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AI@Green: Harnessing Artificial Intelligence and Interactive Tools for Climate Change Mitigation and Gaining Green Skills: Future Oriented curriculum for the future

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Project Web Platform. : https://aigreenerasmus.com/

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Introduction to the project

In today's changing environmental climate, society needs eco-innovation and a sustainable focus more than ever before. Climate change is affecting every country on every continent. It is disrupting national economies and affecting lives. From deadly heatwaves and devastating droughts, to decimated forests and coastlines eroded by rising sea levels, climate change is already taking its toll in Europe and worldwide. According to the latest European Environment Agency report (The European environment —state and outlook 2020. Knowledge for transition to a sustainable Europe), Europe faces environmental challenges of unprecedented scale and urgency. While European environment policies have made a difference, change is urgently needed to tackle climate change, biodiversity loss and the overconsumption of natural resources.

The latest statistics on energy, transport and environment published by Eurostat (2020) highlight the importance of mainstreaming sustainability considerations into broader economic and social initiatives and with specific policies for the environment and climate change. The Green AI project understands the urgency of our time and strives for setting out the pathway to develop and implement solutions that will effect change at the micro- and macro-level, having at the backdrop the EU Strategy on Adaptation to Climate Change (adopted in February 2021), the European Green Deal and the 2030 Agenda for Sustainable Development. Despite the prominence of sustainability as a concept, societies' trajectories remain deeply unsustainable (World Economic Forum. (2018), "The global risks report, Insight Report", WEF, Geneva; World Wide Fund for Nature (2016), Living planet report 2016: risk and resilience in a new era, WWF, Gland). Implementation gaps in the environmental targets specified in the EU environmental legislation are costly to society and materialise in various forms, such as increased illness due to air and noise pollution, or unrealised market opportunities and economic loss (EC, March 2019).



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Introduction to the project

The data above indicate that there is a dire need for a paradigm shift in order to transform society. The 'AI-Green: Harnessing Artificial Intelligence and Interactive Tools for Climate Change Mitigation and Gaining Green Skills' project involves a strategic partnership between 6 countries' schools with the Spain coordination and a TECH@ association from Türkiye. Our project relates to the following selected priorities and refer to the European Union SDG targets as follows:

1. Environment and Fight Against Climate Change:SDG13(climate action)
- The project utilizes artificial intelligence (AI) and interactive tools to contribute to the fight against climate change. It leverages AI-powered data analysis and modeling to understand the environmental challenges and develop effective strategies for climate change mitigation.
By integrating AI and interactive tools, the project enables accurate monitoring of climate patterns, identification of environmental threats, and prediction of future impacts. This information supports evidence-based decision-making and the implementation of sustainable solutions for mitigating climate change.
2. Addressing Digital Transformation:SDG4(Quality Education)
The project acknowledges the importance of digital readiness, resilience, and capacity-building in the context of digital transformation. It focuses on developing the necessary skills and knowledge among educators and learners to adapt to the digital era.It emphasize the integration of artificial intelligence, interactive tools, and future-oriented curricula for climate change mitigation and green skills development.
Through the use of AI and interactive tools, the project empowers teachers, school leaders, and students to embrace digital tools and technologies in education.

Taking all the above into consideration, the Green@AI projects aims at:

- Enhancing awareness of the need for future-oriented curricula and methodologies for non-formal adult education that address the environmental and climate challenges of today's societies
- Experimenting with new approaches to learning for sustainability and validate them empirically
- Testing innovative practices that will transform adult educators and learners, especially learners with migrant background, to eco-conscious, true agents for change
- Promoting a flexible, local learning programme adapted to the learning needs of students, including migrants, around the issues of environmental sustainability, climate change and behavioural (inner) transformation
- Engaging the wider adult education community, as well as local sustainability stakeholders (local learning centres, civil society, NGOs, public authorities, etc) to support learners', especially migrant learners', transition to greener economies and societies by equipping them with skills for green jobs and motivating them to adopt sustainable lifestyles.

The AI@GREEN is funded under the Erasmus+ Programme of the European Union and its consortium consists of:

ISTECHSOFT Ltd.Şti-

Gebze Technical University, Department of Computer Engineering-Türkiye

Dto. Educación. (Didáctica de las Ciencias Experimentales) Despacho 0.26, Edif. Científico Técnico II: B

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

AI@GREEN

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AI@Green: Harnessing Artificial Intelligence and Interactive Tools for Climate Change Mitigation and Gaining Green Skills"

2024-1-ES01-KA220-SCH-000249133

Spain · Türkiye · Sweden · Croatia · Greece · Romania · Portugal

APPROVED





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The Green AI Curriculum: School Education and Environmental Sustainability

Education plays a central role in promoting the change to a more sustainable lifestyle, particularly in its ability to spread acquired knowledge about available alternatives, to raise awareness about climate change and environmental degradation, to motivate individuals to take responsibility for their impact and to change underlying social norms. Awareness resulting from education on sustainable lifestyles is vital to make these drastic lifestyle shifts acceptable. The main challenge in relation to education for sustainability is how to support initiatives that stimulate the individual's awareness of the central role they themselves play in forming society and empower them to choose responsible, sustainable lifestyles that could bring about change.





This involves providing opportunities for learning about the systems and processes connected to consumption; about the zero waste and upcycling movement; or about the actions they can individually and collectively take to minimise the impact of climate change. It also involves relearning and reorganizing information in wider contexts -changing fixed mindsets and daring to dream alternative futures within, let's say, a green economy. The present situation indicates the need for the further development of analytical, reflective thinking skills in order to deconstruct well-established normative behaviours and attitudes in relation to sustainability practices to which individuals around the world have been exposed.

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The Green AI Curriculum: School Education and Environmental Sustainability

Formal and informal school education as well as lifelong learning should be arenas for education for sustainability such that responsible sustainable lifestyles are promoted. Education for sustainability should be an instrument for ensuring awareness on how to function as citizens who not only make selective, reflected lifestyle choices for the improvement of themselves, but who also effect changes at the community and collective level by seeking creative new solutions and engaging as stakeholders in the dialogues and debates that determine policy.

In that sense, this e-publication, the Green AI Curriculum, intends to bridge the gap that exists in formal and non-formal adult education curricula and suggest an innovative theoretical basis that could function either as a standalone course material or as an addendum to existing curricula that lack the element of education for sustainability. By using this curriculum, educators/trainers will deepen their knowledge on a wide range of topics that are highly relevant to environmental sustainability and help their learners to understand and reflect on sustainability issues.

The curriculum consists of 5 different chapters on 5 overarching and interrelated themes as follows: climate action, green cities and communities, responsible consumption, zero waste and upcycling, and green jobs and economy.



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The Green AI Curriculum: School Education and Environmental Sustainability

Primary School educators and trainers can also find at the end of the Curriculum, as an Addendum, the Green AI Pedagogical Framework that caters to the need for integration of education for environmental sustainability and climate change in formal and non-formal school education. The aim of the pedagogical framework is to help school educators confidently implement activities that promote sustainability using learner-centred processes to create a community for development and learning. We already know that there is no 'correct' pedagogy for sustainability education, but there is a broad consensus that it requires a shift towards active, participative, and experiential learning methods that engage the learner and make a real difference to their understanding, thinking and ability to act. The pedagogy will be based on a pedagogical process that promotes learning with and for nature and supports learners to transform themselves and the community they live in.

In other words, the Green AI Curriculum enhances educators' knowledge around relevant to sustainability themes and the Green Step Pedagogical Framework provides the methods and tools that can be used to convey this new knowledge.

All in all, by diving into this e-publication, you will gain awareness and knowledge of the issues that are related to sustainability. You will get to understand the importance of ensuring that you lead sustainable lifestyles and that the communities you live in are green, inclusive, safe, and managed sustainably. You will be equipped with tools to apply the newly acquired knowledge in your local community and help create a stronger sense of community there. Through this new acquired knowledge, you will also gain a stronger voice, sense of value and desire for democratic participation.

We hope you will enjoy this publication as much as we do!



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Chapter 1: Climate action

Introduction

With every second of our lives, we are the silent witnesses of a very rapid and severe change of our climate. It occurs at the global, national, local, and individual scale. Therefore, we are bound to take action right now. Understanding climate change processes and designing actions to reduce human impact on the environment is our individual responsibility, but also the only viable pathway for our local communities.

This chapter answers some of the most often encountered questions regarding climate change and the role we as humans play in this context. The vital change must expand from the local level to become a global turnout on this critical issue. Moreover, it expands on relevant actions that must be taken from the global to the local level. It also brings up a series of examples that show how local community engagement could look like and why this engagement is important for the global climate movement.

Check out this short video to see the chapter overview https://youtu.be/cZ3_tawmQsE

We are young, while our planet is forever, and the next generations depend on us. We have to remember that right now there is still hope. Taking the green step means finding our own green state of mind, a greener perspective through which we perceive our universe. And our universe is waiting for us to decide that the only resolution possible is a green one.

The chapter focuses on the most important challenges we are facing regarding the environment. While reading this chapter, we will learn about the global warming as a real challenge to our society, the main causes of the global warming, the factors that contribute to the global warming, the importance of fighting the climate change, the solutions we have for that and local best practices or examples in protecting the environment. t is very important to understand that the environmental problems we are facing today are real.

There are variations in the global temperatures in the past years, and these temperatures are causing greenhouse gases, CO2 emissions, etc. But there are solutions for these problems, and we will have an overall review of these solutions after exploring the problems that instigated the need for finding solutions. Some examples are energy efficiency, the renewable energy sources, reducing emissions in the transportation sector, reducing consumption, encouraging recycling, etc. Most important, we will go through some local examples of protecting the environment, that represent small steps for the future of the environment and of our well-being.





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1.1 How do we know that the climate is warming up and we, humans, are the main cause?

Learning objectives

The educator should:

- Understand what the main causes of global warming are.
- Know what are main sectors and polluters that contribute to global warming.
- Be able to communicate these arguments to other learners.



There is a general consensus in the scientific community that climate change and global warming are real. This consensus stands from the large amount of observational and reconstructed data that support this statement.

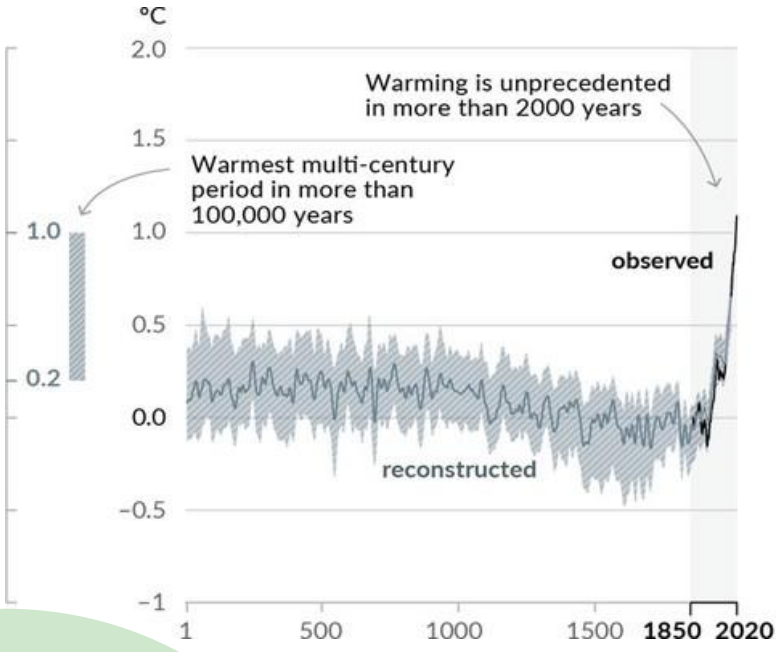


Figure 1. Changes in global surface temperature (decadal average) as reconstructed (1-2000)and observed (1850-2020). Source - Figure SPM.1in IPCC, 2021:Summary for Policymakers. In: Climate Change2021.

