an opportunity exists.

B.2. A location in one's own school that has the potential to become a school urban garden is chosen and the location is visited in order to analyze the possibilities for the establishment of a school urban garden. (It is necessary to have several locations in preparation, from which one is chosen for this activity). The location is analyzed with the tools offered by permaculture (see the lessons Analysis of 5 elements, sector and function analysis).

C. Reflection on the study visit (45 minutes)

Based on experiences and recorded data (notes from visits to the garden/location and pre-recorded list of useful functions of the urban garden) and analysis of 5 elements,

participants conclude which of these benefits and to what extent the cut example satisfies. Also, based on the location plan/draft, the participants list the elements they would include and argue the locations of the elements and the connections between them. In particular, relations between users of the garden and ways of involving the wider community are analysed.

Reflection questions

- Why are community gardens important in urban areas?
- Why is the social component of urban gardens important?
- What is the current use of areas that could be a school urban garden?
- Do I want and do I have the opportunity to participate in the work of the existing urban garden?
- Do I have the possibility to participate in the establishment of an urban garden?
- What would happen if an urban garden were established in my school?
What benefits would I get from it?

Literature: Gardeniser - <https://gardeniser.eu/en>

Small green spaces (yards, balconies...)

Duration: 2 hours

This lesson will cover the topic of implementing permaculture practices to design and create small green spaces in an urban environment. The students will ascertain that even the smallest spaces in urban environments can be used to grow food.

Goal

The goal of this lesson is to have the students learn how to apply permaculture analysis and tools in creating a productive green spaces on a small areas as yards and balconies. They will find out possible solutions for growing food in small urban areas.

Cilj ove lekcije je da učenici nauče kako primijeniti permakulturnu analizu i alate u stvaranju produktivnih zelenih površina na malim površinama kao što su dvorišta i balkoni. Saznat će moguća rješenja za uzgoj hrane u malim urbanim sredinama.

Introduction/background

The usual approach to growing food implies large fields or at least gardens of a minimum of 100 square meters. However, we do not need a big backyard or a giant greenhouse to have a successful garden. Some of the highest yielding gardens produce delicious fruits and vegetables from a small space, even in urban environment.

All that is needed are some design skills, imagination, tools and materials. Everything from vertical gardening to intercropping can multiply your growing space. Even a small sunny area on a balcony or patio can make a great space to grow plants.

However, there are several important points to keep in mind when growing food in a small area. Analyzing the area and making a design should be the starting point.

Ground cover

Small yards can be covered in soil (grass, weeds). In this case, it is necessary to inspect the depth of the soil as in urban environments because the green areas are often just a thin layer of soil over gravel or concrete. Soil depth can be easily identified by observing the vegetation on the plot. Some plants are deep rooted and some are shallow. If you can identify deep-rooted plants that means there is enough soil to start growing food directly. If the soil is shallow, it may be best to plan raised beds or containers without the bottom.

In most cases however, the spaces are covered in concrete or tiles and therefore there is no other way to grow food but in containers.

Water

These small urban spaces can be sensitive to excess water due to insulation. It is important to take care of drainage in the containers so that any excess water, which is gathered or led away from the surface, does not cause damage. Inspect how much water each plant needs not to overwater them and make good drainage if they do not like moist soil. Plan to save water as much as possible - use the local resources and recycle water from the sink or AC, for example.

Sun and daylight

Apart from soil and water, plants need sun and light to grow. Small spaces in the urban environment may easily suffer from lack of sun and light. Observe in detail how many hours of sun and how exposed to light is the space you plan to make green. In each case, we have to design accordingly and differentiate the heliophytes (plants that need plenty of light) from the sciophytes (plants that can grow in shade or part-shade).

Figure 2: Heliophytes and sciophytes graphic

Air pollution

We should take special care of the air quality in the area where we plan to grow food in an urban environment. It is ideal to be at least 100m from any larger roads / highways, or to be higher than the third floor. In addition, not all plants draw pollution to them - some can even be used as barriers.

Figure 3: Absorption of heavy metals table

Making the best of every square meter

Incorporating vertical gardens into this concept is very useful to create and use more space. Stacking plants near one another can also be needed in this case - this is why it is important to take special care of companion planting when growing food in small spaces. In addition, it is clever to pick vegetable species that grow quickly and are picked as they grow (like cress salad, chives, nasturtium etc.)

Tips for Maximizing Your Space

Companion Planting

Companion planting is the planting of different crops in proximity for any of a number of different reasons, including soil health, mutual physical support and protection, pest control, pollination, providing habitat for beneficial insects, maximizing use of space, and to increase crop productivity. Companion planting is a form of polyculture. By combining plants that complement each other, we can create diverse beds and significantly increase the amount of food grown per unit area.

Choose Compact Varieties and Avoid Space-Hogging Crops

Each variety of carrot, broccoli, cabbage, or any other crop can come in a range of sizes. Small varieties are often labeled as “miniature”, “baby”, or “compact.” Choose varieties that do not take up a lot of space or have an aggressive growth habit.

Use Succession Planting

Succession planting means growing several seedings of a crop in a sequence throughout the season. Instead of growing one crop of carrots, you might grow spring, summer, and fall carrots. The key to successful succession planting is planning.

Don't Forget to Prune

Pruning is one of the ways to maximize your harvests in a small space. Un-pruned crops like tomatoes, strawberries, and cucumbers can take up way more space than necessary. It encourages the plant to grow more fruit instead of putting its energy toward leaf growth.

Don't Forget the Borders

There is a key principle in permaculture design called "use edges and margins of value". Whether you have a fence, wall or narrow beds, you should make the most of the edges of your garden.

For example, you can create perennial beds for companion planting along the edge of the garden. Plants like lavender, rosemary and perennials can help pollinate your crops and control pests.

Types of Small Space Gardens

Raised Bed Garden / Povišene gredice

<https://homesteadandchill.com/raised-garden-beds-pros-cons/>

<https://balconygardenweb.com/raised-bed-gardens-for-balcony/>

<https://www.apartmenttherapy.com/patio-garden-ideas-167221>

Vertical garden / Vertikalni vrtovi

<https://i.pinimg.com/564x/42/15/4b/42154b29f45ce1899f031d00568926ee.jpg>

<https://i.pinimg.com/564x/2f/53/c9/2f53c9ae16d9ce200e5093ba5daf2e54.jpg>

Balcony Garden or Windowsill Garden

Vrt na balkonu ili prozorskoj dasci

https://air-grow.com/wp-content/uploads/2021/10/Balcony_garden_designs-1-845x684.jpg

<https://modernfarmer.com/2018/12/4-tips-for-setting-up-a-windowsill-garden/>

Learning objectives

Knowledge

- To understand the prerequisites and possibilities of growing food in the smallest urban spaces.

Competencies

- To learn to identify and analyse the existing conditions of the small space which will be designed into a green space.

Skills

- To gain knowledge on how to design a small green space.

Preparation/materials/tools

- Tape measure
- Paper
- Ruler
- Pencils, pens, crayons
- Square foot garden planner
- List of companion plants

Step by step/how to

Plan how your balcony/terrace/yard will become food-productive

1. Prepare at least one floor plan and cross section of a balcony/terrace/yard. Draw in the windows, fence, walls and any existing elements on the balcony.
2. Take photos of the chosen space.
3. Analyze the chosen space with the learners - implement a 5 elements analysis and sector analysis.
4. Distribute the learners into groups.
5. Hand out blank floor plans to each group.
6. They have 30 minutes to make a basic design of the space with sketches showing containers with plants. They should also research/think of a variety of plants they would include in their small gardens. What containers will they use, will they harvest and recycle water somehow?

or

1. Start with a piece of paper that outlines the space.
2. Take measurements of the entire area and imagine different layouts.
3. Imagine your garden into 3-4 different zones.
4. You may have zones for annual vegetables, perennial herbs, and ornamental flowers.
5. Decide if you prefer rectangular, square, or other-shaped beds.
6. A small backyard may be perfect for elongated rectangular beds.
7. Measure out your pathways based on how much access you'll need near your beds.
8. Find areas where you can incorporate vertical or container gardening techniques.
9. Weigh out the different layouts and choose what gives you the most square footage.

Reflection questions

- Why is it important to make small urban spaces green?
- What are the benefits of small urban green spaces for people and the planet?
- Can you create a small green space in your school/ home?
- How could that affect your colleagues or family?
- What can you grow in a small green space?
- What is important to keep in mind when designing a small green space?

Indigenous and non-indigenous planting and considering the right plant for the right location

Duration: 3h theory + 1h practical work

Right plant, right place!

The "right plant in the right place" principle can prevent many common ecosystem problems and potentially reduce maintenance requirements of green areas. Different plants have different growth requirements and not every plant is suitable for every place, especially in an urban environment where different elements of urbanization and nature interact. Not all plants are suitable for planting in your area, find out what is indigenous to your area or compatible with growing conditions in your region.

Analyze with the students the environment of the area where you live. Introduce them to indigenous plants and the possible negative consequences of choosing a non-indigenous, invasive plant.

Goal

The goal of this lesson is to increase the learners' ability to choose a right plant and location for planting depending on how the plant interacts with its surroundings. The learners will also gain insight into the importance and consequences of planting indigenous and non-indigenous plants.

Introduction/background

Each location where a new green area is planned has its own requirements and not every plant is suitable for every location. Planting should be done by first analyzing the environment and its needs and choosing the plant accordingly. It is very useful in the design to put everything on paper (floor plan and section) in order to get an overview of the possible positions of the plants and their mutual relations and relations with the environment. The goal is to create a landscape that sustains itself, its natural environment and the people who manage it. Such a landscape is in harmony with its environment, with plants and microbes, soil and air working together as a harmonious, self-sustaining unit that requires minimal inputs of nutrients and labor.

Surroundings

The first and perhaps the most important choice when designing a green space is: will it work with the environment or against it? We can try to grow what we want, regardless of the natural and domestic conditions of the garden, or we can choose plants and cultivation methods that suit the environmental conditions (both below and above ground).

It is best to start by understanding what is happening around the area where the plants will be planted: is it close to a road / street / sidewalk, is there concrete or asphalt nearby and how big is the lot. The type of plant we use can greatly affect the space we plant it in, which means we need to have good reasons for every plant we decide to make part of our urban environment.

It is necessary to connect the garden with the surrounding natural areas by using plants that attract, provide shelter and feed local insects and animals, and to create plantings that have multiple purposes and functions.

Perennial / seasonal

Depending on the purpose of the urban green space, the available resources and the existing needs, as well as wishes that are to be met, can guide you to choose between perennial or seasonal plants for any given location. Of course, it can also be a combination of both and it mostly depends on who will be caring for the plants and what is the long-term plan for the location.

Annual plants are plants that complete their life cycle in one growing season. If you want to grow the same plants again next year, collect their seeds. Many edible plants such as vegetables and herbs are annuals, so annuals are an essential part of your vegetable garden or herb garden.

Annuals are the perfect plant for containers and smaller enclosed areas. With only a short growing season, it is unlikely to outgrow the container and require repotting.

Perennials are plants that grow and produce fruit over several growing seasons. Plant them once, and depending on the crop, they can live anywhere from two years to a decade.

Perennials play an important role in soil health. Since they do not need to be replanted every year, soil disturbance is minimized and soil organisms thrive. Perennials have extensive root systems and store carbon deeper in the soil where it is more stable. In addition to sequestering carbon, perennial plants can help increase water-holding capacity and reduce soil erosion.