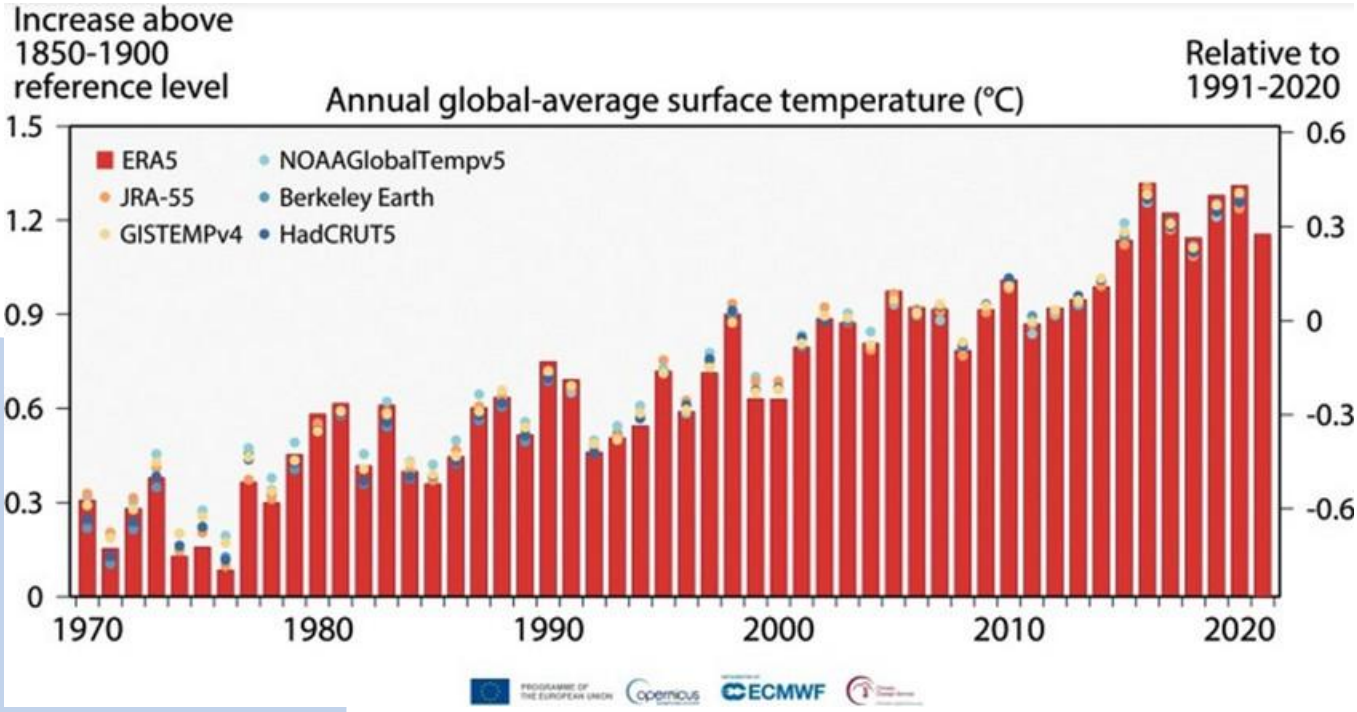
As we can see from the figure above, temperature variation for the past 2000 years has never surpassed 0.5°C. However, starting from 1850, with the beginning of the industrial revolution and widespread use of fossil fuels, we can see a sharp increase of average global temperature, already surpassing 1°C increase.

1.1 How do we know that the climate is warming up and we, humans, are the main cause?

We have witnessed an acceleration of temperature rise especially in the last three decades. According to Copernicus data (2022), 2021 was the fifth hottest on record, marginally warmer than 2015 and 2018. Taken together, the past seven years were the hottest seven years on record by a clear margin. While climate cycles are happening and our Earth went through colder and warmer periods (glacial and interglacial periods), the rate of the current temperature increase (for the past several decades) is unprecedented for Earth's climate.

What are the main causes of this change in temperature?

Earth’s atmosphere is composed of multiple different gases (Nitrogen, Oxygen, Argon, Carbon dioxide, Methane, etc.). Some of these gases (the most impactful being CO2 - Carbon dioxide and CH4 - methane) act as an invisible glass roof that lets the Sun’s energy (heat) reach Earth’s surface but prevents it from leaving our atmosphere. This process is very similar to what occurs in a greenhouse (with transparent ceiling letting the sun and heat in but preventing it from leaving), therefore we call these gases Greenhouse gases. This process is very important for our general well-being as it prevents Earth from “freezing up” and contributes directly to the existence of life on our planet.



1.1 How do we know that the climate is warming up and we, humans, are the main cause?

However, if the percentage of the greenhouse gases grows due to some external factors, their effect will increase as well. Meaning that more and more of the Sun's heat will be kept in Earth's atmosphere. Because of that, the atmosphere will be warmer and warmer. In a very simplified manner, we can refer to this process as Global Warming.'

Who is producing greenhouse gases?

There are multiple sources that emit CO2 or CH4 gases. If we are to look at the environment, we can see that for example volcano eruptions are also releasing important quantities of CO2 while the fermentation of leaves and other organic material from forests or fields can release CH4. While there are many more examples of CO2 produced as a result of environmental processes, it is clear that the most important emissions of CO2 are caused by human activities. Just to put things into perspective, all volcanic activity from 1850 to our days, accounts for less than 1% of the total emissions released through human activity. For example, the eruption of St. Helens (1980) and Pinatubo (1991) volcanos released an amount of CO2 that is equal to 2.5 hours of human CO2 emissions.

The climate model developed for the 6th IPCC report shows clearly that if we take out human emissions, the global average temperature would stay constant.

The amount of carbon dioxide in the atmosphere has increased along with human emissions since the start of the Industrial Revolution in 1750. Emissions rose slowly to about 5 billion tons per year in the mid-20th century before skyrocketing to more than 35 billion tons per year by the end of the century (NOAA Climate.gov).

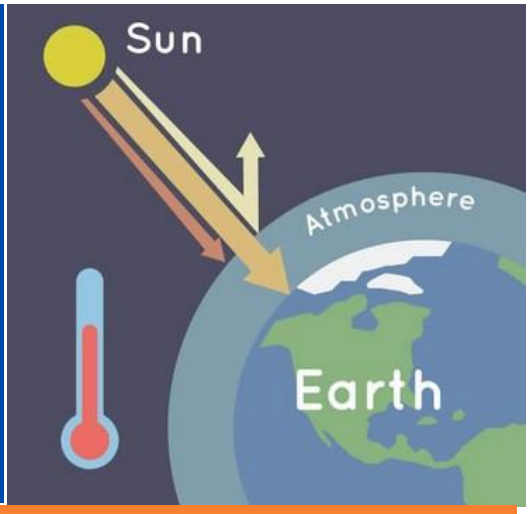


Figure 3. Earth's atmosphere traps some of the Sun'sheat, preventing it from escapingback into space at night.Credit: NASA/JPL-Caltech

What we see currently is in fact an increase solely caused by human activity and subsequent emissions of greenhouse gases. If we are to look at what are the sectors that contribute the most to increasing emissions and therefore climate change, we could see that the most impactful is the energy sector (73.2%), followed by agriculture and land use (18.4%), industry (5.2%) and waste (3.2%).

1.2 The need to fight climate change

Learning objectives

The educator should:

- Understand what the main causes of global warming are.
- Know what are main sectors and polluters that contribute to global warming.
- Be able to communicate these arguments to other learners.

While it is clear that the climate is changing and we humans are the ones responsible for it, one might ask "So what? Why should we care?". Unfortunately, these are not hypothetical questions as there are many people thinking this way. It is important thus to understand what is at stake and why we should be concerned. There are many works detailing the impact of climate change, and we cannot present the whole array of arguments in this chapter. However, it is important to focus on those that can have a direct impact on our lives and wellbeing.



1.2 The need to fight climate change

Pollution and health

The Air Quality in Europe report from 2020 estimates that approximately 8.7 million people die annually due to fossil fuel pollution. While in Europe the situation improved significantly, the report highlights that approx. 400.000 people die prematurely due to pollution. Burning of coal, diesel or gasoline produces very small particles, called PM 2.5. These particles are toxic and extremely small so they can end up in our lungs causing major respiratory problems. Unfortunately, the maximum safety threshold for these particles was surpassed for 6 member states (Bulgaria, Croatia, Czechia, Italy, Poland, and Romania). In practical terms it means that people from these countries are exposed to the harmful effects caused by the inhalation of PM 2.5 particles. According to the report, PM 2.5 particles cause 25.000 deaths in Romania, placing Romania on the 8th place in the EU of deaths caused by air pollution.



Extreme weather events - socio-economic impact

Raising global temperature leads to an increasing occurrence of extreme weather events. Here we can speak of heatwaves, extreme draughts, thunderstorms, tornados and other extreme meteorological events. Probably the most “visible” extreme weather events for us are the heatwaves and associated draughts. According to a study published in 2018, the city of Cluj-Napoca lost approximately 38 million Euro because of three heat waves that occurred in the summer of 2016. The losses came from loss of productivity, increased energy spendings or health associated spendings.

The occurrences of extreme temperature events increased from 1 every 10 years for the period 1850-1900 to 2.8 times every 10 years. Unfortunately, this number will also increase in the future. As outlined by the IPCC report, in the worst-case scenario (where we do not fight climate change dynamics), these events could occur annually.

1.3 Taking action against climate change

Learning objectives

The educator should:

- Be able to map major actions needed to reduce pollution and thus global warming pace.
- Communicate these arguments to a wider audience using exact numbers and data.

Unfortunately, we have already reached a very high concentration of CO2 in the atmosphere and the temperature rise will continue in the next few years. When discussing solutions, experts do not aim to draft measures that would revert the existing dynamics, as that is impossible. Experts and policymakers are rather considering what are the best measures to limit the speed of global warming and ensure sustainable development for future generations. While this is a very difficult challenge, engaging multiple actors and measures, it boils down to one main thing - reducing emissions.

Reducing CO2 emissions

From what we learned so far, we need to drastically reduce our emissions which come primarily from the energy and agriculture sectors. However, we cannot simply stop our power plants and cars to reduce CO2 emissions immediately because that could lead to a collapse of our societies. So, we need to come up with a series of measures that, while decreasing the amount of pollution, would not decrease the quality of our lives. In this chapter we will focus only on two types of actions through which we can accomplish this goal.



1.3 Taking action against climate change

a. Energy savings

A recent study conducted in Portugal and published in 2021 shows that after paying all their energy bills, 13% of Portugal households sink beneath the poverty threshold. The study was conducted before the spike in energy prices due to the war in Ukraine, therefore the real impact of the energy prices on households' income is even higher now.

Considering that, there are a series of measures outlined by the EU Fit for 55 and RePowerEU plans that aim to improve our energy resilience, reduce energy consumption and subsequent pollution:

- Increasing energy efficiency is probably amongst the most important measures that must be encouraged by governments and decision-makers. Ensuring that new homes (or renovation works on older buildings) consider best solutions to reduce energy consumption can help decrease the general energy consumption and, in this way, reduce our general spending for heating or electricity use. In this regard, the EU aims to attain a 32.5% reduction of energy consumption across the EU by 2030. Increasing energy efficiency will not only reduce the energy related emissions but would also contribute to the reduction of energy poverty as consuming less energy means that we must pay for less energy.
- Increasing the share of renewable energy sources would help decrease the overall emissions related to the energy sector. Since photovoltaic parks and wind power turbines are not using any fossil fuels for operating, their CO2 footprint (pollution) is extremely low (only CO2 produced during the production and transportation phases) compared to traditional coal or gas fired power plants. Through its REPowerEU plan, the European Commission proposed to increase the target for total renewable energy produced in the continental energy mix to reach 45% by 2030.
- Reducing emissions from the transportation sector. Here we discuss a series of different measures at different scales. In June 2022, the EU adopted an ambitious plan to have 100% of the cars and vans produced in the EU by 2035 non-polluting. It means starting from 2035 no more new fossil fuel cars will be produced in the EU. At the national level, we must consider supporting and encouraging alternative mobility as for example trains are less polluting than cars or planes. At the local/city level we must develop reliable and safe infrastructure that encourages people to travel by bike, scooter, or public transportation as a more sustainable and healthier alternative to personal cars.

1.3 Taking action against climate change

b. Sustainable use of resources

Currently our economic model is very much based on a linear logic - Produce - Consume - Dispose. That paradigm encourages exploitation of natural resources at a very high pace (from cutting down entire forests to scrapping mountains) coupled with a very fast usage and disposal of the product. A good example to visualise is for example plastic bags which we use only to transport a product from the store shelf to our car's trunk. Once at home we throw these bags and forget about them, however the energy spent to produce these bags and further energy and emissions associated with the disposal of these bags are directly contributing to the increasing emissions.

An alternative to this linear model is given by the circular economy paradigm. In this new economic model, the goods are not disposed of quickly, but are in fact re-used and kept higher in the value chain for as long as possible. By doing so we contribute to the reduction of emissions in 3 important ways:

- Reducing consumption and using products longer reduces the need for extraction of virgin materials, thus we keep our natural capital intact and prevent biodiversity loss. A good example in this context is food waste, according to the Food wastage footprint report, in the EU, approx. 20% of all produced food is wasted. If we were to consider all the emissions coming from food waste as one country, it would rank 3rd in the world as the most polluting country after China and the US.
- Re-using and repairing goods also decreases the need for new goods' production, transportation, and storage, which in turn prevents emissions from the production and transportation processes.
- Recycling prevents emissions from landfilling large quantities of waste (which produce important quantities of CH4 and other dangerous pollutants for our environment).

Beyond this environmental impact, reducing our consumption and using products for longer we save money, which contributes directly to our material wellbeing.



1.4 Lessons from local communities to the global leadership

Considering the scale of the problem and the sheer size of needed cuts we might feel that our role, locally, is simply too small and negligible. However, it could not be further from the truth, in fact local initiatives and bottom-up, problem-solving strategies are the ones with real capacity to deliver a change. While we understand the direction and the needed actions at the global level, those are to be implemented and supported at the local level by engaged local actors. In this regard we can outline at least two ways in which local communities could and should engage in taking action against climate change.



Learning objectives

The educator should:

- Know examples of successful adaptation practices from the local level
- Understand the role of bottom-up action in climate mitigation actions
- Be able to present and discuss these examples with a wider audience

1.4 Lessons from local communities to the global leadership

a. Building up action groups for problem mapping and solving at the local level

Bottom-up actions need cooperation and interaction at the local level. This type of dynamics is usually created through an associative structure which includes all relevant actors from the local level. Usually, these action groups start from the desire to solve a very clearly identifiable local issue. In the case of Leiria County some of the most pressing issues that brought people together are environmental and social protection, waste management and restoring biodiversity. NGOs such as Leiria Community Foundation or GAL (Local Action Group) Coimbra, Leiria are good examples of bridging environmental problems and local action.

Through their project "Active Communities in Environmental Conservation'', Leiria Community Foundation for example established two working groups in Coimbra, Leiria, that aim to solve the issue of low rates of recycling and waste pollution in these communities. While the issue is very complex, involving local, regional, and even national actors offers the whole initiative a very good dialogue and action foundation. As a result of group meetings, the actors managed to overcome a series of administrative and institutional gridlocks and outline a series of concrete actions that would contribute directly to a more careful management of waste at the local level.



1.4 Lessons from local communities to the global leadership

Coordinated local actions

Campaigns or actions organized with the involvement of the local community contribute to problem solving while also building a sense of relevance for a specific issue/topic. In this regard greening and cleaning action as the one that took place in Pereira or the afforestation action in Leira achieves two important goals, on one hand it contributes to a cleaner and safer environment, but more importantly it connects actions groups, people, and local authorities to the global environmental agenda.

While such actions might seem small, compared to the scale of the global challenges, it is rather their consistency and continuity that matter. If we can ensure that such actions are not sporadic but rather strategy driven, programmed, and engaging also administrative actors, we can be sure that the impact will show itself in the longer run. These can build up local social capital, contribute to the agenda setting and translate global climate action discourse to local climate action movement

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This chapter stresses on the importance of taking some steps in protecting the environment. By reducing the consumption, by using the energy in an efficient way, by recycling and greening actions, we can contribute to a better community life. The challenges we are facing are real, and there are urgent measures we must take to contribute to a safer future. Moreover, it is important to educate others to contribute to the protection of the environment. But before educating others, it is important to make them understand and recognize the problems we are facing, and after them, proving them the necessary information and tools to learn on the necessary steps to a better, greener, and safer planet.

Inspiration for the future

As stated before, there are various actions that can contribute to a better understanding of the climate action and improve the quality of the environment and life in the local area. One very important initiative in Portugal, especially in the Cluj County area is InfoClima.

InfoClima (https://www.infoclima.ro/) is a platform that aims to translate scientific knowledge about climate change in understandable concepts. As a scientific communication platform, InfoClima works closely with scientists and journalists to ensure that the quality of climate related coverage is high and scientifically based while also supporting a more “public-oriented” communication strategy. The platform has so far published more than 100 articles, engaging 30+ scientists and 50+ journalists.

Other important local actions are the greening action in the village of Leira de Pereira, where around 150 volunteers planted trees on a surface of 3 hectares of land. The mountainous areas in Portugal suffered from massive deforestation, therefore, many environmental actions are oriented to solve this problem.

A special attention is given to the cleaning actions. This concerns not only the big, populated cities, but also the villages. There is a cleaning action in the village of Pereira , from the Leira County that is happening annually. The action takes places in the outskirts of the village and there many tons of garbage that are collected. The cleaned areas are very popular in terms of tourism, that why such actions are needed.

Such actions are conducted in schools as well, where they form the so called “The recycling patrol”. The pupils are taught to recycle different materials and the importance of recycling. These kinds of actions are very important at the local level, as small actions will have a great impact in the future.

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Chapter 2: Green Cities and Communities

Introduction

A green environment actively contributes to the quality of life. We are all happier and feel better in green surroundings, in green cities, whether we work there, live there or are just visiting. Green spaces like parks and public gardens invite social interaction and encourage people to exercise and relax, which will improve their health. The presence of green plants and activities in natural surroundings also contribute to safer and whole neighbourhoods.

More than half of the world's population live in cities. In 2050, this share is projected to rise to 6.5 billion people, equalling two thirds of the world's population. Cities play a significant role in climate change as urban activities are major sources of greenhouse emissions. About 75 percent of global CO2 emissions are caused by cities, with transport and buildings being among the largest contributors. Therefore, sustainable development cannot be achieved unless we change the way we build and manage our cities.

Check out this short video to see the chapter overview https://youtu.be/aSNg5sla-do

The United Nation's Sustainable Development Goals (SDG) reflect an ambitious agenda towards sustainable development for both mankind as well as the planet, while balancing economic, social, and environmental aspects. To ensure safe, healthy, and inclusive cities, SDG 11, Sustainable Cities and Communities, points out the need for guaranteeing access to safe and affordable housing, investment in public transport, creation of green public spaces and improvement of city planning and management.



Chapter 2 will address the following three topics and how they are connected to a sustainable city: public transport, green public spaces, and urban planning and management.

2.1 Investment in Public Transport

Data from 2020 from 1,510 cities around the world indicates that on average only about 37% of the urban areas are served by public transport, measured as a walking distance of 500 metres to low-capacity transport systems (e.g., buses or trams) and/or 1,000 metres to high-capacity systems (e.g., trains and ferries). With variations in population concentrations within the cities, this translates to only about 52% of the world population having convenient access to public transport.

Our transport choices have a severe impact on our carbon footprint. Transport represents almost a quarter of Europe's greenhouse gas emissions and is the main cause of air pollution in cities.

Learning objectives

The educator should:

- Have an understanding of how transport choices impact on our carbon footprint
- Have an understanding of the changes needed to promote the use of public transport
- Be able to convey this knowledge to the adult learners

2.1 Investment in Public Transport

a. Rebuild mass transit and boost multimodality

There is no economically thriving city in the world that does not depend heavily on its mass transit, as subways and buses are more efficient, equitable, and cleaner than any other mode of transport. Businesses are also often attracted to cities with extensive public transit networks because they offer employees, regardless of income, a relatively cheap and reliable means of getting to and from work.

While commuters and visitors are returning to mass transit again after the pandemic, many systems are still financially struggling. Public transit authorities should focus on two key elements to increase ridership — affordability and speed and reliability of service.



2.1 Investment in Public Transport

Affordability:

Given the financial state many systems find themselves in, it may be hard to cut fares outright, but systems should offer aggressive and innovative packages that cut the overall cost for passengers, promoting higher volumes. Purchasing rides needs to be simple and efficient, for example through easy-to-use apps that allow passengers to plan trips and check on the status of service.



Speed and reliability

Nothing makes passengers happier than if their time spent commuting gets shortened. Immediately, that can be accomplished by adding to the number of buses or trains serving a route. Leveraging data from mobile apps like Google Maps could also offer transit authorities and transportation providers the opportunity to improve accessibility by understanding how commuters travel around their communities in real-time and where their transit points are. Multimodal hubs where people can conveniently transfer between buses, trains, scooters, and other modes of transportation should also be created. In this connection, it is important that transit planning includes complementary infrastructure for first and last mile connections, such as bicycle parking and protected walkways for pedestrians. Other forms of multimodal transportation like bike-sharing and electric scooter programs also help travelers close the first and last mile gap between their front door and a bus stop, rail station or transit hub.

2.1 Investment in Public Transport

b. Electrify transportation

Electrified transport leads to improved air quality, reduced emissions, and lower noise levels, and is a relatively straightforward way for cities to make themselves more sustainable. The technology already exists for rail, buses, and small vehicles like cars and trucks, but moving forward cities face a big challenge ensuring that national and regional electrical grids can accommodate the increased demand for power from the transportation sector. Most cities also need to build significantly more charging infrastructure.

c. Enable cycling and walking

In order to expand and encourage cycling and walking, cities need to extend and, in some cases, create infrastructure, such as no-car-zones and bicycle lanes and paths. Cities also need to foster bike- and scooter-sharing services. To help make sure micro-mobility supports a strong mass transit system, cities need to allow bicycles on subways and buses and encourage the installation of bike- and scooter-sharing docks adjacent to transit stations. However, bicycle efforts have met opposition in some cities, even from walkers, as authorities often fail to proactively enforce traffic rules for cyclers. This therefore needs to be addressed.