(picture of erosion i.e. showing the root system under the ground and how it prevents erosion)

Evergreen / deciduous

When it comes to deciding whether the plant should be evergreen or deciduous, again a combination of both can be chosen. However, we should clearly know what we want the green areas to be. Evergreen plants, because they reach high, will provide shade throughout the year. However, in some other cases, we may need a deciduous plant to get more sunlight in the colder months. In smart passive design, evergreens are generally planted in the north to act as windbreaks, while deciduous plants are planted south or west of buildings, gardens, parks, etc.

It is best to have a healthy mix of deciduous and evergreen trees in your yard. Deciduous plants offer beautiful fall foliage and good shade when fully grown. Evergreen plants provide privacy and act as wind protection for years.

Figure 1: Example photos of evergreen and deciduous plants

Size and shape

When considering plant size, we need to plan ahead. The development and growth of the plant below and above the surface should be taken into account. By densely planting plants that develop large roots or crowns on a small surface, the plant will not have enough space for its development and will "crowd out" other plants planted nearby. If we plant a young tree, we should know that it will grow, be taller and wider. Plant future larger trees far enough apart from each other so that they have room to grow, and you must not plant them too close to buildings and roads. Also, smaller trees and fruit trees need space for the development of the crown, and their crown can make it impossible to pass along paths or to other elements.

Figure 2: Various sizes and shapes of canopy sketch

Figure 3: Consequence of the wrong plant choice

Indigenous / non-indigenous Autohtono / neautohtono

Observing the environment, we can easily recognize which plants have always existed there - they are called autochthonous plants. These plants adapt easily once planted as they are accustomed to environmental conditions and are able to withstand local weather conditions including winter cold and summer heat. Also, they may not need as much care as other plants once they are well established and growing. They are resistant to most pests and diseases. All these features mean that native plants meet the sustainable needs of today's urban gardener.

On the other hand, we can notice non-native plants everywhere. Sometimes they turn into invasive species that are difficult to get rid of once they start spreading. This is an important reason to think carefully before planting a non-native plant. However, sometimes it can even be beneficial to introduce new plant species into the environment because they can have beneficial effects. In this case, we must be sure that they are not invasive and that they will not aggressively interfere with the existing environment, creating an imbalance.

Consider integrating "volunteer" seedlings of native plants (plants that grow wild in the area and are often considered weeds), rather than indiscriminately weeding them out. Conversely, avoid planting non-native plant species that could invade and disrupt nearby natural areas.

Choose variety

Use a wide variety of plants that complement and balance each other horticulturally and decoratively. Include a variety of trees, shrubs and perennials to provide structure and plant them with a number of edible and ornamental annuals to increase variety and yield. Combine nutrient-demanding plants (such as tomatoes) with nitrogen-accumulating plants (such as legumes) to balance and restore soil fertility.

Figure 4: Examples of successful and self-sufficient urban gardening

Manage natural processes

Create a compost pile for spent vegetation and uneaten produce to return their nutrients and organic matter to the soil. Mulch with beneficial additives and fertilize with organic materials that support beneficial soil microbes and increase organic matter. Disturb the soil as little as possible to maintain its structure and to avoid bringing buried weed seeds to the surface to germinate.

Keep the "good" insects at bay by using plants that attract them. Cut back native perennials in early spring, not fall, to provide food for birds, protection from erosion and shelter for beneficial insects.

Learning objectives

- To learn about the local flora.
- To gain knowledge of various specifics of different plants.
- To gain the ability to analyze a location from the perspective of whether it can be improved by the introduction of new plants in the area or not.
- To learn to design urban green spaces based on a thoughtful choice of plants.

Step by step/how to

Make an herbarium

1. Take the learners for a walk in your immediate surroundings
2. Pick as many plants as you can find into paper bags (leaves and stems, for trees only leaves)
3. Identify the plants using books, apps or others. Identify if they are indigenous or non-indigenous.
4. Find out as much as you can about the plants and write it down
5. Put them between sheets of newspaper
6. Press them in a book together with the paper with the name of the plant and description
7. Leave the plants to flatten and dry in the books for a week
8. Arrange them into an herbarium

or

1. Take the learners for a walk in your immediate surrounding
2. Make a sketch of a area with all elements
3. Identify all the plants that already exist
4. Identify the plants using books, apps or others. Identify if they are indigenous or non-indigenous.
5. After analysis write down which plants, where and why would be desirable to plant to improve and ennoble existing conditions

Reflection questions

- Why is it important to analyse the location and its characteristics before planting?
- What indigenous and non-indigenous plants grow in your area?
- What important characteristics of plants should we consider before planting?
- What effects can plants have on an existing or planned urban green space?
- How do non-indigenous plants affect the environment?

Soil, creation and regeneration

Duration: 2 hours

This lesson is about soil, its importance to micro and macro ecosystems, and tools for building and regenerating soil.

Goal

The aim of the lesson is to explain the importance of healthy soil, soil conservation, and soil construction, and to point out the methods and ways of building healthy soil. Both in urban conditions and in gardens and larger areas

Introduction/background

Healthy soil is the basis

of all life on the terrestrial part of the Earth. Just as important is the health of the soil on the agricultural areas where we grow food, it is just as important in forests, uncultivated areas and in urban conditions.

Without healthy soil, there are no healthy plants, neither in parks nor in forests or on agricultural land. Healthy soil is the basis for the growth of plant cover, which directly and indirectly provides us with the conditions for life.

- filters and purifies water
- supports the growth of vegetation and enables the circulation of nutrients
- regulates the atmosphere and plays an important role in climate regulation through the storage of gases (e.g. CO₂)
- determines the system's resistance to extreme phenomena such as drought or flooding (soil hosts 1/4 of the planet's biodiversity and is one of the most complex ecosystems)
- contains countless macro- and micro-organisms that contribute to the global cycle of nutrients and enable life on Earth (according to the FAO, over 95% of food comes directly from the soil)
- soil is a source of calories, carbohydrates, proteins, fibers, minerals, oils, medicines...

Soil types

Considering the size of mineral particles, soils can be:

Clay < 0.002 mm

Clay (powder) from 0.002 to 0.05 mm

Sand > 0.05 mm

The ratio of the amount of mineral particles of different sizes in a soil sample tells us what kind of soil we are working with. Soils are usually a mixture of clay, powder (loam) and sand in different proportions

Chemical properties of soil

According to its chemical reaction, the soil can be acidic or alkaline. The acidity or alkalinity of the soil also depends on which plants will grow best on it.

The most common are soils with a neutral Ph factor, or close to it, slightly acidic or slightly alkaline. Soils of extreme acidity or alkalinity are extremely rare.

Soil organic component and soil fertility

Life in the soil

The entire food web of life in the soil rests on plants. Through photosynthesis, plants extract carbon from the air, incorporate some of it into their own organism, and release some of it into the soil in the form of simple sugars.

The soil is a habitat for countless types of microorganisms, from simple bacteria to amoebas, flagellates, nematodes to long-lived and different types of fungi. Just as in the macro world that we can see with the naked eye, at the microscopic level there is a turbulent life activity.

Some microorganisms cooperate with plants, create active symbiotic relationships, live on simple sugars that plants secrete through their roots. In return, they protect the plant from pathogenic organisms and supply it with micronutrients that the plant could not absorb on its own. Other microorganisms are parasitic on roots or on other, larger organisms. Some are active hunters, and some only consume dead organisms, plants, microorganisms or animals and fungi.

Living organisms deposit carbon and (nitrogen) from the atmosphere into their bodies and gradually increase the amount of biomass in the soil. Dead organic matter is gradually transformed into humus by microbiological activity.

Humus

- Humus is created by the conversion of dead organic matter into complex compounds (humification). It is a product of microbiological activity in the soil
- Humus gradually releases the most important nutrients for plants (nitrogen, phosphorus, potassium)
- Humus is 75% water and 25% dry matter
- Composition of humus: humic acid, humin, fulvic acid

- Humus contains up to 60% carbon and up to 6% nitrogen
- Fertile soils contain from 3% to more than 10% humus

Soil fertility

Soil fertility is the ability of the soil to support plant growth, and it directly depends on the amount of humus in the soil.

Regardless of the type of soil with regard to the size of the mineral particles, the increase in organic mass (and the gradual increase in the proportion of humus in the soil) improves the structure and texture of the soil, improves the absorption and retention of water in the soil, and improves the permeability of the soil. All this directly improves soil fertility.

Conventional tillage and negative consequences

From the beginnings of tillage to the present day

From the very beginnings of growing food, man has used various tools to till the soil. First with wooden sticks and ploughs, later with the first domesticated working animals with plows. Wooden tools are gradually replacing metal ones. The first teams with one or two animals become too weak. In front of the plow, several increasingly larger and stronger work animals, obtained through selection, are cut. Larger and larger areas are cultivated, the soil is plowed more often and deeper. And simple plows that only furrowed the upper layer of the soil become plows that turn the earth over with their passage. There are more and more domestic animals, forests are being cleared and burned due to grazing. Wilderness areas are shrinking. In Europe, the number of large carnivores has decreased, some species have completely disappeared.

With the introduction of internal combustion engines and easily available and cheap oil, the frequency of mechanical tillage and the depth of plowing significantly increased. Machines are getting bigger and stronger, the number of crossings of agricultural machinery over arable land is becoming more frequent.

In the 1950s, the use of mineral fertilizers and various pesticides increased. Plots are getting bigger, food cultivation is based on monoculture cultivation of several species. Hybrid wheat, corn, rice become the backbone of agriculture and the food we most often consume. Yields per hectare have increased more than three times since the 1950s. We don't raise animals in the same way anymore. Cattle and sheep move from pastures to large industrial farms. And for them, food is grown on arable land.

But this kind of success in breeding has its price. In addition to the reduced variety of cultivated crops, the overall biodiversity has also been reduced. Natural habitats are shrinking and disappearing.

Plowing and turning over the land degrades and destroys microbiological soil ecosystems, increased oxidation returns to the atmosphere a greater amount of carbon than the land is able to absorb. The amount of humus in the soil decreases

and disappears. The soil loses its ability to absorb and retain water. Bare plowed land is vulnerable to erosion caused by wind and rain.

Spraying monoculture fields with pesticides indiscriminately poisons all organisms, both those we are trying to suppress and those who are collateral victims. All living things are suffering, both above ground and soil microbiology.

Excessive use of mineral fertilizers does not contribute to soil health either. Plants absorb and use only a small part, the rest seeps into the deeper layers of the soil and pollutes underground and above-ground water.

Tools for preserving healthy soil and regenerating degraded soil

Structural changes of land

To reduce and prevent soil erosion caused by the movement of water through the terrain, we implement different structures. Depending on the climate, the type of soil, the slope of the terrain, the frequency and amount of precipitation, we choose the solutions that are best for our conditions. The goal is to slow down the movement of water across the terrain and disperse it evenly across the terrain. Water that moves slowly has more time to soak into the soil and be better used by plants (agricultural crops). Drywalls, terrain terracing, swales, (accumulation channels according to isohypses), dams and the like are tools that will increase the absorption of rainwater into the soil. Ponds, puddles, reservoirs, ponds are another way of storing water when it is abundant. We can use the water collected in this way at the time of the year when there is no rainfall.

Grounds with excess water can be drained using drainage channels, absorption wells, ditches...

All structural changes to the land that we intend to make should be well thought out and planned. Only after that we start the works. A well-designed and implemented water management system is a long-term investment in soil health.

Reduced tillage

- the less frequent passage of heavy machinery through the plot we cultivate directly affects soil compaction. The tractor (towing vehicle) pulls the attachment it needs when performing the work. If the order of work is as follows: ploughing, disking, harrowing, sowing, top-up with liquid fertilizer, it is possible to connect all or part of the connections to the tractor, so that multiple operations are performed in one pass. In addition to the fact that this method of operation compacts the soil less, we also save time and money (fuel).