2.1 Investment in Public Transport

d. Build infrastructure to withstand effects of climate change

Construction that accompanies any necessary changes to transit systems or roadways should, for instance, recognize the increased risk of flooding resulting from climate change. Continuity plans for transit systems should also be put in place to get them running again after a disaster. Keeping the electrical grid modernized is also important for cities in order to accommodate the increased demand from electric vehicles and as preparation for sudden surges caused by extreme weather.

e. Understand the connection between sustainable public transit and well-being

As older vehicles (e.g., buses) are phased out, transportation providers can reduce greenhouse gas emissions further by using Renewable Natural Gas (RNG), switching to hybrid-diesel buses, or choosing a zero emissions vehicle. In addition to environmental benefits, sustainable public transportation also creates sustainable economic opportunity. Finally, the health implications of choosing public transit and active transportation over driving are numerous. Studies show that choosing public transit can increase physical activity, leading to better overall health. According to the University of Cambridge, a brisk 20-minute walk each day can be enough to reduce an individual's risk of early death by between 16-30% (Ekelund, U et al). Studies show that choosing public transit can make you healthier and happier. Studies even suggest that well-planned transit can make an individual happier and increase satisfaction and contentment (Transportation Research Part F: Traffic Psychology and Behaviour focuses on the behavioural and psychological aspects of traffic and transport). But ultimately, sustainable transportation means designing public transit services that are attractive to the people who want to use them.



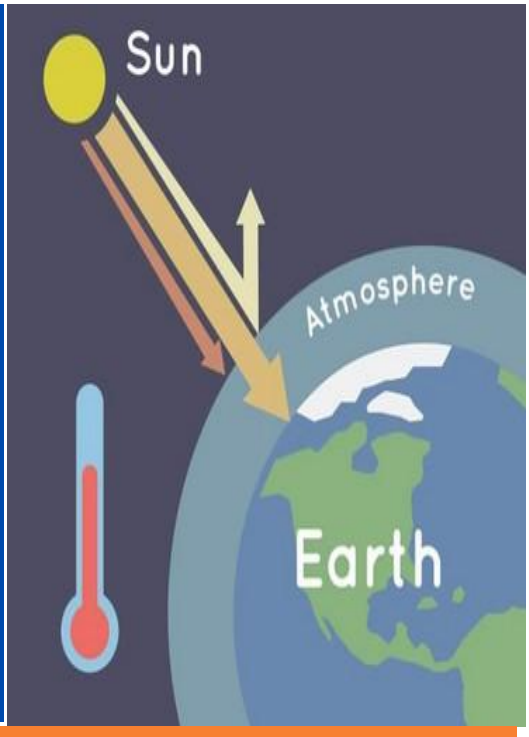
2.1 Investment in Public Transport

4 eye-openers

1. Leave your car at home. Each litre of fuel burned in a car engine releases more than 2 kg of CO2. This means that for an average car, one tank of fuel releases more than 100 kg of CO2 into the atmosphere.
2. Cycling, public transport, car-pooling and car sharing services are all good alternative ways to get around. Of course, walking is the greenest mode of transport.
3. Take the train. One person travelling alone by car produces 3 times more CO2 emissions per kilometre than if they travelled by train.
4. Explore alternatives to flying. Flying is the fastest-growing source of CO2 emissions from transport. Consider taking the train if you are only travelling a few hundred kilometres or less.

Benefits of public transport

- Reduction in energy consumption
- Reduction in air pollution
- Reduction traffic congestion
- Decrease in the number of traffic accidents
- Increase in mobility and safety
- Decrease in noise levels
- Low-cost transportation option
-
-
-



(Transportation Research Part D: Transport and Environment, Volume 93, April 2021, 102764)

2.2 Creating Green Public Spaces

Learning objectives

The educator should:

- Have an understanding of the numerous benefits to human urban populations and wildlife offered by urban green spaces
- Have an understanding of the impact of green spaces on health, economy, water and air quality, climate and temperature
- Be able to convey this knowledge to the adult learners

Did you know that almost two thirds of the urban area that will exist by the year 2030 is yet to be built, so it is vital that we take the opportunity to create and maintain healthy and sustainable urban environments? Urban green spaces such as gardens, parks and woodlands provide numerous benefits to human urban populations, and a vital habitat for certain animals. By contributing to improved physical fitness and mental health, the presence of green spaces can enhance the health and wellbeing of people working and living in cities. Green spaces also indirectly impact our health by improving air quality and limiting the impact of heatwaves by reducing urban temperatures. In addition, vegetation stores carbon, helping to mitigate climate change, and the soil reduces the likelihood of flooding by storing excess rainwater. But let's explore some of the benefits for creating green public spaces in our cities!



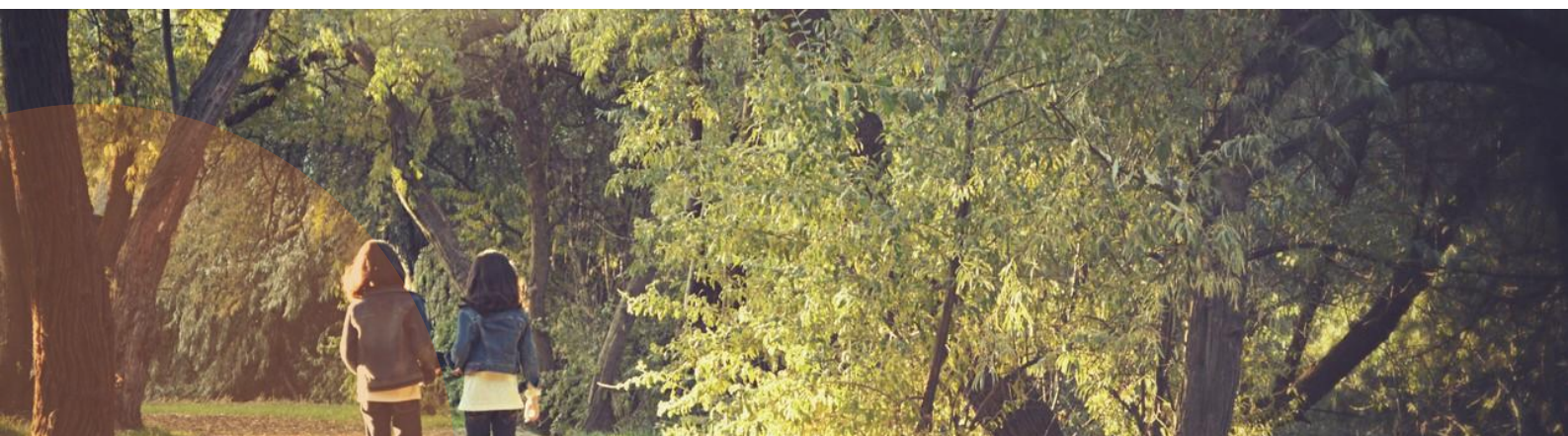
2.2 Creating Green Public Spaces

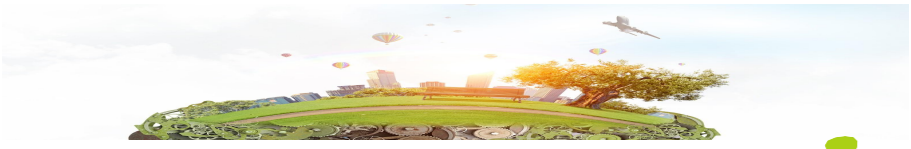
Health and Wellbeing

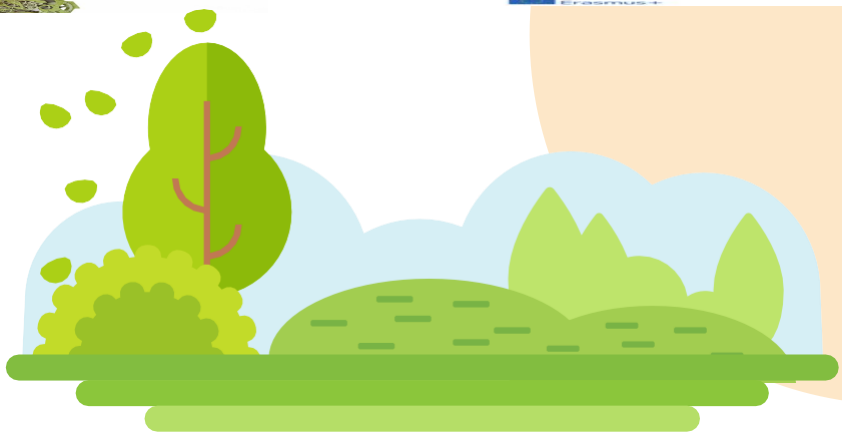
Spending time in green spaces has been shown to produce levels of chemicals in the brain associated with low stress and positive impacts on blood pressure. Across Europe, several deaths a year are associated with sedentary work and a lack of physical activity. Green areas encourage physical activity by providing a pleasant environment to exercise; woodland trails encourage cycling and walking, and large sport and parks areas encourage more formal physical activity. Where accessible green public space is provided, it will be used and may help reduce socioeconomic health inequalities as the socioeconomic position of the local population does not seem to affect how often it is used. These spaces also provide pleasant areas to relax and socialise, promoting greater levels of social activity and stronger neighbourhood relationships, particularly important in maintaining a high quality of life for elderly people.

Climate and Temperature

The urban heat island (UHI) effect occurs because the materials used to build towns and cities absorb more of the sun's energy than the natural surfaces they replaced. The UHI effect makes people in urban areas particularly vulnerable to heat waves. Urban green spaces reduce the UHI effect by providing shade and by cooling the air through the process of evapotranspiration. During evapotranspiration, the sun's energy is used to transfer water from the leaves of plants into the atmosphere. Urban green spaces are on average around 1–2°C cooler, both day and night, than built-up areas in the same town or city, and this cooling effect can extend beyond the green space itself, into the surrounding urban areas. During the summer this may reduce the need for air conditioning, and associated energy use, in nearby buildings.