- Plowing turns the soil layers so that the upper, humus layer together with the plant cover ends up buried, and the lower soil layer comes to the surface. The soil receives a greater amount of air (oxygen) and the accumulated carbon (humus and undecomposed biomass) oxidizes and goes into the atmosphere. Also, frequent plow passes create a plow sole (compacted layer of soil directly under the plow) through which the plant's roots cannot grow. Alternatives to the plow are subsoilers that

penetrate the soil, aerate it, but do not overturn the soil layers. In this way, the structure and texture of the soil is not destroyed, the habitat of microorganisms remains untouched and undermining enables the life of aerobic organisms in the deeper layers of the soil. The resulting plow sole is also broken with a blaster. The immediate benefits are better and deeper infiltration of water into the soil and the development of deeper and stronger plant roots. Due to the better utilization of rainfall and reduction of possible erosion, the submersible should be "plowed" along the isohypses of the terrain, so that the furrow made by the submersible also has the function of a swale.

Mulching

- Mulching is covering the soil we cultivate with organic matter; straw, hay, compost, wood chips. Mulch prevents the growth of unwanted vegetation (weeds), protects the soil and soil microorganisms from UV rays and overheating. Mulched soil does not collect rain and the water that infiltrates into the soil evaporates much more slowly. Due to constant temperature and moisture, microorganisms are much more active in mulched soil than in bare soil without any cover. Organic mulch is also food for microorganisms, and it decomposes over time and becomes part of the soil. Mulching in this way is feasible on small cultivation areas, in gardens or flower beds. It is not practical (or cheap) to mulch large areas in this way.

Live mulch, pre-sowing, green manure

- Mulch does not necessarily have to be dead organic matter, nor does it have to be brought from another location. When cultivating larger areas, it is more practical to grow mulch on the same area where we grow the main crop. The most important thing is to prevent the land from being bare, without vegetation. By sowing plant cover when the plot is not the main crop, we protect the soil and the microorganisms in it and enable additional photosynthesis and carbon accumulation in the soil through the interaction of plants and microorganisms. Any plant cover (even wild "weeds") is better for the soil than bare soil.

Also, newly grown biomass will become food for microorganisms after we destroy it before sowing the main crop.

It is preferable to sow a mixture of seeds of different plants as a starter. Veggies, cereals, clovers, cabbages, each plant species has different needs for nutrients, different depth and structure of the roots, and each achieves symbiosis with a different set of microorganisms. And each one in the root area (rhizosphere) grows and feeds precisely those microorganisms from which it benefits the most

By encouraging the diversity of plant species, we also encourage the biodiversity of life in the soil. We plow the green cover shallowly into the soil before sowing the main crop. This way of destroying the pre-culture is called green fertilization or sideration.

We can also destroy the cover crop by laying it down or mowing it. In this way, the aerial part of the plant does not dig into the soil, it remains on the surface and continues to protect the soil and the new crop. It is possible to sow directly into the mulch, without prior ploughing, by hand or machine. The pioneer of this method of sowing was Masanobu Fukuoka (author of the book "The Revolution of a Straw").

Before sowing, the seeds can be "packaged" in clay balls (seed balls), or sown directly, without prior preparation.

In urban conditions, large areas of soil are generally not intended for growing food. Most often, these are parks with grassy areas intended for all residents. Public areas, including green areas, are mostly under the administration of the city, or utility companies. However, plants that grow in parks also require healthy soil, and they are subject to the same natural laws as everyone else. To grow, they need enough sun and water, soil deep enough for root development with enough nutrients and soil microbiology diverse and numerous enough to help them grow.

The principles of building healthy soil in parks are the same as on other areas where we grow plants for other purposes; we must regulate the movement of water through the terrain, prevent erosion caused by water and wind, and strive to achieve as much biodiversity as possible on the planned planting area. The great biodiversity of the plant cover also guarantees a great diversity of microorganisms in the soil. Of course, without losing sight of the basic function of green areas in the city. When choosing plants, preference should be given to autochthonous and non-native species, well adapted to local conditions.

Soil construction methods that we can use in city parks are:

- Mulching; we do not remove fallen tree leaves or take them out of the park area)
- Composting; in agreement with the utility company, set up composters for disposal of bio waste generated by visitors to the park. Remains of fruit, used paper packaging and the like. Compost created in such composters can be used in areas of the park where it is needed.
- Spraying with compost tea or extract; if we have a small amount of good compost and a large area of land into which we want to introduce useful microorganisms from the compost, we prepare the desired solution and apply it with a watering can or sprinkler, preferably just before the rain so that the microorganisms reach the soil as soon as possible
- Chop and drop; do not take the trimmed branches of bushes and trees out of the park, leave them in areas where they do not disturb visitors. Over time, it will decompose and until then serve as a habitat for small animals and insects, regular residents of the parks.
- Wood chips; chop the pruned branches by machine and spread them over the surface of the soil or use them for composting
- Reduce mowing on grassy areas, allow the development, flowering and pollination of autochthonous grasses, and thus increase biodiversity

Soil construction on private plots in the city and suburbs depends solely on the will, knowledge and motivation of the owner. Coordination with local self-government bodies, utility companies or neighbors is not necessary, and the owner is free to apply all the methods mentioned in accordance with his needs and the purpose of the surface.

Learning objectives

Knowledge

- upoznavanje sa osnovnim alatima koje možemo koristiti pri izgradnji humusnog sloja tla, neovisno o namjeni i površini parcele

Competencies

- Naučiti analizirati postojeće stanje tla i identificirati probleme, te odabrati neke od alata koji su upotrebljivi u konkretnom slučaju

Skills

- Gaining knowledge of how nature builds soil and applying it in the best possible way in given circumstances

Preparation/materials/tools

- projector and screen
- 1 l jars and water for carrying out the soil analysis test.

Step by step/how to

1. Presentation (30 minutes) in which we emphasize the importance of soil quality for the production of healthy food. We explain the elements and characteristics of soil and the techniques of soil regeneration and improving its quality.

2. Test - soil analysis (sampling can be done earlier, but sample analysis is done after the introductory presentation). We explain to the students that we will conduct a soil analysis test and give instructions on how to collect samples from different locations. The samples are collected in the designated jars, water is added, the contents are mixed and left to settle.

After the contents of the jar have settled, we interpret the individual layers, their characteristics and, as a final result of the analysis, the suitability of the soil from which the sample was taken for the intended purpose. If we conclude that there is a deficiency (for example, a lack of humus), we discuss solutions to solve the observed problem (methods of adding humus, mulching...)

Questions:

Nugget:

https://docs.google.com/spreadsheets/d/19vSy9DDh8wTSRdinK8N6MO7Qpyi42DiV/edit?usp=drive_link&oid=110028319539421164003&rtpof=true&sd=true

Literature:

Soil Primer

Composting

Duration: 2 hours

This lesson will cover the topic of composting - processing organic waste with the help of aerobic organisms. With the help of composting, we turn the potential problem of biowaste created in the household, agricultural or industrial production into an excellent and cheap resource that can be used for growing plants on the balcony, garden and on larger areas.

Goal / Cilj

The goal of this lesson is for the students to recognize the potential of biowaste, spot potential resources from their environment (school, household, estate, village or city) and learn how to turn a problem into a solution with the help of the provided tools.

Introduction/background

Compost and composting

- Introduction
- What is composting?
- Why compost?
- What can we compost?
- How to compost?

Introduction

In nature, all dead organisms are decomposed by various natural processes and the mass of their bodies becomes part of a new cycle of life. Nature is thrifty and reasonable, it does not throw anything away, it does not build huge landfills of dead plants or animals. She recycles. It breaks down the complex buildings of dead organisms into basic building blocks, and builds new ones from them according to complex plans. An atom of carbon or phosphorus that is embedded in the stem of a dried sunflower, in two years may be part of the fruit of a cucumber, or a tree, or a cat. Or you.

What is composting?

The composting process is based on imitating the decomposition processes that occur on the soil surface. Fallen leaves and fruits, dried grass, broken branches fall to the ground and under favorable conditions the process of their decomposition begins with the action of various organisms. Bacteria, fungi, insects, earthworms, snails, centipedes... All of them break down the dead biomass and turn it into humus. Humus becomes part of the soil, and enables new generations of plants to grow more easily and better.

The compost pile is an accelerator of these processes and an incubator of useful microorganisms that we want to multiply and introduce into the soil in as large a number as possible.

- Composting is the process of decomposition of biomass with the help of aerobic organisms.

Why compost

Composting is a simple and easy way to turn our biodegradable waste from a problem into a solution; into a useful product - compost.

Every household produces a certain amount of biodegradable waste every day. Kitchen waste and other biodegradable household waste represent more than half of the total waste produced by the average household on a daily basis. If we add to that the "waste" that we have in the garden or yard (remains of garden plants, stems, leaves, fruits that are not edible, residues from pruning fruit trees, weeds and ornamental plants...) the ratio of biodegradable in the total mass of waste grows even more. This waste requires adequate disposal, regardless of whether we dispose of it ourselves or the utility company. If we live in a place where the separation of biodegradable waste (and other types of waste) is not organized, all the waste is mixed in the same pile, covered with new waste and soil. The biodegradable component of such mixed municipal waste is decomposed without the presence of oxygen, with the help of anaerobic microorganisms. As a byproduct of their activity, they produce methane, a very potent greenhouse gas. In addition, landfills for unsorted waste are a great danger to groundwater, the leakage of harmful substances from such landfills is a potential environmental disaster.

The direct benefits we achieve from composting are:

- We dispose of our own bio-waste
- We significantly reduce the load on local landfills
- We reduce waste disposal costs
- We reduce the emission of greenhouse gases
- We protect underground and surface water
- We contribute to the preservation of nature
- We destroy the causative agents of plant diseases
- We destroy the causative agents of human diseases (E. Coli bacteria, parasites)
- We contribute to the circulation of nutrients (N, C, P, K, Ca and other elements)
- We increase the share of useful microorganisms in the soil, we introduce useful bacteria, fungi, nematodes with compost
- We build healthy soil, enable the growth of healthy plants

- We improve the soil's ability to absorb and retain water

What can we compost?

Material suitable for composting is divided into:

- Material rich in carbon (carbon material C)
- Material rich in nitrogen (nitrogen material N)
- The rest

Material rich in carbon (carbon material C)

- Paper packaging, cardboard, paper (if there is no way to send the paper for recycling)
- Used paper goods (handkerchiefs, napkins, paper towels)
- Textiles of natural origin (linen, cotton, wool...)
- Remains of indoor plants and potted plants
- Remains of branches from pruning fruit trees and ornamental plants
- Garden residues, stems and leaves of vegetables and fruits
- Sawdust and shavings from carpentry workshops (natural, chemically untreated wood)
- Sawdust and bark residues from firewood (if possible, use biodegradable oil to lubricate the saw chain)
- Wood chips
- Harvest residues (straw, corn stalks, grapes...)

Material rich in nitrogen (nitrogen material N)

- Raw remains of fruits and vegetables
- Food that is no longer usable (wormy meal, moldy bread, etc.)
- Coffee grounds
- Used tea bags (if they are in paper bags, avoid buying tea in non-degradable bags)
- Dry and fresh grass
- Food for herbivores that can no longer be used (soggy hay, silage, etc.)
- Manure with litter (sheep, horse, chicken, pig...)
- Feces and litter of herbivorous pets and birds (hamsters, mice, parrots, pigeons)

- Feathers, wool, pet hair
- Cut hair, nails

The rest

- Eggshells

We can compost all of this without any problems, of course, by paying attention to the correct proportions of carbon and nitrogen in the pile, and by paying attention to moisture and air circulation

What do we not compost?