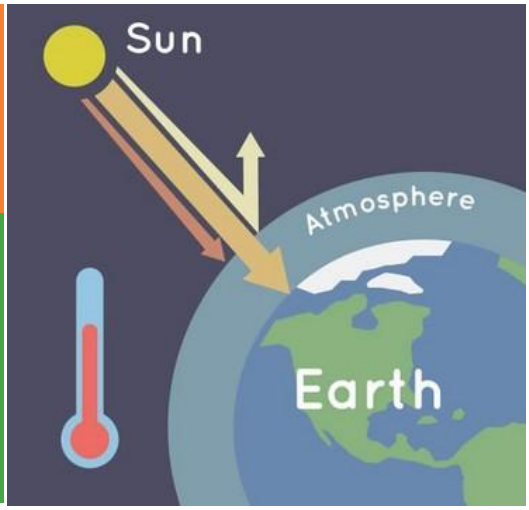
2.2 Creating Green Public Spaces

Climate and Temperature

The amount of CO2 in the atmosphere has increased by more than 40% since humans began industrialising, resulting in a gradual warming of the planet over the past century. Trees and plants take CO2 from the atmosphere and around half of it is stored in their branches and roots, with large amounts of carbon also stored by the soil. This process is known as carbon sequestration and it results in an overall reduction of atmospheric CO2 concentrations, as long as the vegetation is preserved. However, when dead trees and plants decompose, they return CO2 to the atmosphere. Understanding the carbon balance of any green space therefore requires an analysis of the amounts of sequestration and decomposition, in addition to any maintenance related greenhouse gas emissions. Overall, urban green spaces take in more carbon than they return to the atmosphere, but their design and maintenance play a vital role in determining how much carbon they will store. For example, a "forest-like" green space with many trees and native vegetation ground cover maximises carbon sequestration over a "park-like" design with fewer trees and frequently mown grass. As well as creating new green space, looking after existing mature trees is important because they continue to sequester and store large amounts of carbon. Trees also form a noise barrier when the canopies cross the noise, reflect and break it in different directions, leading to a reduction in noise levels in cities.

As Doug Kelbaugh, FAIA FCNU, dean emeritus of the Taubman College of Architecture & Urban Planning at the University of Michigan, said:

"The more trees we plant, the less environmental damage needs to be repaired, with fewer severe heat waves and less intense heat islands in cities".



2.2 Creating Green Public Spaces

Air Quality

Urban air pollution consists of tiny particles, known as particulate matter, and gases such as ozone (O3), nitrogen dioxide (NO2) and sulphur dioxide (SO2). These pollutants are formed mainly as a result of vehicle and industrial emissions.

Poor air quality is a serious threat to human health as it causes problems for the respiratory and cardiovascular systems which can lead to diseases. It is estimated that approx. 3.7 million deaths per year are caused worldwide by exposure to poor air quality. Trees and shrubs have multiple impacts on air quality. They can improve air quality by removing both particles and gases from the air since particles stick to the surface of the leaves, and gases are taken up through pores on surface of the leaves. Trees with complex, ridged, or hairy leaves (e.g., pine trees) tend to capture more particles than trees with broader, smoother leaves. However, plants also emit gases (volatile organic compounds) into the atmosphere that can result in the formation of O3 and particulate matter under certain conditions.

Flooding and Water Quality

In urban areas, the water-resistant materials used for roads and pavements mean that rain is not absorbed and remains on the surface. During periods of heavy rainfall this water accumulates and when the drainage capacity of the area is exceeded it leads to flooding.

In contrast, vegetated surfaces can intercept and store water, reducing the volume of rainwater run-off. Benefits from individual trees are maximised if they are planted in pits containing permeable soils able to absorb additional water, or structural soils that facilitate the growth of tree roots beneath pavements and roads. A further consequence of high levels of surface water run-off is that rainwater washes pollutants away from the surfaces, transporting them into water ways. This can be detrimental to the water quality in streams, rivers and lakes and can lead to high amounts of pollutants gathering at water treatment facilities. Including green spaces as part of new urban developments, as well as integrating them within existing urban areas, could help reduce these risks and it offers an alternative to other hard engineering flood control that can be disruptive and expensive to install.

2.2 Creating Green Public Spaces

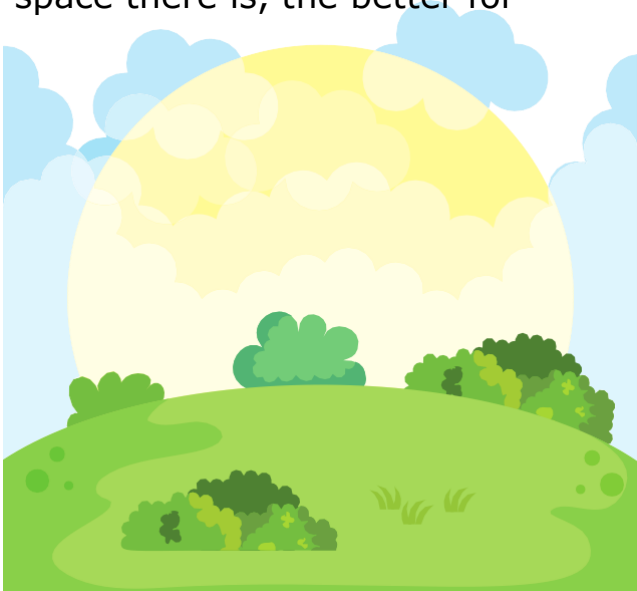
Wildlife and Habitats

Towns and cities are typically considered to host a less diverse range of plants, animals and birds than nearby rural areas. However, green spaces within an urban area can be home to many of the same species more commonly associated with rural settings, including some that are threatened. For some species, urban areas can provide a more favourable habitat than intensively farmed countryside, suggesting that towns and cities could make an important contribution to conservation efforts.

Large parks and woodlands are able to support the widest range of species, but even small areas of vegetation such as roadside verges, roundabouts and green roofs can support a range of plants, insects and birds. For many people living in a city, spending time in urban green spaces is their only regular opportunity to be surrounded by nature. Research suggests that people get more enjoyment from spending time in green space when they perceive there to be a high level of biodiversity and that visitors to green spaces would be willing to pay to see an enhancement in the species richness of plants, birds and insects. Urban green spaces can act as "wildlife corridors", linking larger parks, and providing links to rural areas on the outskirts of towns and cities. This facilitates the movement of animals, birds and insects between individual green spaces and prevents the fragmentation and isolation of wildlife.

Urban green spaces form an important habitat for pollinators, like bees and butterflies. Maintaining a healthy population of pollinators is important as many flowers and crops depend on them in order to reproduce. Pollinator populations are decreasing, so providing viable habitats in urban areas could form part of a broader strategy to combat this trend. The greener space there is, the better for urban wildlife.

But strategies for enhancing biodiversity will depend on the location, type of habitat and species present. However, things like less intensive management practices (e.g., infrequent mowing of grass); protecting some parts of the green space from human interference, by for example routing paths away from the most suitable nesting locations to prevent adverse effects on the reproductive success of birds; and the introduction of native wildflowers.





2.2 Creating Green Public Spaces

Economic Impacts

The presence of green space affects an urban region in the many different ways; the economic impacts of which are not straightforward to quantify. In terms of direct financial impacts, studies suggest that proximity to green space is positively linked to both commercial and residential property prices, with properties overlooking a park being valued approx. 5-7% higher than equivalent properties elsewhere.

The creation, maintenance and management of green space also generates employment opportunities and may have indirect benefits to local economies by encouraging further investment and property development in the area. However, it is not clear whether assigning monetary values can fully capture the importance of non-monetary effects, such as increased biodiversity or the cultural significance of woodland. Further research is needed to develop approaches that can combine monetary and non-monetary valuations in order to assess the true value of urban green spaces.

4 eye-openers

1. The more frequent visitors to green space report the largest benefits to their mental wellbeing.
2. Large parks with many trees with wide canopies and minimal paving reduce the urban heat island effect the most and they are the most effective type of vegetation for capturing pollutants.
3. Urban green spaces store and filter water, reducing the risk of flooding and improving water quality in streams, lakes, and rivers.
4. Interconnected green spaces consisting of native trees and shrubs, with less intensive management, offer the greatest benefits for wildlife.



2.3 Improving Urban Planning and Management in Participatory and Inclusive Ways

Learning objectives

The school educator should:

- Have an understanding of the importance of inclusive urban planning
- Have an understanding of the criteria for effective public participation
- Be able to convey this knowledge to the school learners

What Is Urban Planning?

According to Encyclopedia Britannica Urban planning is defined as 'design and regulation of the uses of space that focus on the physical form, economic functions, and social impacts of the urban environment and on the location of different activities within it'.

What Is Public Participation?

Public participation is concerned with an individual's or a group of individuals' right to be involved with and influence public assessment and decision-making processes. In other words, citizens living in a community have the right to be involved in planning its future. After all, it is these citizens who will live with the consequences and impact of new developments, therefore involving them at each stage of the project from concept to development is crucial. It is widely acknowledged and accepted that citizens need more say in shaping the future of our towns and cities - a basic condition of local democracy. Public participation is interlinked with participatory democracy. Participatory democracy can be defined as the process of collective decision-making, where both governments and citizens work in tandem to facilitate the co-creation of policymaking.

Henry Sanoff, one of the world's leading proponents of user participation in design, says that users have a particular expertise which needs to be integrated into design.

Be transparent

While the concept of public participation in urban planning is widely acknowledged and discussed, the reality is often less practiced. Planning is a complex process controlled by strict statutory requirements; therefore, citizens can become overwhelmed by the jargon and rigid language of public consultation methods. Furthermore, traditional methods often result in citizens having to read lengthy and complex documents unfamiliar to them, which can also be extremely time-consuming.

The majority of public participation and consultation methods have been non-digital. Interestingly, studies have found that digital methods of public participation in planning led to citizens critically thinking about their local area and what they would like to see in the future. This encouraged creative thinking and helped citizens feel empowered, while also simplifying the processes and tackling many of the shortcomings of more traditional methods.



Criteria For Effective Public Participation

Public participation, albeit important and necessary, must be done in a way that maximises true value for all parties involved. The key criteria that must be met in order for participation to be effective are:

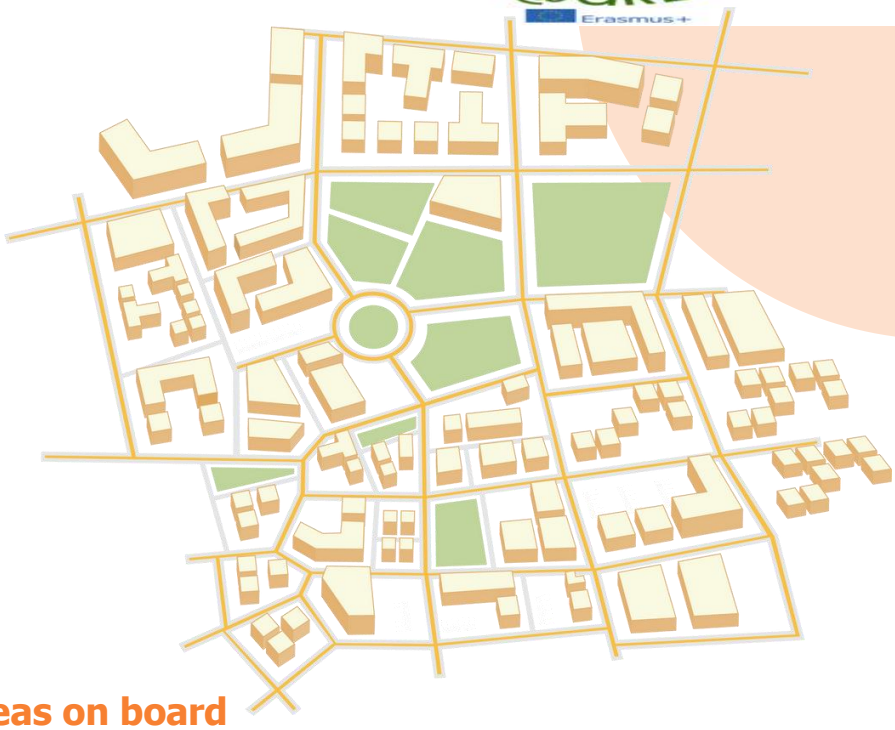
Ensure all affected parties are represented from the beginning

It is hugely important that all parties impacted or affected by a new development or project are consulted and engaged with from the very beginning. This does not only mean consulting adults that live in the area, but also means consulting children, ethnic minorities, younger people or any other stakeholders with interest

Be transparent

Transparency is absolutely critical to building trusting relationships between planners, citizens and stakeholders.