- Animal remains, remains of meat, bones, fish, dead pets.
- Cooked food
- Waste fats from the kitchen (grease, cooking oil)
- Paper towels soaked in cooking oil
- Ashes
- Human excrement
- Dairy products

We avoid putting these ingredients in the compost for various reasons. Some are potential bait for mice or rats (cooked food, meat), some need a different set of microorganisms to decompose (fats), some are a potential source of infection (human excrement, potential bacterial infections, possible parasites), ash can change the pH factor of the compost pile. There are methods of composting these ingredients as well, but we avoid them in a home or garden composter.

What can't or shouldn't we compost?

- Glass
- Metal
- Plastic
- Glossy or plasticized paper
- Meds
- Paints, chemicals
- Sawdust from glued panels (chipboard, plywood, MDF and the like, due to chemical adhesives and resins)
- Synthetic fabrics

These are not good compost pile ingredients, either they are inorganic and not compostable, or the chemicals would degrade the compost and contaminate the soil into which such compost would be introduced.

How to compost?

We can start composting already in the apartment, where most of our bio waste is generated.

Composting in a bucket

One bucket with a volume of 40 to 60 liters is sufficient. The procedure is simple. We drill a hole around the rim of the bin so that the compost has enough air, cover the bottom with broken or cut twigs, so that air can reach the bottom of the container. Some cardboard or dry leaves, and some soil, or ready-made compost go on them. Soil or compost serve as an inoculator, they contain microorganisms that will inhabit our kitchen and other waste and turn it into compost over time. Kitchen waste is rich in nitrogen, so it should be mixed with some carbon-rich material. Cardboard, sawdust, wood chips or dry leaves will serve the purpose. When we put our waste in this small home composter, we simply cover it with sawdust and moisten it as needed. The ratio should be about three parts brown, carbon-rich material for every part green, carbon-rich material. So, for every handful of leftovers from the kitchen, three to four handfuls of sawdust (or whatever you already have). The contents of the bucket should be stirred every couple of days, so that air reaches all parts of the container. You can keep the container in the apartment or on the balcony, it is important that it is not in direct sunlight and that it is not exposed to freezing in winter. In addition to the correct ratio of nitrogen, carbon and air access to the container, adequate humidity is also very important. If the compost is too dry, it needs to be moistened, if it is too wet, add a little more sawdust and mix everything. We can do the composting process from start to finish in a home composter like this and use the finished compost in the garden, flower pots, or give it as a gift to someone who has a garden.

If you have your own garden and garden composter, this kind of home composter can serve as a convenient storage. In it, you put kitchen waste mixed with an appropriate amount of carbon-rich material until the container is full. When the container is full, or the moment is convenient for you, empty the contents into the garden composter.

If you use the home composter as a temporary storage of biowaste generated in the household, and you do not intend to compost the contents to the end in it, but in the garden composter, the procedure is the same; stack the brown and green material in layers, but without adding water. Sawdust (or some other dry carbon-rich material) will absorb water from kitchen scraps and prevent the formation of harmful gases and unpleasant odors.

Roto (rotating) composter

Composting in urban conditions has its own challenges. The space where we can compost is limited, most of the city's residents live in apartments without a private yard. If you are lucky enough that your building has a common area, a garden or a

yard, you can place the garden composter in it as well. Of course, if all tenants of the building agree. A classic garden composter is not always the best solution, especially if there are several users. It is difficult to control whether all tenants/users put in enough carbon material, whether they maybe wet the compost too much... Compost still requires supervision and occasional interventions, no matter how minimal they are. Controlling temperature, humidity, occasionally turning over the pile is an additional job that not everyone will be happy to take on. And a compost pile left to its own devices can easily start to smell.

An elegant solution for a communal, shared composter is one of the roto composter variants.

Photo: Mladen Mladenović

<https://www.perforum.info/izrada-rotacijon-protocnog-kompostera/>

The use of this composter is simple. The user puts in their biowaste, puts in the required amount of brown, carbonaceous material and spins the composter. Rotating the composter mixes and aerates the compost, and the composting process takes place relatively quickly. Depending on the design, these composters can be emptied manually, or they can be flow-through, so that the finished compost falls out by itself through the openings provided.

Composting with the help of earthworms

Composting with earthworms is also easy. These ringers don't ask for much. We can literally keep them in a bucket under the sink, or have an area of several hundred square meters where we will grow them. Compost creeper (most often *Eisenia fetida*, although some other species are also used) requires little. She needs a place to live (bucket, plastic or wooden container with a lid), food, moisture and air. It is very efficient in turning biowaste into vermicompost. If their living conditions are good, they will not leave their intended habitat. They regulate their number themselves. If they feel that they have multiplied enough, i.e. filled the habitat, they simply stop reproducing. The main product of compost earthworms is their excrement, vermicompost. Earthworms are rich in nutrients that plants can directly absorb.

Composting in a garden composter

Composting in the garden is the most common method of composting. We can compost in composters or without them, in a pile. Regardless of whether we compost in a composter or not, it would be good if our garden compost pile had a volume of one cubic meter. Experience has shown that the compost piled into such a volume is airy enough so that even the middle of the compost pile gets enough air, and that the conditions in all stages of composting are aerobic.

We can make a garden composter ourselves, from the materials we have on hand. Old board, pallets, panels, brick, stone, wire mesh. The shape of the garden composter is usually a cube, or a roller (if we use a wire mesh).

We will use the mature, finished compost from our composter in the garden to improve the quality of the soil. In order for our garden and the crops we grow from compost to benefit as much as possible, we must pay attention to the following:

- Contents of the compost heap
- The volume of the compost heap
- Correct ratio of brown (carbon) and green (nitrogen) material
- Optimum humidity and breathability of the compost pile material
- The temperature of the compost heap

Contents of the compost heap

The sources of material for our compost are mostly biowaste generated in our household or farm. Sometimes our needs for compost or compost material are greater than we have. Then we can collect or buy other people's biowaste to compost to meet our own compost needs. Regardless of whether the material is free for us or we buy it, it is good to take care not to introduce materials into the compost that we do not want in our garden. Agricultural crops are often treated with various pesticides, and the residue of such chemicals is also present in crop residues. A thermal compost pile breaks down most pesticide residues, but not all. Such pesticide residues will pass undecomposed through the compost, we will bring them into the garden, harming the micro- and macrobiology of the soil. In the end, we will also consume these harmful chemicals or their residues with the vegetables and fruits we grow.

The volume of the compost pile

Regardless of the type of composter, we always strive for our compost piles to have a volume of one cubic meter. Such a volume provides enough oxygen and compost in the center of the compost pile. Air, i.e. oxygen, is necessary for aerobic microorganisms that we grow in compost with proper composting.

Correct ratio of brown (carbon) and green (nitrogen) material

All organic matter consists of carbon (C) combined with smaller amounts of nitrogen (N). The balance of these two elements is called the C:N ratio. Materials with a high nitrogen content are called nitrogenous or green materials: animal excrement, urine, grass clippings, vegetable and fruit residues, coffee grounds. We call materials with a high carbon content brown material: sawdust, wood chips, straw, cardboard, etc. Aerobic microorganisms in the compost pile are most active at a ratio of 1N:3C. So, for every unit of green, nitrogenous material, it is necessary to add three units of brown, carbonaceous material.

We stack the material in layers, as shown in the diagram below, until we fill the composter or reach the desired volume. Between each layer, it is advisable to pour water on the material, taking care not to overdo it. The material must be moist, never soaked.

Optimum humidity and breathability of the compost pile material

With adequate moisture (approx. 60%) and enough air (oxygen), our compost pile will quickly start to heat up.

How to determine if the compost is moist enough?

Take some compost in your hand and squeeze it in your fist.

Result number 1:

The compost is moist and cold to the touch, and has an unpleasant smell. When we squeeze it in our fist, liquid drips from it

- The compost is too wet, it has started to be dominated by anaerobic bacteria that are undesirable for compost.

• How to "repair" compost that is too wet:

Shake and aerate the compost pile by adding more carbon material. Dry carbon material will absorb excess moisture. A dried and aerated pile like this will quickly start working, i.e. aerobic microorganisms will again get ideal conditions for living and will eliminate undesirable microorganisms.

Result number 2:

The compost is dry to the touch or just slightly moist. When we squeeze it in our fist, the material dissipates. The material that we put in the compost pile decomposes slowly or not at all. The compost pile is not heated.

- The compost is too dry, the ingredients of the compost pile are not decomposed, the microbiological activity is minimal

• How to "repair" too dry compost:

Shake or rearrange the compost heap evenly moistening the material.

Result number 3:

Compost is moist to the touch, when you squeeze it in your fist it forms into a lump from which it is not possible to squeeze out water. The formed lump of compost is easily dispersed with little pressure. The material in the compost heap is clearly decomposing, there are no unpleasant smells.

- Compost has ideal humidity, neither too dry nor too wet. No intervention is required.

Compost pile temperature

Microorganisms that break down the compost material in the good conditions that we have provided for them reproduce quickly, eat the compost material and each other, and the elevated temperature of the compost pile is the result of these turbulent activities on a microscopic level. The rising temperature of the compost heap is an indicator that we have determined the C:N ratio correctly, and that there is enough water and air.

Thermal composting is good for several reasons. Temperature destroys

- weed seeds

- the causative agents of plant diseases i
- the causative agents of human diseases
- parasite eggs and larvae

We control the temperature of the compost pile with a thermometer. The temperature should not exceed 65 degrees C. When the temperature reaches the maximum temperature, the compost needs to be rearranged, that is, aired and possibly moistened. Temperatures above 65 degrees also destroy the beneficial microorganisms that we want to multiply and bring into the soil in as large a number as possible.

Ripening of compost

After two or more rearrangements of the compost heap (depending on the material and the pulverization of the initial material), we notice that the compost heap no longer develops such high temperatures. The starting material has been decomposed and we can no longer recognize it. Microbiological activity is still present in the compost, but it is no longer so violent. The material we received is dark brown in color and has a pleasant, earthy smell. We can use compost in the garden, in compost preparations, as mulch and the like.

If we intend to use the compost for making seedlings or as an addition to the substrate for potted plants, the compost should also undergo a ripening, i.e. aging phase to reduce the microbiological activity to the point where it can no longer harm our plants. We rearrange it, moisten it if necessary and leave it in a suitable place for three to six months.

How do we know if our compost is mature enough?

A simple "salad test" will help us determine whether the compost is ripe enough. Sow a few lettuce seeds in the compost container. In mature compost, lettuce seeds will sprout in two to five days. Plants should be dark green and healthy. If the salad does not sprout after a few days (two to five), or the sprouted plants are obviously stressed, irregular, stunted and light green, let's leave the compost to mature for a while longer.

Learning objectives

Knowledge

- See the potential of biowaste and learn how to turn it into a useful resource that can be used in the garden with a minimum of work

Competencies

- Learn to distinguish materials that can be composted, learn how to properly compost them, and how to spot and eliminate possible defects in the compost pile.

Skills

- Acquiring knowledge on how to practically stack a thermal compost heap.

Preparation/materials/tools

- Four wooden pallets
- Hammer
- A meter
- Wood screws
- Cordless drill
- Bits for cordless drill
- Drill bits for cordless drill
- Rope/wire

Step by step/how to

Making a composter from old pallets (according to the instructions in the lesson)

- Make a composter with a volume of 1 cubic meter from the material you have. The composter must be strong enough to hold its shape during composting. It is desirable that it can be easily disassembled and facilitate access to the compost and work with it (overturning, emptying the composter)

Reflection questions

- Why is it important to compost?
- How much biowaste does your family produce?
- How much unused (thrown away) biowaste does your town/village produce (factories, family businesses, catering and commercial establishments)?
- Can we use at least part of the unused biowaste of the community as raw material for compost for our own garden or field?

Waste management

Duration: 3 hours

The waste issue is a significant problem faced by modern society and is an unavoidable result of our lifestyle. As our standard of living changes, the quantity and harmfulness of waste also increase. Waste directly threatens human health and pollutes the soil, water and air, as most of the waste ends up in landfills and becomes non-recyclable garbage.

Discuss with your learners the waste problem and ways to reduce waste through actions and habits we can adopt in our personal lives.

Goal

The objective is to familiarize students with the problem of waste, raise awareness of the growing amount of waste that is generated daily, and the negative impact of the waste problem on us as individuals and the environment. The goal is to educate them on how to be part of the solution to the waste problem, by changing our habits.

Introduction/background

Everything we buy and use has an impact on the environment. The production and transportation of goods require energy and resources, such as water and materials. These processes can contribute to pollution and the depletion of natural resources. Additionally, the use of land for various purposes, including manufacturing and infrastructure, can disrupt ecosystems and reduce available space for natural habitats. It is important to consider the environmental implications of our consumption choices and strive for sustainable practices to minimize these impacts.

Municipal waste, generated by domestic households, non-domestic and industrial entities, is a growing concern. On average, the world produces 2.01 billion tons of waste annually.

Rapid population growth, and urbanization, have led to a significant waste management problem in society, particularly in cities. The increase in consumption has resulted in a larger quantity of waste being generated. Every individual must consider waste management as a responsibility.

The goal of waste management is to increase the product's lifecycle and reuse and recover materials where possible, to reduce the total amount of waste that goes into landfills and minimize the environmental burden. The responsible disposal of waste plays a crucial role in supporting sustainable development and transitioning towards a circular economy, ultimately leading to the creation of a valuable resource. There are several actions and habits that individuals can implement in their personal lives to minimize waste. Firstly, practicing the 3Rs - Reduce, Reuse, and Recycle - is crucial. By reducing the consumption of single-use items and opting for reusable alternatives, we can significantly decrease the amount of waste generated.

Additionally, reusing items whenever possible can help extend their lifespan and reduce the need for new products. This can be achieved through activities such as repairing damaged items, donating unwanted but usable items, or repurposing materials creatively.

Furthermore, recycling plays a vital role in waste management. Separating recyclable materials from general waste and ensuring they are properly recycled can help conserve resources and reduce the amount of waste that ends up in landfills.

Another effective way to minimize waste is by practicing responsible consumption. This involves making informed choices about the products we purchase, opting for items with minimal packaging or packaging that is recyclable or biodegradable.

Lastly, raising awareness about the importance of waste reduction and recycling within our communities can have a positive impact. Encouraging others to adopt sustainable habits and participating in local initiatives or clean-up events can contribute to a cleaner environment.

<https://www.greenpeace.org/international/story/44079/slowing-the-circular-economy/>

Biowaste accounts for a third of municipal waste, thus representing the largest single component of municipal waste. Biowaste can be kitchen waste (food preparation residues), garden or green waste. It is a valuable raw material for the production of quality compost. Composting is the process of aerobic decomposition of bio-waste to produce carbon dioxide, water, heat, and compost, as the final product (in just a few months). Compost nourishes plants, ensures soil aeration, retains water and favors the growth of root plants. Composting is a simple and easy way to turn our biodegradable waste from a problem into a useful product - compost.

Learning objectives

- To learn what waste management is and why it is important.
- To gain knowledge on how the waste hierarchy functions.
- To learn how the waste hierarchy principles can be implemented in everyday life.
- To develop the knowledge and abilities needed to properly separate waste.
- To gain skills in composting in a home, office or in the garden.

Step by step/how to

Make your indoor compost

1. Buy a compost bin or do it yourself from plastic storage containers, wooden pallets...
2. Pick the spot for your compost bin

3. Research what you can compost and in which ratio (carbon vs. nitrogen, compostable and non-compostable organic materials)
4. Get the essential ingredients for the compost heap - green (nitrogen) & brown (carbon)
5. Get the balance of brown and green materials right
6. Give it a good airing with regular turning.
7. Monitor your compost (is it too dry or wet, unpleasant odor...).
8. Use the produced compost for your houseplants, garden, public park...

Trade fair

Organize trade fair with your learners where you can exchange items you don't need and use.

Repair Café

Repair Cafés are workshops organized to learn how to repair our defective objects together instead of throwing them away.

Organize an event where you invite volunteers with knowledge and skills in repairing various items (electronic/mechanical gadgets, clothing, etc.). Invite learners to bring non-functional or damaged objects and repair them together with volunteers.

Reflection questions

- Why has waste become a huge problem in our urban environment?
- Why is it important to reduce production of waste?
- What will happen to us and our environment if we continue to produce big amounts of waste?
- How can I contribute to resolving this problem?
- What can I do so that people closest to me change their habits and produce less waste?

Nuggets:

https://drive.google.com/file/d/1TZE6PMYgZq8UdN_5Aht7Of_Brf1hipah/view?usp=sharing

<https://youtu.be/RHlr8Cvfaag>

Transition - social action

Duration: theoretical part 2 x 45min

Transition and activism are interconnected in their goals of creating positive change in society. Transition focuses on community-led efforts to build resilient and sustainable communities. It emphasizes the importance of local action, participatory decision-making, and nurturing cultural and mindset changes.

Activism encompasses a broader range of actions aimed at addressing social, political, or environmental issues. Activists often work towards systemic change by raising awareness, mobilizing communities, and advocating for policy reforms.

In this lesson, students will be introduced to the concept of transition and activism, as important part of the movement. They will also learn about the essential steps involved in initiating a transition initiative in communities.

Goal

Introduce students to the importance of the transition movement and the steps involved in establishing a transition initiative in the community.

Introduction/background

Transition is a movement that has been growing since 2005. Transitional groups/communities adhere to transitional principles and use participatory methods to envision the necessary changes. They are focused on initiatives such as renewable energy projects, localization of food systems, and the creation of resilient communities and green spaces. They encourage entrepreneurship, cooperate with municipalities, promote connection and care, and emphasize the importance of repair and re-skilling. Recognizing the potential of community-level action, there is a growing understanding that top-down approaches alone are not sufficient to drive meaningful change.

The formation of the Transition movement was driven by a combination of environmental concerns, the recognition of resource limitations, and a desire for community empowerment and resilience in the face of global challenges.

Activism within the Transition movement involves individuals or groups taking action to promote the principles and goals of Transition at a local or community level. Transition activists work towards creating sustainable, resilient, and socially just communities by implementing practical solutions and advocating for systemic change. They may engage in activities such as organizing community events, raising awareness about environmental issues, promoting renewable energy projects, supporting local food systems, and collaborating with local governments and organizations. Transition activism aims to empower communities to take control of their futures and actively participate in shaping a more sustainable and equitable society.

Steps in initiating a transition initiative in the community:

1. **Research and educate yourself:** Gain knowledge about sustainability, local environmental issues, and successful transition initiatives in other communities. This will help you understand the challenges and opportunities involved.
2. **Identify like-minded individuals:** Reach out to friends, neighbours, local organizations, and community leaders who share your passion for sustainability. Forming a core group of dedicated individuals will make your initiative stronger and more impactful.
3. **Set goals and create a vision:** Define the purpose and objectives of your transition initiative. What do you want to achieve? Be clear about your vision and communicate it effectively to attract others who wish to join your cause.
4. **Engage the community:** Organize community meetings, workshops, or events to raise awareness about the importance of sustainability and gather community input. Encourage dialogue, listen to different perspectives, and involve diverse stakeholders.
5. **Collaborate and build partnerships:** Reach out to local businesses, schools, government agencies, and nonprofits. Collaborating with these entities can help leverage resources, knowledge, and networks to support your transition initiative.
6. **Take action:** Start implementing concrete projects and initiatives that align with your goals. This could include community gardens, recycling programs, energy efficiency campaigns, or educational workshops. Remember, even small actions can make a big difference!
7. **Communicate and celebrate progress:** Regularly update the community on your initiatives, share success stories, and encourage active participation. Celebrate milestones and achievements to keep the momentum going.

Doing Transition successfully is about finding a balance between these:

The Head: we act on the basis of the best information and evidence available and apply our collective intelligence to find better ways of living.

The Heart: we work with compassion, valuing and paying attention to the emotional, psychological, relational and social aspects of the work we do.

The Hands: we turn our vision and ideas into a tangible reality, initiating practical projects and starting to build a new, healthy economy in the place we live. (Transition Network, 2016)

Transitioning to a more sustainable community takes time and dedication. So, it is important to stay positive, be open to learning, and adapt your approach as needed.

* <https://transitionnetwork.org/> - how to initiate transition activities and methods of inclusion and working of transition groups

Learning objectives

- To understand the importance of transition movement and reasons why it is crucial to initiate transition activities in our community. To learn steps in starting a transition initiative in the local community.
- Recognizing how to involve the local community in changes and activities aimed at preserving the environment, caring for people and sustainable and fair use of local resources
- Application of participative methods in the inclusion of community members in transition activities.

Step by step/how to

Plan and organize transition activity in your school/local community

1. Introduce students to the examples of transition activities/events that you can find on <https://transitionnetwork.org/> and methods of their organization.
2. Talk with your students about the main issues that they recognize in their surroundings and needs to be addressed. Analyze the needs of your community.
3. Based on your possibilities and resources, decide how you can contribute.
4. Together decide how your activity/event will be organized and how responsibilities will be allocated.
5. Analyze which additional resources, members/schools/institutions, etc., you need and make connections.
6. Connect with the local community and invite them to your activity/event.

Reflection questions

- What are the negative impacts of how we produce, consume and interact with our surroundings and the people in it?
- Is it sustainable and how it will impact our future?
- Is there a way that members of the local community can join together to make positive changes and to build up resilient communities and a sustainable future?
- Which activities could be organized in my community? What are the possible obstacles for that and what are the prerequisites for organization?
- How can we contribute to a transition movement?

Making decisions in groups - Decision making by consent

Duration: 90 minutes (2 school hours) / *Trajanje: 90 minuta (2 školska sata)*/ *Durata: 90 minute (2 ore de școală)*

Group communication and efficient decision-making are very important for achieving goals. In this lesson, students will learn about different decision-making methods and try the consent decision-making method as one that enables the participation of all involved in the decision-making process, and solves some of the obstacles that other decision-making methods have.

Goal

The goal of this lesson is to teach students and teachers to adopt and simply apply the consent decision-making method.

Introduction/background

Getting to know the term "sociocracy", its origin, sociocracy as a method of group organization and action, but also as a movement. Also with the current practice situation in the world:

<https://medium.com/dobra-ekonomija/sociokracija-kao-pokret-e87436b761fa>

<https://en.wikipedia.org/wiki/Sociocracy>

Existing materials can be used to decide on consent:

<https://edutorij-admin-api.carnet.hr/storage/extracted/fc43d2f8-e801-4103-9a44-7a81b5bea9f0/index.html>

<https://medium.com/dobra-ekonomija/sociokracija-kao-pokret-e87436b761fa>

<https://en.wikipedia.org/wiki/Sociocracy>

<https://www.sociocracyforall.org/sociocracy-in-schools/>

<https://edutorij-admin-api.carnet.hr/storage/extracted/fc43d2f8-e801-4103-9a44-7a81b5bea9f0/index.html>

<https://en.wikipedia.org/wiki/Sociocracy>

<https://medium.com/dobra-ekonomija/sociokracija-kao-pokret-e87436b761fa>

Learning objectives

Getting to know the importance of communicating in groups

Familiarity with different decision-making methods and their advantages and disadvantages.