Everybody involved in the participation process must have equal and fair access to information. That is, each group consulted must be given all of the information that is necessary for them to effectively present their views and opinions.



Allow for creativity and take ideas on board

As pressing issues on sustainability and housing become more prominent, encouraging innovation and creativity from the public has huge potential. Encouraging new ways of thinking allows developers to tap into the knowledge of citizens and create exciting, innovative and forward-thinking developments.

However, successful user participation complements rather than replaces professional design and technical expertise. Design, planning and policy professionals can extend the range of possible solutions and options in ways that untrained users cannot. Evidence points to the need for good management of the user participation process if it is to be effective. Otherwise, the result may be gridlock, or poor outcomes reflecting narrow or vested interests at the expense of the wider public interest.

4 eye-openers

1. Citizens' needs must be heard and taken into consideration, so that they can see how their individual needs or concerns fit into the wider picture leading simultaneously to realistic, more informed public expectations and understanding.
2. A stronger sense of community and ownership over the final result may develop as voices are being heard through public participation.
3. Cost savings are offered by encouraging greater user support for change.
4. Engagement and democratic participation are encouraged.

Inspiration for the future

1. The Climate Resilient Neighbourhood and Tåsinge Plads

The square Athens's first climate change-adapted urban space. It was officially opened in December 2014. The square responds to a need for rainwater management, and it is at the same time an investment in a better urban life. The square is centrally located in The Climate Resilient Neighbourhood, and it has become a green oasis and a new meeting point for the inhabitants.
The vision is also to transform Aristotelous , Drapetsona, another city square, into a living green urban space with room for nature and insects but most importantly a space for residents in the neighbourhood.



The citizens' own climate projects take part in climate change adaptation with their own green projects. Local enthusiasts create planting beds, rain beds and green roofs in the neighbourhood.

New sustainable urban park

The 25,000 m2 grey concrete deck Pier 2 on **Aristotelous 59, Drapetsona** Ø has been transformed into a green and sustainable urban park. In the coming summer, it will be possible for the residents and visitors to enjoy life in green surroundings with a view of the harbour.



The city park is initially temporary to investigate what works in terms of plants, facilities and activities. This will be investigated in collaboration with residents and guests on **Aristotelous Drapetsona** in the coming time.

Inspiration for the future

The city park has been established using recycled materials. The hills consist of sand from the seabed, and the paths are created from old asphalt. Some of the felled old poplar trees from along the ring road are also given new life in the city park. The trunks will be laid so that they become both new homes for small beetles and insects. Hilltops and hilly terrain have already been laid out at Pier 2, which in the spring will bloom with Swedish wildflowers. "Native species" have been planted that should be able to cope with the maritime environment. In addition, 250 plants and trees have been planted. In itself, this is the test measure to gain experience with a view to a possible establishment of a permanent city park on Aarhus Ø.

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Chapter 3: Responsible Consumption

Introduction

Check out this short video to see the chapter overview https://youtu.be/HpyB0mqzERQ

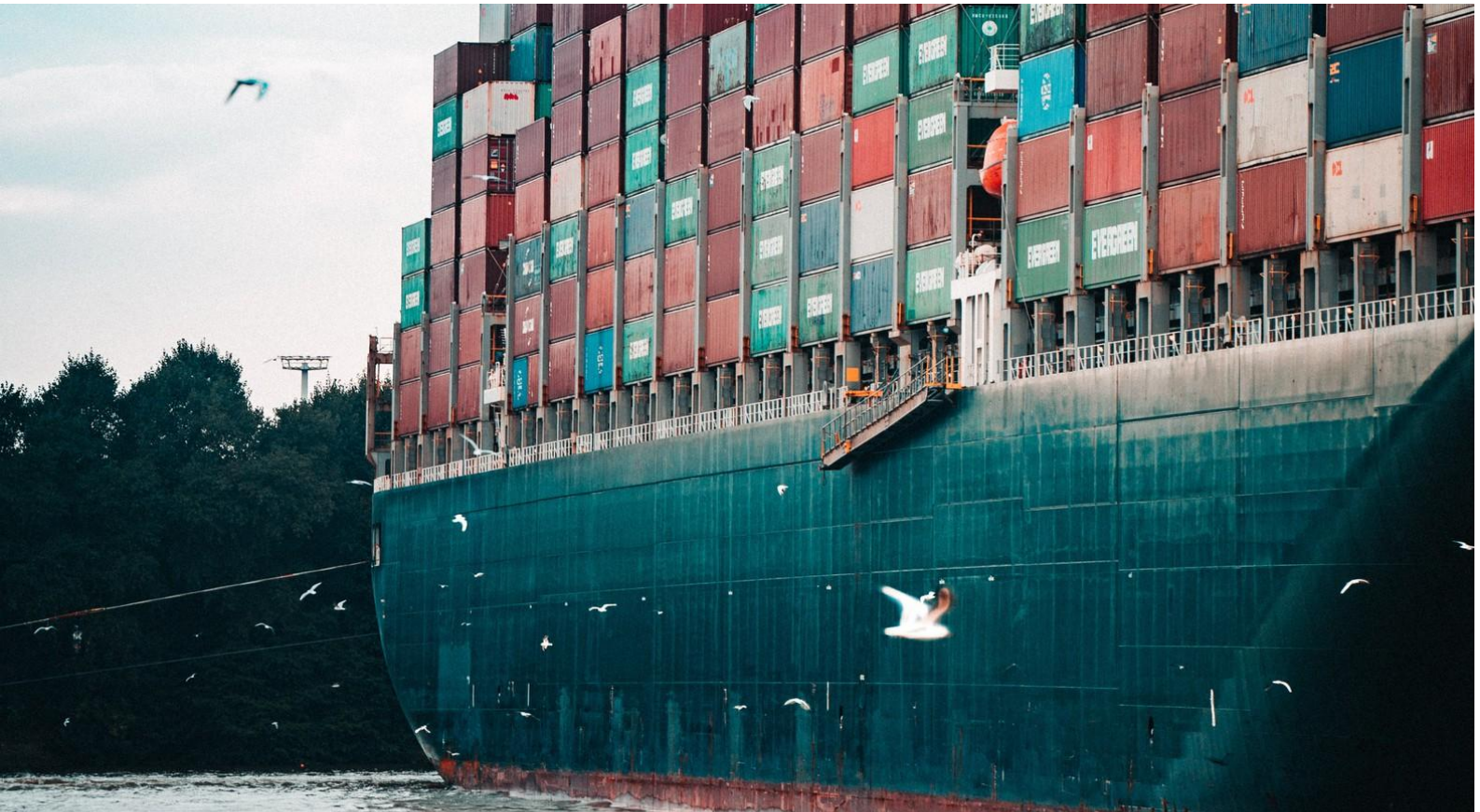
In March 2021, the European Commission launched a series of short educational videos to inform and raise awareness on consumption issues. One of these videos is dedicated to sustainable consumption with the key message that our daily choices affect the environment. In this video we learn, among other things, that it takes 232 years for each new mobile phone to have zero environmental impact and that if we extended the use of our electronic devices (phones, computers) for another year, we would reduce annual carbon dioxide emissions by 4 million tonnes, the equivalent of taking 2 million cars off the road (European Commission, 2021).

This video comes as a continuation of a major global effort to promote responsible consumption. A milestone in this process was the year 2015 and the "2030 Agenda for Sustainable Development," when the UN included responsible production and consumption among the 17 Sustainable Development Goals. Specifically, Goal 12 targets individuals, businesses, and communities so much so that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature; waste generation is substantially reduced through prevention, reduction, recycling, and reuse; and companies are encouraged to adopt sustainable practices (UN, 2021).

Introduction

Various ecological disasters warn us to change our consumption habits. Pollution of the seas and groundwater, destruction of forests, climate change and atmospheric pollution show us that we cannot continue wasting our natural resources. It is therefore imperative that we cultivate and adopt new consumption habits and transform harmful behaviours that endanger the very systems on which our future development depends. Changing our consumption habits is something that at a first glance seems difficult. Driving a car is now taken for granted. Continuously using air conditioners during the summer seems an absolute necessity. Eating meat every other day is habitual. These habits indicate that we really have very little information about the environmental impact of our consumption choices and therefore do not feel responsible for the various environmental problems that threaten our wellbeing.

Education for responsible consumption therefore comes to the forefront and educators are called upon to design and implement actions aimed at changing our consumption habits and patterns. Changing consumption patterns involves multiple layers, starting from personal attitudes and values, passing on to social norms and lifestyle choices, and reaching up to socio-economic structures and institutions. For this reason, we believe that adult education should immediately address the topic of responsible consumption, as this issue is at the core of environmental and sustainability education



Towards an understanding of responsible consumption

Although the definition of responsible consumption is open, in this chapter we define responsible consumption as individual and social consumption choices that are consistent with sustainable development, i.e., that have the least possible impact on the environment and contribute to social justice. In addition to the term responsible, the terms green, ethical and sustainable consumption are also used in the international literature and shed light on different dimensions of responsible consumption (Liarakou, 2019).



3.1 Towards an understanding of responsible consumption

But let's explore some of the axes that constitute responsible consumption:

Green Consumption

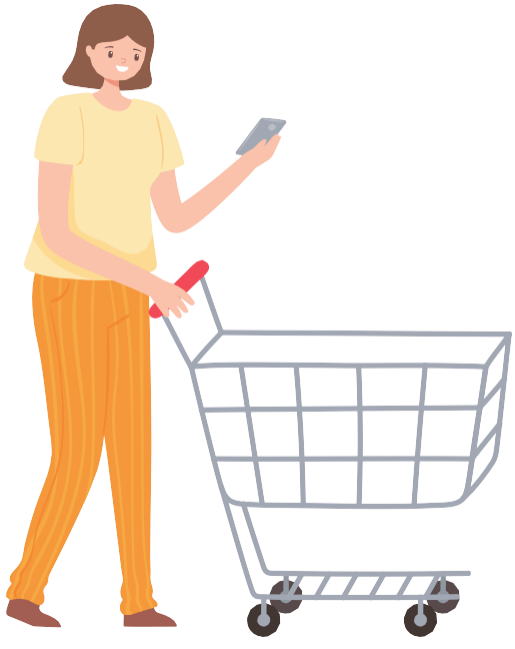
It mainly refers to environmentally friendly consumption practices which were traditionally associated with avoiding certain goods (e.g., propellants) and choosing practices such as recycling and using public transport. Today it is further associated with efforts to reduce energy and material consumption. The need for measurable results has led to the adoption of scientific indicators (such as ecological footprint or carbon footprint) to assess the environmental impact of our consumption practices (Sachdeva et al., 2015; Guckian et al., 2017).

Ethical Consumption

This gives an ethical connotation to our consumer behaviour. This is because, on the one hand, our consumption choices are a field of expression of values and norms, and on the other hand, consumer products have an ethical dimension that is determined by the social, political, and environmental context in which they are produced, distributed, and sold. These contexts can refer to environmental issues, workers' rights, child labour, producer pay, animal treatment, etc. We can express responsibility towards the environment and society by buying or avoiding a product, considering its ethical dimension (Carrier, 2012; Kushwah et al., 2019).