Learning signs for non-verbal communication.

Familiarization with the consent decision-making method.

Application of the consent decision-making method through a guided exercise.

Preparation/materials/tools

Blackboard/magnetic board, chalks/markers

Written materials with a description of signs for non-verbal communication.

Written materials with a description of the steps of the consent decision-making method.

Step by step/how to

Introduction

We begin with an introductory question: How do we make decisions as a group?

We write the answers on the board.

The following is a short presentation in which the most used decision-making methods are presented and we connect them with the offered answers to the introductory question. Additionally, we highlight the advantages and disadvantages of each of the presented decision-making methods.

The students are then introduced to the term "decision-making by consent". We define and explain the term as a decision-making method and compare it with the already known methods mentioned in the earlier presentation. We point out which problems the mentioned methods solve and which are its advantages. We also present the context of the emergence of the consent decision-making method.

Exercise: Round

We inform the students that we will conduct a decision-making exercise by consent, and we introduce them to another new term - "rounds" - as a method that we will use during the exercise.

We organize the group in such a way that we sit arranged in a circle facing each other. Let's explain why we use the round method (we all have the same right to communicate, everyone can express themselves, everyone can see the other members of the group and their reactions). We explain the order of speaking and the possibility to skip the answer to the question, as well as that at the end of the round those who skipped the answer can still answer the question. The term and role of facilitator in the process is explained.

We test the first round (circle) with some simple question (eg How do I feel when I need to communicate in this way? or What do I think about this method?).

When we have successfully completed at least one round of the round and established that there are no ambiguities, we define the topic on which we will decide using the consent decision method.

Exercise: Decision making by consent

The leader/facilitator presents the elements of the consent decision-making method (and signs of non-verbal communication that will be used during the exercise):

1. Defining the proposal to be decided on and introducing the participants to the context in which the decision is made (the proposal should be a topic close to the students - a proposal for the location of a trip/excursion, use of common resources - the location of the school garden, the name of the school cooperative or some similar topic).

NOTE: In order to be accepted, a proposal does not need to be "perfect" in the sense that it is the ideal proposal of all group members. It should be such that it is acceptable to everyone and good enough that everyone who decides "can live with it", that they have no objections to it and that they are willing to try it.

2. The defined proposal is followed by a clarification round in which participants can ask questions to the proposer to obtain clarifications and/or additional information about the proposal. It is important that the proposal is clear to everyone who decides, and if necessary, the proposal itself can be reformulated to make it clear to everyone. (No counter-proposals or alternative proposals are given, but rather the removal of ambiguity in relation to the proposed)

3. There follows a round in which the participants declare the proposal with a non-verbal reaction (reactions are expressed simultaneously with non-verbal hand signs that the facilitator presented earlier).

There are three possible reactions: consent, remark and objection. Consent means no objection and acceptance of the proposal. Remark means that there are no objections and does not necessarily indicate agreement with the proposal, but the proposal is accepted with some expressed amendment that does not fundamentally change the proposal itself. A remark does not need to be argued and can mean disagreement but without concrete arguments against the proposal. Remarks are considered as contributions and are recorded. It is expressed with *the palm facing down* Objection means that we do not accept the proposal and argue the reasons that we consider not acceptable - the reasons should be such that they endanger or

damage one of the members of the group or another individual, as well as that the proposal is not in accordance with ethical principles, vision and the goals we represent. The *objection is expressed with the palm facing up*, because it is considered a contribution to making a correct decision acceptable to all members of the group.

If there are no objections, a decision is made

4. If there are objections, they are resolved in such a way that the proposed decision is changed and refined in order to respect the objection. The objection in the new decision proposal can be integrated by the facilitator or it can be part of the group decision process of all or part of the group of those participating in the decision.

5. The group declares itself about the new decision proposal with a new round of non-verbal reactions and if there are no objections to the new proposal, the decision is made. As long as there are objections, a decision cannot be made.

6. The adoption of the decision is concluded and remarks are recorded if there were any and if they were not integrated into the proposal. Followed by an agreement on implementation, deadlines and testing if necessary

7. Celebration for successful group decision-making.

Reflection questions

- Why is efficient decision-making important?
- What are the methods of decision-making in groups and what are their advantages/disadvantages?
- What are the advantages of the consent decision-making method?
- Can everyone always be satisfied with the decisions made?
- In what situations can I apply this method?

Nugget:

<https://youtu.be/94-3SikVQbl>

Water in urban environments

Duration: 3 hours

Water is a crucial resource in cities, necessary for drinking, sanitation, industry, and irrigation. However, managing water in urban areas can be challenging due to factors such as population density, limited water sources, and infrastructure constraints.

Managing water in cities is a complex task that requires careful planning, investment in infrastructure, and sustainable practices. By adopting efficient water management strategies and promoting responsible water use, cities can ensure a reliable water supply for their residents while minimizing environmental impacts.

Goal

The goal is to assist students in comprehending the difficulties and approaches used in handling water resources in urban regions. The objective is to make them aware of the crucial role of sustainable water management methods and their repercussions on urban communities and the environment. By doing so, students will develop a better grasp of the significance of efficient water management in densely populated areas and the necessity of sustainable practices.

Introduction/Background

Water is a precious resource that goes through a continuous cycle of evaporation, precipitation, and returning back to the oceans. However, this process is not always straightforward, especially at a local level. Sometimes water falls on an area, accumulates and causes flooding, or it can quickly drain away, leading to water scarcity. That's why it's essential to manage water resources efficiently and sustainably. By keeping water in our systems for as long as possible, we can use it multiple times, reduce water waste, and even prevent flooding.

In cities, water is crucial for various purposes, including drinking, sanitation, and industrial processes. However, managing water in urban areas can be challenging due to limited water sources and high population density. Key aspects related to water in cities include water supply, demand, infrastructure, wastewater management, stormwater management, water conservation, and water governance. By adopting efficient water management strategies and promoting responsible water use, cities can ensure a reliable water supply for their residents while minimizing environmental impacts.

In urban areas, several methods of water conservation can be implemented to promote sustainable water usage. Some of these methods include:

1. Efficient irrigation systems: Installing drip irrigation or using sprinkler systems with smart controllers can help minimize water wastage by delivering water directly to the roots of plants and adjusting watering schedules based on weather conditions.

[Drip irrigation System](#)

[Sprinkler Irrigation System](#)

2. Rainwater harvesting: Collecting rainwater from rooftops and storing it in tanks or underground reservoirs can provide an additional source of water for non-potable uses such as gardening, washing cars, or flushing toilets.

[Rainwater Harvesting System](#)

3. Greywater recycling: Treating and reusing greywater from sources like sinks, showers, and washing machines for purposes like irrigation or toilet flushing can significantly reduce the demand for fresh water.

[Container Home Greywater Treatment and Disposal](#)

4. Water-efficient fixtures: Installing low-flow faucets, showerheads, and toilets can help reduce water consumption without compromising functionality.

5. Public awareness and education: Promoting water conservation practices through public campaigns and educational programs can raise awareness about the importance of water conservation and encourage responsible water usage.

6. Leak detection and repair: Regularly inspecting and repairing leaks in water supply systems, both in households and public infrastructure, can prevent unnecessary water loss.

7. Xeriscaping: Designing landscapes with native plants that require less water can minimize the need for irrigation in urban areas.

[Xeriscaping](#)

8. Water metering and pricing: Implementing water metering systems and tiered pricing structures can incentivize water conservation by making users more aware of their water consumption and encouraging efficient usage.

Water contamination is a significant problem faced by urban areas.

Phytoremediation, which involves water purification with plants, is a natural and environment-friendly method. Certain plants are capable of absorbing, breaking down, or transforming contaminants in water. Here are some plant-based water purification techniques that are commonly used:

1. Wetland or constructed wetland systems: Wetlands are natural water filtration systems that use plants, soil, and microorganisms to remove pollutants. Constructed wetlands mimic this process and can be designed to treat specific contaminants. Plants such as cattails, reeds, and bulrushes help in filtering out pollutants while microorganisms in the soil break them down.

2. Aquatic plants: Some aquatic plants, like water hyacinth and duckweed, can absorb and accumulate pollutants such as heavy metals and organic compounds. These plants can be grown in water bodies to help purify the water by absorbing contaminants.

3. Biofilters: Biofilters use plants and their root systems to filter water. Water is passed through a container filled with plant roots, which trap and break down pollutants. This method is commonly used in aquariums and fish tanks to maintain water quality.

4. Algae-based systems: Algae can remove nutrients like nitrogen and phosphorus from water, which can cause water pollution. Algae ponds or bioreactors can be used to cultivate algae and remove these nutrients from wastewater or polluted water sources.

The use of plants in urban environments can play a significant role in preventing flooding by controlling stormwater runoff. Here are some ways in which plants can be helpful:

1. Green infrastructure: The implementation of green infrastructure practices like green roofs, rain gardens, and bioswales can help absorb and retain rainwater. These features contain vegetation and permeable surfaces that permit water to infiltrate the soil, reducing the volume of runoff and slowing down its flow.

2. Tree planting: Trees possess extensive root systems that can absorb significant amounts of water. Planting trees in urban areas helps increase soil permeability and reduces surface runoff. Additionally, trees provide shade, which can lower ambient temperatures and reduce the risk of intense rainfall events.

3. Riparian buffers: Establishing vegetated buffers along rivers, streams, and other water bodies can help prevent flooding by stabilizing banks and absorbing excess water during heavy rainfall. These buffers also filter pollutants and improve water quality.

4. Green spaces and parks: Creating and preserving green spaces within cities, such as parks and urban forests, can act as natural sponges for rainfall. These areas allow water to infiltrate the soil, reducing runoff and the risk of flooding.

5. Sustainable urban drainage systems (SUDS): SUDS are designed to mimic natural drainage processes by incorporating vegetation, permeable surfaces, and storage features. They help manage stormwater runoff by slowing down its flow, promoting infiltration, and reducing the burden on traditional drainage systems.

It is essential to consider the specific characteristics and requirements of each city while implementing these measures. Local climate, soil conditions, and urban design

should be considered to maximize the effectiveness of plant-based purification and flood prevention strategies.

We can all do our part to conserve and manage water resources. This can be achieved through simple habits, such as reducing water usage, fixing leaks promptly, using water-efficient appliances and fixtures, practicing responsible irrigation techniques and being mindful of water consumption in our daily activities such as showering and washing dishes. Additionally, supporting initiatives and policies that promote sustainable water management can further contribute to our overall conservation efforts.

In conclusion, it is important to cherish and protect water as it is a precious resource. Responsible management and understanding of its cycle ensures we have enough water for our future needs and generations.

*for more insight on water management go to

https://drive.google.com/file/d/1EXwIQUVNIUOu2rw_B6FYu2sgLmkmLXBC/view?usp=drive_link

https://drive.google.com/file/d/1Q4t_vD-sAcmwtJl6VpY4oKO1Y6II0Jl7/view?usp=drive_link

Learning objectives

The aim is to educate students about the challenges and strategies involved in effectively managing water resources in densely populated environments. The objective is to raise awareness about the importance of sustainable water management practices and their impact on urban communities, the environment, and future generations. The key objectives include:

1. Identifying water challenges in urban areas: This involves discussing the specific water-related issues faced by cities such as water scarcity, pollution, aging infrastructure, and increased demand due to population growth.
2. Exploring sustainable water management strategies: This involves introducing various approaches to address urban water challenges, including water conservation, rainwater harvesting, wastewater treatment and reuse, green infrastructure, and efficient water distribution systems.
3. Promoting responsible water use: The aim is to encourage students to adopt water-saving habits like reducing water consumption, fixing leaks, and using water-efficient appliances and fixtures.
4. Considering the social and environmental impacts: This involves discussing the broader implications of water management decisions on public health, ecosystems, and the overall sustainability of urban areas.

Step by step/how to

Managing water resources_experiment

Prepare 2 plastic boards. One board leave empty. Other board cover with few layers of textile that will simulate soil layers. Make models of drywalls, swales, trees, lakes, shrubs... with different objects and materials (textile, plastic straws, sponge, toothpicks...) and place them on a board. After board preparation tell student to pour same quantity of water over both boards. Observe what happens with water.

Discuss with students about experiment results and the importance of healthy soil and water retention barriers.

Reflection questions

- How can we contribute to water management in urban areas?
- What specific actions can be taken to promote water conservation in urban areas?
- How can we increase awareness among citizens about the importance of water management and conservation?
- What steps have we taken to reduce water consumption in our own homes or schools?
- Are there any innovative technologies or practices that can be implemented to optimize water usage in urban areas?
- How can we engage with the community to encourage their participation in water conservation practices?

Biodiversity

Duration 180 min

Use and value diversity. Increasing biodiversity leads to more stable provision of ecosystem services and increased resilience and self-sufficiency of the system as a whole.

" Diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides.." - David Holmgren

Goal

Studying biodiversity provides valuable insights into the functioning of ecosystems and the interdependencies between species. By understanding how different species interact and contribute to ecosystem processes, we can better comprehend the delicate balance and resilience of natural systems. This knowledge is crucial for making informed decisions about conservation and sustainable management of ecosystems. .

Introduction/background

Biodiversity refers to the variety of life forms, including plants, animals, and microorganisms, that exist in a particular ecosystem or on Earth as a whole. It encompasses the diversity of species, genetic variation within species, and the variety of ecosystems and ecological processes. Biodiversity is crucial for the functioning of ecosystems, as it provides essential services such as pollination, nutrient cycling, and climate regulation. It also has intrinsic value, as each species has its own unique characteristics and contributes to the overall complexity and resilience of the planet. However, biodiversity is currently facing significant threats due to human activities such as habitat destruction, pollution, climate change, and overexploitation of natural resources. Conservation efforts are essential to protect and sustain biodiversity for the benefit of present and future generations.

Biodiversity plays a crucial role in maintaining the balance and stability of ecosystems. Each species within an ecosystem has a specific role or niche, and the interactions between different species contribute to the overall functioning of the ecosystem. This includes processes such as pollination, nutrient cycling, and pest control, which are essential for the productivity and sustainability of ecosystems.

Biodiversity provides numerous ecosystem services that are vital for human well-being. These services include the provision of food, clean water, and air, as well as the regulation of climate, disease, and natural disasters. Biodiversity also supports cultural and recreational activities, and has aesthetic and spiritual value.

Biodiversity is important for scientific and medical advancements. Many of the medicines we use today are derived from natural sources, and studying diverse species helps us understand their potential benefits for human health. Biodiversity

also contributes to scientific knowledge and understanding of ecological processes, evolution, and adaptation.

Biodiversity has intrinsic value. Each species has its own unique characteristics and contributes to the overall beauty and complexity of the natural world. Preserving biodiversity is not only a matter of practical importance but also an ethical responsibility to protect the diversity of life on Earth for future generations.

Biodiversity loss is primarily caused by human activities.

1. **Habitat Destruction:** The conversion of natural habitats into agricultural land, urban areas, or industrial zones leads to the loss of biodiversity. Deforestation, land clearing, and fragmentation of habitats disrupt ecosystems and displace many species.

2. **Pollution:** Pollution from various sources, such as industrial activities, agriculture, and improper waste disposal, can have detrimental effects on biodiversity. Chemical pollutants can contaminate water bodies, soil, and air, harming both aquatic and terrestrial species.

3. **Climate Change:** The alteration of global climate patterns due to human-induced greenhouse gas emissions has significant impacts on biodiversity. Rising temperatures, changing precipitation patterns, and extreme weather events can disrupt ecosystems, affect species' habitats, and lead to shifts in species distributions.

4. **Overexploitation:** Unsustainable harvesting of natural resources, such as overfishing, illegal wildlife trade, and excessive logging, can deplete populations of species and disrupt ecosystems. This can lead to the loss of biodiversity and the collapse of ecosystems.

5. **Invasive Species:** Introduction of non-native species into new environments can have detrimental effects on native species and ecosystems. Invasive species can outcompete native species for resources, disrupt food chains, and alter ecosystem dynamics.

6. **Fragmentation and Habitat Loss:** Fragmentation of habitats due to infrastructure development, such as roads and dams, can isolate populations and limit their ability to migrate or find suitable habitats. This can lead to reduced genetic diversity and increased vulnerability to extinction.

Addressing these causes of biodiversity loss requires collective efforts, including sustainable land use practices, pollution reduction, mitigation of climate change, responsible resource management, and measures to control invasive species. Conservation efforts, protected areas, and international agreements also play a crucial role in preserving biodiversity.

Biodiversity loss has significant consequences for both ecosystems and human societies.

1. **Ecosystem Disruption:** Biodiversity loss disrupts the delicate balance of ecosystems. When species disappear, it can lead to imbalances in food chains, reduced resilience to environmental changes, and decreased ecosystem stability. This can result in the loss of important ecosystem services, such as pollination, nutrient cycling, and natural pest control.
2. **Decline in Ecosystem Productivity:** Biodiversity loss can lead to a decline in ecosystem productivity. As species disappear, the efficiency of ecosystem processes, such as photosynthesis and nutrient cycling, can be compromised. This can have cascading effects on the availability of resources, such as food and clean water, which are essential for human well-being.
3. **Increased Vulnerability to Climate Change:** Biodiversity loss exacerbates the impacts of climate change. Healthy ecosystems with diverse species are better able to adapt to changing environmental conditions. However, when biodiversity is reduced, ecosystems become more vulnerable to the effects of climate change, such as extreme weather events, habitat loss, and shifts in species distributions.
4. **Loss of Medicinal Resources:** Many medicines and drugs are derived from natural sources, including plants, animals, and microorganisms. Biodiversity loss reduces the availability of these resources, limiting our potential for discovering new treatments and cures for diseases.
5. **Economic Impacts:** Biodiversity loss can have significant economic consequences. Industries such as agriculture, forestry, and fisheries rely on healthy ecosystems and diverse species for their productivity and profitability. The decline of biodiversity can lead to reduced crop yields, decreased fish stocks, and increased vulnerability to pests and diseases, impacting livelihoods and economic growth.
6. **Cultural and Social Impacts:** Biodiversity loss also affects cultural and social aspects of human societies. Many indigenous and local communities have deep cultural and spiritual connections to their natural environments, which are often rich in biodiversity. The loss of species and ecosystems can erode cultural traditions, disrupt traditional practices, and impact the well-being and identity of these communities.

It is important to address biodiversity loss and take proactive measures to conserve and restore biodiversity. The conservation of biodiversity is crucial for the well-being of both ecosystems and human societies, and it is essential for maintaining a sustainable and resilient planet.

Learning objectives

- insights into the functioning of ecosystems and the interdependencies between species.
- recognition of the importance of preserving and protecting species and their habitats.
- strengthening environmental awareness and encouraging responsible stewardship of the planet

- understanding the consequences of human activities on biodiversity loss

ljudskih aktivnosti na gubitak bioraznolikosti

Step by step/how to

1. Presentation - (45 min) - we present the network of interrelationships and the connection of ecosystem elements with clearly indicated benefits for these elements and especially for humans. We point to examples of disruption of ecosystem biodiversity and the consequences it leads to.
2. Making a hotel for insects as an example of biodiversity conservation (according to the instructions for making it attached to the lesson). Before construction, or during the introductory presentation, the functions and uses of insect hotels are explained.
3. Positioning the hotel for insects in the garden or in the meadow. According to what we learned from the lessons on terrain analysis, we choose a suitable place to set up the insect hotel and its positioning in relation to other elements. We analyze what insects need to survive in the hotel during the winter and what to do after leaving it, and how to create the necessary conditions (seeding a flower meadow).

Reflection questions

1. How does biodiversity contribute to the stability and resilience of ecosystems?
2. What are some of the major threats to biodiversity and how can they be addressed?
3. How does biodiversity support human well-being and provide ecosystem services?
4. What are the economic implications of biodiversity loss?
5. How can individuals and communities contribute to the conservation of biodiversity?
6. What are some successful examples of biodiversity conservation efforts?
7. How does climate change impact biodiversity and what can be done to mitigate its effects?
8. How does biodiversity contribute to food security and agricultural productivity?
9. What are the ethical considerations surrounding the preservation of biodiversity?
10. How can we raise awareness about the importance of biodiversity and promote sustainable practices in our daily lives?

Nuggets:

<https://youengage.me/p/6610ce7b06ab4a010009b558>

Good economy

The term 'economy' refers to the entire system that includes the production, distribution, and consumption of goods and services in a particular region or country. However, current economic models are not sustainable and have a negative impact on the environment. Students will learn about 'good economy' and its models that incorporate the three main ethics of permaculture: earth care, people care, and fair shares.

Goal

Aim is to introduce models for economic organization that support the development of sustainable and resilient communities while respecting permaculture ethics: care for people, care for the planet, and fair distribution.

Introduction/background

The economy refers to the overall system that encompasses the production, distribution, and consumption of goods and services within a particular region or country. It involves various factors such as businesses, industries, markets, financial institutions, and individuals. This system plays a crucial role in the overall well-being and development of a society.

Economy today also faces challenges. These challenges include income inequality, environmental sustainability, access to resources, and economic stability. Efforts are being made to address these issues through initiatives such as sustainable development goals, fair trade practices, and responsible business practices.

It is not possible without new or fairer and more sustainable foundations of the economy realize the three ethical principles of permaculture: care for people, care for the planet and fair distribution.

Within the context of permaculture, the economy focuses on designing systems that are economically viable, socially just, and environmentally sustainable. It involves strategies such as localizing production and consumption, supporting regenerative businesses, promoting fair trade, and minimizing waste.

A good economy is an economy that:

- supports the quality of life in the entire community
- creates plenty of opportunities and possibilities to satisfy our needs without endangering others
- accepts responsibility and fosters solidarity
- fairly uses and shares resources

→ respects the sustainability of the ecosystem. (Šimleša, 2015)

Models of good economics

There are several models and approaches to defining a good economy, each with its own set of principles and goals. These models are not mutually exclusive, and elements of each can be combined to create a more comprehensive approach to the good economy.

Fairtrade

Fairtrade is all about ensuring that producers are paid fair prices for their products, promoting sustainable production, and supporting social and environmental standards.

Fairtrade aims to guarantee that producers receive fair prices for their products, which helps to cover the costs of sustainable production. To support the primary producers, we agree to pay a slightly higher amount than the amount which is paid for the same product from local supermarkets or shopping centers.

Fairtrade aims to empower small-scale producers by providing them with direct access to markets, eliminating middlemen, and enabling them to negotiate better deals.

Fairtrade encourages sustainable farming and production methods that minimize negative environmental impacts. This includes promoting organic farming, biodiversity conservation, and responsible resource management.