Sustainable Consumption

It is a socially and environmentally conscious way of buying, using and disposing of goods and services that involves dimensions such as 1. meeting basic needs and avoiding overconsumption, 2. caring for environmental well-being that addresses the impact of consumption on the depletion of natural resources and pollution, 3. concern for future generations; 4. concern for quality of life and rejection of materialistic values; 5. adoption of a 'life cycle' approach, whereby both producer and consumer should take into account and care for all life stages and non-obvious costs of a product (Lim, 2017; Quoquab & Mohammad, 2020).



Whatever the term used, responsible consumption refers to a wide range of practices related to both goods and services. The main categories or sectors associated with responsible consumption are mainly food, housing (which includes energy and water consumption), transport and clothing (e.g., EEA, 2013). It should be clarified that buying or acquiring goods is only the first stage of the consumption process. Consumption is a broader process of decisions and actions that includes, in addition to acquisition, the use and final disposal of products (Peattie & Collins, 2009). Responsible consumption practices and behaviours that have been of interest to researchers in recent years are saving energy and water in the household; buying items with little or no packaging; repairing items instead of buying new ones; buying local, organic, recycled products/goods.



3.2 Factors influencing consumer behaviour

Learning objectives

The educator should:

- Have an understanding of the three different levels that influence consumer behaviour
- Give practical examples for each level



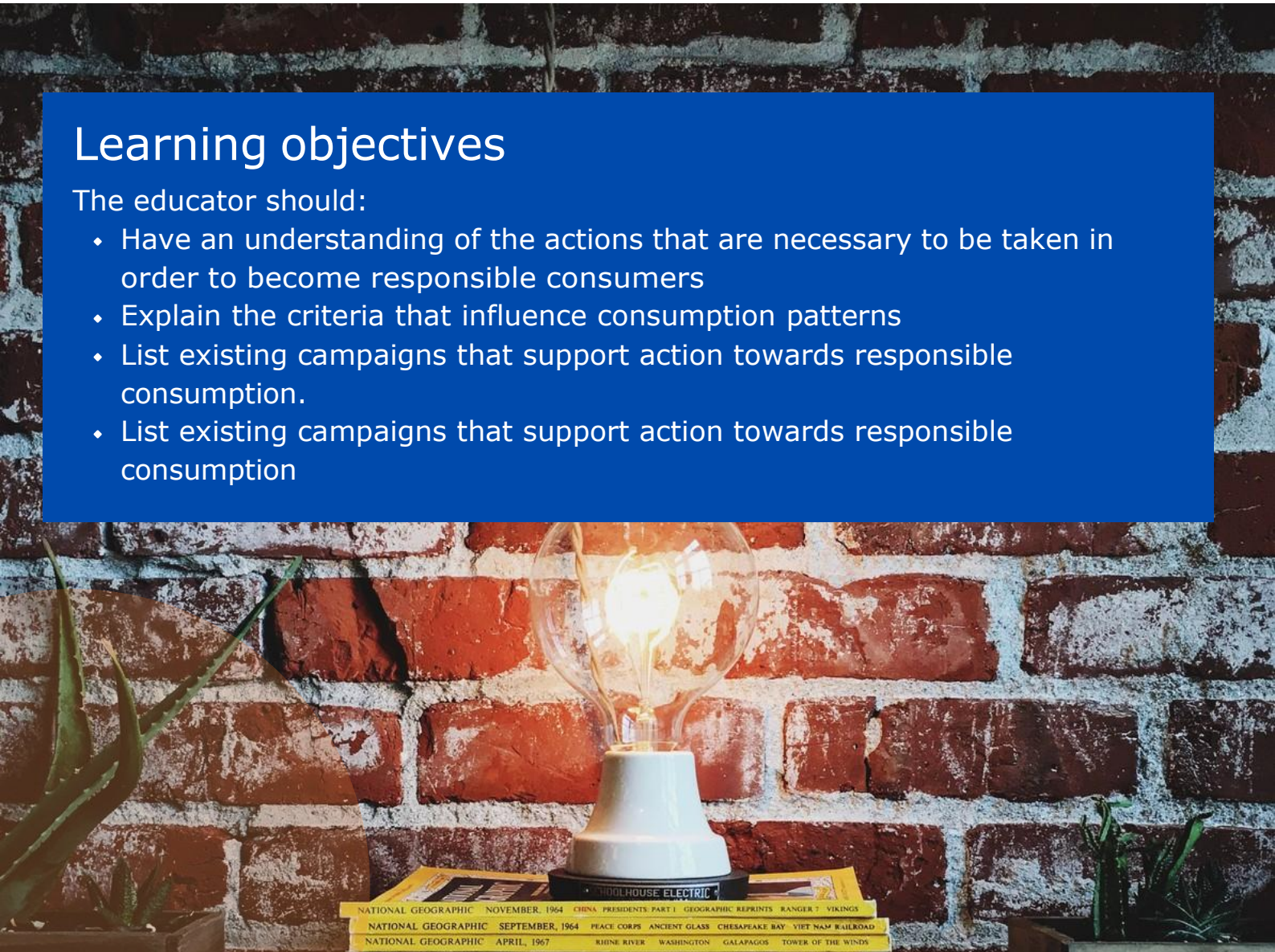
3.1 Factors influencing consumer behaviour

Based on recent studies (Yarimoglu & Binboga, 2019; Pendergast & Tsang, 2019; Lopes de Morais et al., 2021), factors that influence consumer behaviour are classified into three complementary levels:

- The individual level involves knowledge, attitudes and values, motivation, and consumption habits an individual has formed. Here, the importance of personal moral norms is highlighted, i.e., an individual's perceptions of the moral rightness of an action and the moral obligation to adopt or avoid a particular behaviour. According to this, changing our consumption behaviour is linked to an awareness of the consequences of our actions and taking personal responsibility. For example, understanding the implications of using single-use plastic for your community and the planet will push you to choose using reusable products, such an eco-bag for shopping, a reusable water bottle or a cup to reduce your plastic waste.
- The social level involves socially constructed factors that affect consumer behaviours. This includes social norms, peer influence in terms of consumption patterns, the need for social acceptance, etc. Here, the expectations of others regarding behavioural consumption patterns play a significant role. For example, let’s take a minute and think whether you have ever considered the production path of technology when you decided to change your smartphone, tablet, computer, car because newer models are available on the market and all your friends have changed theirs. Have you ever thought that resources are mined in one part of the planet, processed in other, constructed in third, following the know-how of fourth and the design of fifth, then transported, stored, sold, re-sold and so on? This path is full of problematic issues. Using of natural resources, environmental pollution (in production, transportation, waste), violation of human rights (including child labour), dirty money (the popular case of ‘conflict minerals’ in Congo financing paramilitary violent groups), unequal allocation of profit throughout the chain – just to name a few.
- The institutional level involves factors including incentives for businesses (e.g., taxes, subsidies, fines), enabling conditions (e.g., access to goods) and the institutional framework (regulations, market functioning, etc.).

All these factors interact and constitute an open and constantly changing system that determines the adoption or not of responsible consumption practices. For example, the individual is advised to do some research and buy from companies they know have sustainable practices and don't harm the environment, but at the same time, businesses (especially at the local level) should have incentives to adopt more and more sustainable practices. Moreover, awareness raising around climate crisis that affected the fashion industry paved the way for the wide adoption of upcycling practices. In that sense, it is now considered socially acceptable to wear vintage, thrifted, second-hand clothes. Global Goals advise that we buy second-hand whenever we can. In educational practice we need to address all these different and diverse elements to encourage our learners to adopt responsible consumer behaviours even if they sometimes come across individual, social, cultural, or institutional barriers.

3.2 Thinking as responsible consumers



Learning objectives

The educator should:

- Have an understanding of the actions that are necessary to be taken in order to become responsible consumers
- Explain the criteria that influence consumption patterns
- List existing campaigns that support action towards responsible consumption.
- List existing campaigns that support action towards responsible consumption

3.3 Thinking as responsible consumers

There are many aspects of consumption that with simple changes can have a big impact on society as a whole. For example, facts and figures extracted from the UN website dedicated to the Sustainable Development Goals indicate that each year about one third of all food produced — equivalent to 1.3 billion tonnes — ends up rotting in the bins of consumers and retailers, or spoiling due to poor transportation and harvesting practices, something that businesses need to address. When it comes to consumers, households consume 29 per cent of global energy and contribute to 21 per cent of resultant CO2 emissions. Humankind is polluting water in rivers and lakes faster than nature can recycle and purify. Agriculture (including irrigation, livestock, and aquaculture) is by far the largest water consumer, accounting for 69 per cent of annual water withdrawals globally. Industry (including power generation) accounts for 19 per cent and households for 12 per cent (UN, 2021).

Although the figures above are disheartening, there are some actions that we can do in order to start thinking as responsible citizens. What shall we consider then? First, we shall think that responsible consumption benefits the economy, especially the local economy, as it allows goods and services to be traded, benefiting the agents involved in these trades. Secondly, it has a positive impact on society, as the products or services purchased are linked to a workforce that has fair wages and working conditions and they're also positively good for the buyers (in matters such as health). Finally, a responsible consumer also acknowledges the impacts associated with products' different stages (from its production, transportation, and disposal) and tries to buy the ones with a lower impact.

These are considered cornerstones for responsible consumption and intertwine with the three different levels of factors that influence consumer behaviour as discussed in part 3.2. In that sense, some responsible consumers will focus on the ecological side of their consumption, trying to choose seasonal, organic and ecological products. Others will focus on the impact that their choices will have on the economy by choosing locally produced products. There are also the ones who'll choose their products according to what's best for their health.



3.3 Thinking as responsible consumers

In order to start thinking as a responsible consumer, there are some criteria that could influence our consumption patterns, as follows (youmatter, 2019):

Consumption of green products that have a low impact on the environment:

- Products from certified sectors respecting the environment or biodiversity;
- Commodities with a low carbon footprint;
- Organic products;
- Goods that preserve the quality of soil, water and air and generally prevent pollution, deforestation, and the depletion of natural resources.

Consumption of products according to their respect for social norms and their impact on societies:

- Goods made in good working conditions, without forced child labour and that respect working hours and international conventions;
- Products manufactured in compliance with ethical standards (especially corruption);
- Goods made in cooperation with local communities, respecting their lifestyles and business profit (such as fair trade).

Consumption of "healthier" products, respecting health standards:

- Products without phthalates, bisphenol, and other toxic and dangerous products;
- Commodities without pesticides or other chemical inputs;
- Goods manufactured in accordance with hygiene standards;
- Food products with healthy nutritional composition.

Consumption of products with a positive economic impact:

- Locally made products;
- Productions that encourage the economic autonomy of their producers (as opposed to reliance on commercial or industrial systems such as supermarkets);
- Goods that create more jobs as well as economic and social integration for workers;
- Products that promote employees' work-life quality.