Fairtrade works towards ensuring safe and fair working conditions for workers, such as prohibiting child labor, guaranteeing reasonable working hours, and promoting gender equality.

Fairtrade aims to support community development projects, such as building schools, healthcare facilities, and infrastructure, using a portion of the fair trade premium paid by buyers.

Ethical banks

Ethical banks, also known as sustainable banks or socially responsible banks, are financial institutions that prioritize ethical and sustainable practices in their operations.

Ethical banks typically have a set of values and principles that guide their decision-making. They aim to support projects and businesses that adhere to social and environmental criteria, such as promoting renewable energy, fair trade, sustainable agriculture, or affordable housing. They also tend to avoid financing activities that are harmful to people or the planet, such as fossil fuel extraction or arms manufacturing.

In addition to their lending practices, ethical banks often focus on transparency and accountability. They strive to be open about where customers' money is invested and ensure that it aligns with their values. Some ethical banks also engage in impact

investing, directing funds towards initiatives that create positive social or environmental outcomes.

Cooperatives

Cooperatives are a unique form of business organization that prioritize democratic decision-making, shared ownership, and the well-being of their members. They operate on the principle of "one member, one vote," ensuring that each member has an equal say in the cooperative's affairs, regardless of their level of investment.

Cooperatives can take various forms, such as consumer cooperatives, worker cooperatives, agricultural cooperatives, or housing cooperatives. They are driven by the needs and interests of their members, who come together to meet common goals, whether it's access to affordable goods and services, fair employment, or secure housing.

One of the key advantages of cooperatives is their focus on people and their communities. They aim to provide benefits to their members rather than maximizing profit for external shareholders. This often leads to fair pricing, quality products and services, and a commitment to local economic development.

Cooperatives also foster a sense of solidarity and collaboration among their members. By pooling resources and sharing risks, they create opportunities for individuals to collectively achieve what they might not be able to accomplish on their own. This cooperative spirit can lead to increased social cohesion and a stronger sense of community.

Local and regional currencies

Local and regional currencies are alternative forms of currency that are used within specific communities or regions as a complement to national currencies.

The concept behind local and regional currencies is to encourage people to support local businesses and keep money circulating within the community. By using these currencies, individuals can make purchases from local merchants, service providers, and producers, thereby boosting the local economy. They encourage people to engage with local businesses, build relationships, and support sustainable local practices. This, in turn, helps create jobs, increase local self-sufficiency, and reduce dependence on external sources. These currencies can help reduce the impact of economic fluctuations on the local economy, as they are not subject to the same global market forces as national currencies.

These currencies often operate alongside national currencies and have their own distinct features. They can be physical currencies, like paper notes or coins, or digital currencies that are managed through online platforms or mobile applications.

The social and solidarity economy (SSE)

The social and solidarity economy (SSE) encompasses a wide range of organizations and initiatives, including cooperatives, mutuals, nonprofits, social enterprises, and community-based organizations.

The SSE aims to address social, economic, and environmental challenges by prioritizing the well-being of individuals and communities over profit. It promotes democratic decision-making, community participation, and the redistribution of resources and wealth. By doing so, it contributes to social justice, solidarity, and sustainable development.

One of the key characteristics of the SSE is its focus on the social impact of economic activities. Rather than solely pursuing financial gains, organizations in the SSE prioritize social objectives, such as creating employment, reducing inequalities, promoting gender equality, supporting marginalized groups, or protecting the environment.

The SSE also fosters a sense of empowerment and inclusion. It often involves marginalized or disadvantaged individuals and communities, providing them with opportunities for economic participation, skills development, and social integration. By involving people in the decision-making process and ensuring equal access to resources, the SSE promotes a more inclusive and equitable society.

Furthermore, the SSE encourages collaboration and mutual support among its actors. Organizations within the SSE often engage in partnerships, networks, and solidarity-based relationships. They share knowledge, resources, and experiences to collectively achieve social and economic goals, strengthening the overall impact and sustainability of their initiatives.

„The commons“

The commons refers to shared resources or assets that are accessible to and used by a group of people. These resources can include things like land, water bodies, forests, parks, or even knowledge and cultural heritage.

The idea behind the commons is that these resources should be managed and governed in a way that benefits the entire community, rather than being privately owned or controlled for individual gain. It emphasizes the importance of collective responsibility, cooperation, and sustainable use of resources.

Historically, the commons have played a crucial role in supporting local economies, preserving biodiversity, and fostering social cohesion. In recent times, there have been challenges to the commons due to issues like overexploitation, privatization, and environmental degradation.

There are efforts to protect and revive the commons through various means, such as community-based management approaches, participatory decision-making processes, and legal frameworks that recognize and safeguard common resources.

Learning objectives

Knowledge

- To understand the aims and possibilities of a good economy. What are the models of a good economy and their implementation.

Competencies

- Understanding how economy functions today and downsides of current models. Knowledge of how implementation of good economy contributes to people and earth care and fair share.

Skills

- Application of the good economy model in the local community.

Step by step/how to

Plan and organize cooperatives in your school

1. Introduce students to the organization of cooperatives.
2. Analyze the needs of your community.
3. Based on your possibilities and resources, decide how you can contribute.
4. Together decide how your cooperative will be organized and how responsibilities will be allocated.
5. Analyze which additional resources, members/schools/producers, etc., you need and make connections.
6. Connect with the local community and introduce them to your activities.

Reflection questions

- What are the negative impacts of the economy today on people, planet and share of resources and profit?
- What are the benefits of good economy principles and models?
- Which models could be organized in my community? What are the possible obstacles to that and what are the prerequisites for organization of such model?
- How can we contribute to a fair and sustainable economy, by changing our own production and/or consumption habits?

Nugget:

<https://youengage.me/p/6611b21606ab4a010009c5c2>

Wellbeing indoors (Indoor air quality, acoustic quality, indoor materials, SBS)

Trajanje: 2 x 45 min

Various factors of the indoor environment impact on human well-being and contribute to a safe, comfortable, and healthy habitat. We will examine three important aspects: air quality, acoustic quality (noise), and the various materials we encounter indoors. By analyzing these aspects, we can understand how they influence our well-being and learn how to create an environment that promotes optimal indoor living conditions.

Learners will be introduced to the term "sick building syndrome" (SBS). SBS is a condition in which building occupants experience comfort and health effects that appear to be linked to time spent indoors.

Goal

The goal of this lesson is to introduce a new perspective towards our everyday life indoors and highlight the impact it has on our quality of life and well-being.

Familiarize learners with the main aspects of indoor well-being and measures to improve it.

Teach learners about Sick Building Syndrome (SBS), its symptoms, causes, and ways to decrease risk factors.

Explain how poor indoor air quality can affect people and emphasize the importance of indoor green spaces in removing and preventing SBS.

Introduction/background

A significant amount of our time is spent indoors, making it essential to understand and improve our indoor well-being. The well-being of individuals indoors can be influenced by several factors, including air, acoustic, and material quality of the indoor space.

Air quality: Poor air quality, caused by pollutants such as volatile organic compounds (VOCs), chemicals, allergens, and mold spores, can lead to respiratory issues, allergies, and other health problems. Good air quality, on the other hand, promotes better respiratory health and overall well-being.

Acoustic quality: Excessive noise levels in indoor spaces can lead to stress, sleep disturbances, difficulty concentrating, and decreased productivity. Creating a quiet

and peaceful environment can enhance well-being and allow for better focus and relaxation.

Material quality: The choice of materials in indoor spaces can have an impact on well-being. For example, using materials that emit harmful chemicals or allergens can ...affect indoor air quality. Choosing natural and non-toxic materials can promote a healthier and more comfortable environment.

The surroundings in which we live can also influence the air quality indoors. For instance, if an indoor space is located near a busy road or industrial area, it can be more prone to pollution and outdoor sources of contaminants. Proper ventilation systems and air filtration can help mitigate the impact of external air pollution on indoor air quality.

SBS is a condition characterized by unexplained illness or discomfort experienced by individuals in enclosed spaces, often caused by poor indoor air quality. Sick Building Syndrome refers to a range of symptoms experienced by individuals who spend time in a particular building as headaches, dizziness, fatigue, and respiratory issues. The occurrence of Sick Building Syndrome (SBS) can be influenced by the space in which individuals live, study, or work. Factors such as poor ventilation, the presence of indoor pollutants, high humidity levels, inadequate lighting, and lack of natural elements can contribute to SBS symptoms.

Individuals can affect their well-being indoors by taking certain measures:

- Ensuring good ventilation and air circulation in indoor spaces.
- Regularly cleaning and maintaining indoor spaces to prevent the buildup of dust, mold, and other allergens.
- Selecting non-toxic, low VOC materials and furniture for indoor design.
- Minimizing noise pollution through sound insulation and using acoustic materials.
- Choosing greenery and plants to improve air quality and aesthetics.

Adding indoor plants can help improve indoor air quality and mitigate various concerns related to building pollutants and sick building syndrome. Here are some points to consider:

Air Purification: Certain plants have the ability to absorb harmful pollutants from the air through a process known as phytoremediation. They can remove volatile organic compounds (VOCs) and other toxins, such as formaldehyde and benzene, which are commonly found in indoor environments.

Moisture Regulation: Plants release moisture through a process called transpiration, which can help regulate indoor humidity levels. Plants can add natural moisture to the air and prevent it from becoming too dry or too damp.

Natural Alternatives for Cleaning: It is important to be mindful of the chemicals used for cleaning surfaces and floors indoors, as many commercial cleaning products contain harsh ingredients that can worsen indoor air quality. Switching to natural alternatives, such as vinegar, baking soda, or plant-based cleaners, can provide effective cleaning while minimizing the release of harmful substances into the air.

Noise Reduction and Pollution Prevention: Planting evergreen trees near roads and buildings can act as natural barriers and help reduce noise from outside sources. These trees can also serve as a protective barrier against excessive pollution, preventing pollutants from reaching indoor spaces.

Additionally, the presence of greenery can have psychological benefits, promoting feelings of relaxation, well-being, and connection to nature.

Learning objectives

- To learn about common chemical elements found in indoor air, their sources, and potential health effects.
- To learn about the influence of nearby busy traffic on air quality and the potential pollutants emitted.
- To gain knowledge about possible causes and effects of SBS and preventive measures that we can take.
- To gain skills in selecting natural and safe materials for indoor design, including considerations for low VOC options and sustainable choices.
- To gain skills on using plants as air filters, including plant selection, placement, and care.
- To develop a well-rounded understanding of indoor air quality, sick building syndrome, and the use of plants as a preventive measure.

Step by step/how to

Plants for prevention of SBS / Poster making

1. Divide the learners into 3-5 small groups
2. Introduce the learners with theory of SBS and give them material on this subject.
3. Provide them with materials on indoor plants and their characteristics.
4. Analyze interior building (building materials, paints, adhesives etc) and surroundings (roads, external sources of pollution etc)
5. Each group has 15-20 minutes to connect possible causes/effects of SBS with plants whose characteristics can help to prevent them.
6. After they are finished, discuss their findings.
7. Make a poster on which you will place pictures of a plants connected with SBS effect that can be prevented.

Reflection questions

- How is well-being indoors influenced by air, acoustic and material quality of the indoor space?
- How do the surroundings which we live in influence the air quality indoors?
- How can you affect your well-being indoors?
- Why is it important to recognise the impact of the indoor environment on our health and well-being ?
- How does space where we live/study/work affect the occurrence of SBS?
- What happens if we ignore this effect?
- How can we prevent or minimize SBS by usage of green indoor spaces?

Nuggets:

<https://youtu.be/0BbbH0wEwfl>