The consumption of products manufactured under conditions respecting certain ethical or moral principles:

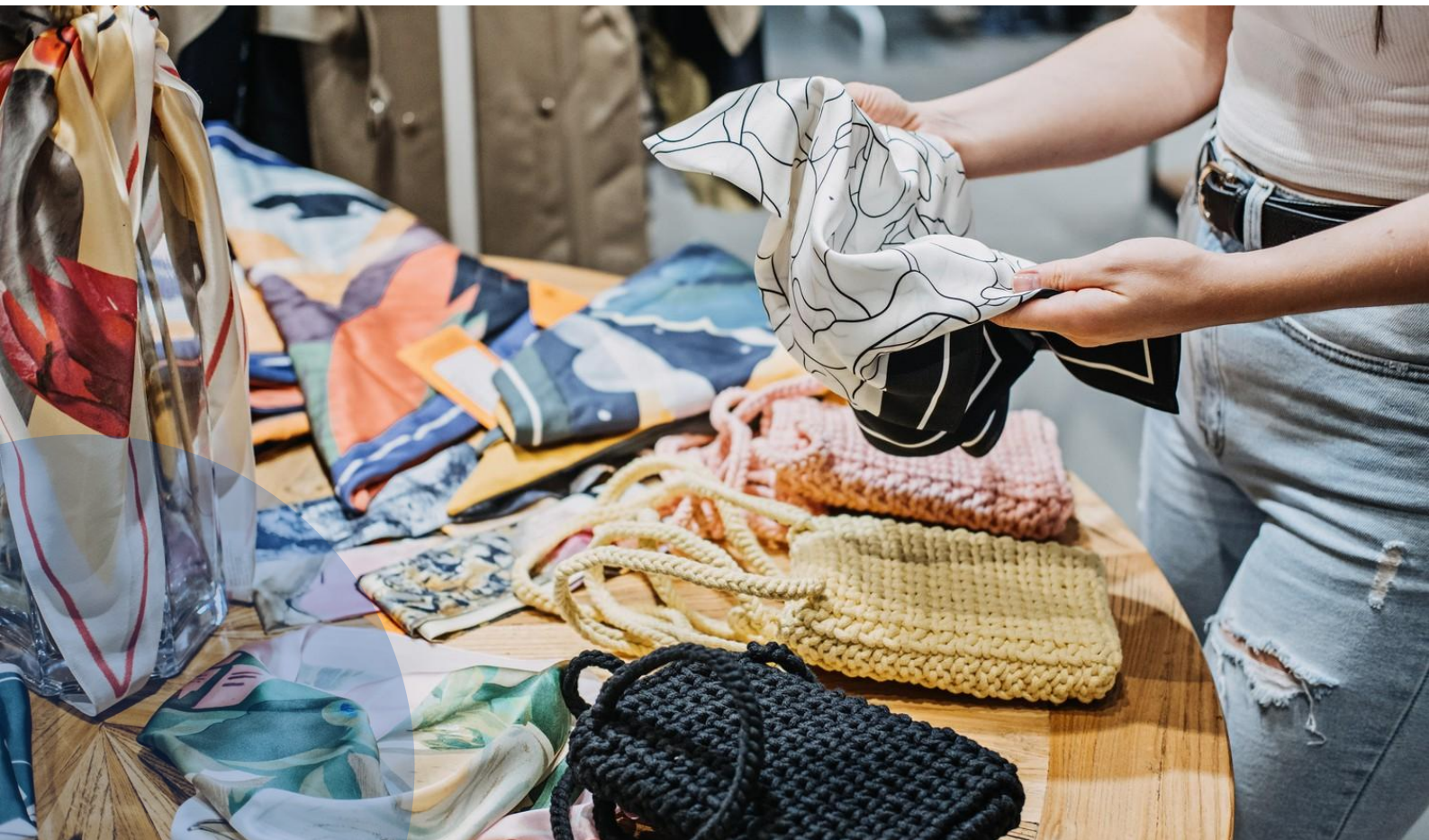
- Respect for animal welfare;
- Respect for fairness and individual freedoms;
- Any other principle contributing to the development of the general interest.

3.3 Thinking as responsible consumers

As consumers we shall also count on the power of our voice. We shall know our rights and put pressure on and advocate for corporate responsibility. We shall join petitions and campaigns calling out businesses with unsustainable practices. For example, the apparel industry today is the second largest polluter of clean water after agriculture, and many fashion companies exploit textile workers in the developing world. Chemicals from dyes make their way into the environment, polluting the air, water, and also harming marine life. The fashion industry (UNFCCC, 2019):

- Produces 20 per cent of wastewater
- Is responsible for 8-10 per cent of the world's greenhouse gas emissions
- $500 billion of value is lost every year due to clothing underutilisation and lack of recycling

For this reason, it is imperative to do some research and buy from companies we know have sustainable practices and don't harm the environment. As individuals we can join the #ActNow Fashion Challenge campaign of the UN which invites people around the world to make their individual contributions to zero-waste fashion. The challenge is to share each zero-waste fashion action on social media using #ActNow and log it on un.org/actnow.



3.3 Thinking as responsible consumers

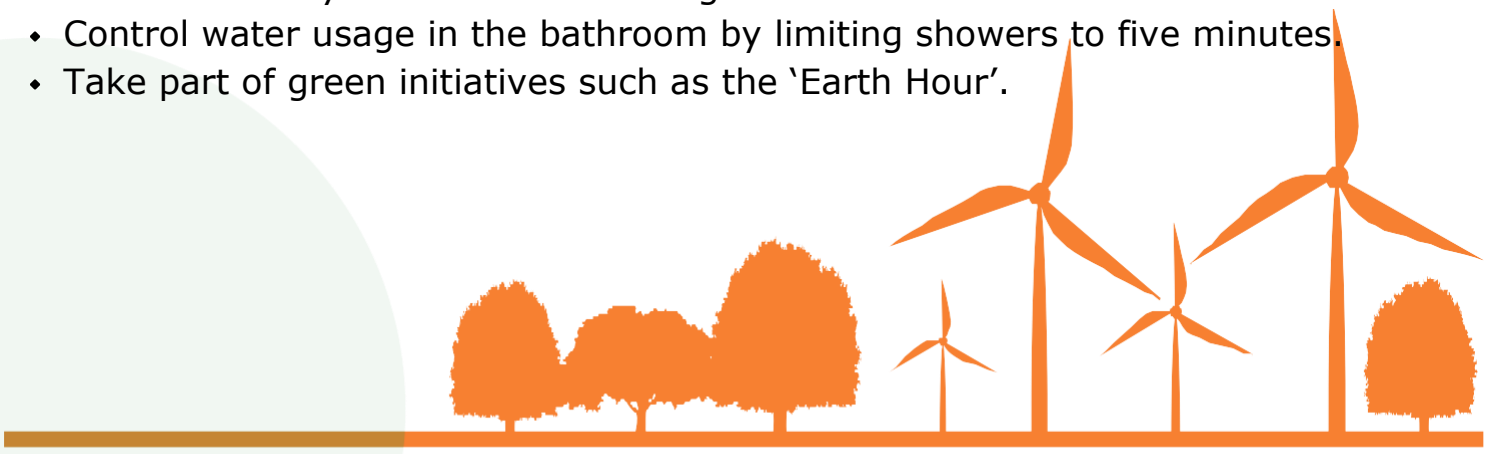
Responsible consumption thus touches upon different pillars of society, such as food; housing; mobility; consumer goods; leisure. The following recommendations adapted from the publication "Education for Sustainable Consumption, Behaviour and Lifestyles: A collection of case studies" (Union of the Mediterranean, 2019) aim to suggest ways to become responsible consumers, as follows:

FOOD

- Reduce food waste by better planning your meals.
- Choose low-footprint diets, incorporating organic and seasonal products.
- Check ingredient labels to identify the origin of foods and its impact on the food chain.
- Reduce your consumption of meat and dairies. Increase your consumption of vegetables and fruits. For example, take part of initiatives and challenges such as 'Meatless Mondays'.
- Avoid excessive packaging and processed foods as much as possible.
- Limit purchases to your local grocery store
- Refill and reuse your bottles and containers, refuse single-use plastic, such as plastic straws

HOUSING

- Switch to greener energy options from renewable energy suppliers.
- Implement a 3R plan: Reduce (consume less and more efficiently), Reuse (take advantage of second-hand bargains) and Recycle (at home, in the workplace and everywhere).
- Save energy, set your air conditioner between 24-26°C, as recommended by the Spanish Users and Consumers Organization (OCU).
- Be efficient at home: use energy-efficient light bulbs, turn off lights and unplug devices when you are finished using them.
- Control water usage in the bathroom by limiting showers to five minutes.
- Take part of green initiatives such as the 'Earth Hour'.



3.3 Thinking as responsible consumers

MOBILITY

- Shift transportation modes to increase the number of trips by walking, cycling and using public transport.
- Share your car in your daily commutes, e.g., share the car when driving to metropolitan areas or to your workplace.
- Celebrate local initiatives such as international Car-Free Day or World Bicycle Day.
- Find alternatives to long-distance travels by choosing train travel over airplanes whenever possible, using virtual conference systems for meetings rather than face-to-face meetings, etc.
- Promote work from home one day per week to reduce carbon footprints and increased productivity.



3.3 Thinking as responsible consumers

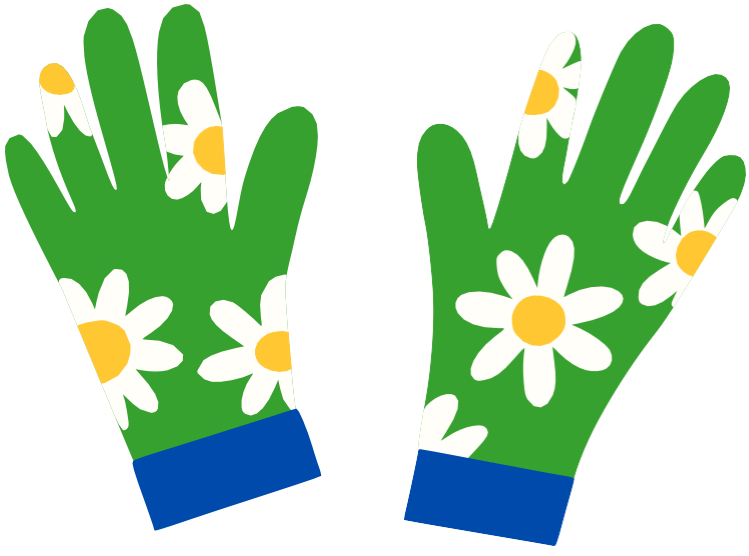
CONSUMER GOODS

- Increase the amount of shared, reused and repaired goods in your community (especially among friends, work colleagues, and neighbours).
- Aim for a zero-waste approach in your daily life. For example, limiting single-use items (especially plastics) such as disposable cups, using rented plates for special events, paper-less strategies at work and in schools, etc.
- Swap your clothes or donate to a second-hand shops or charity organisations.
- Take part of initiatives that reduce fast fashion or excessive consumption such as the 'Buy Nothing Day'.
- Choose products recognised with ecological labels and certification schemes that indicate the products are being produced more sustainably.
- Bring your own shopping and grocery bags.

LEISURE

- Take part in outdoors environmental activities such as beach clean-ups, tree planting or gardening.
- When planning your holidays, give preference to destinations that have demonstrated responsible practices (in areas such as human rights, environmental conservation records, commitment to peace, etc.).
- On vacation, choose an eco-tour operator and bear in mind that some destinations have local restrictions on the use of natural resources such as water and energy. Your hot bath could mean no water for the local community!
- On vacation, travelling light will reduce your carbon footprint by a surprisingly large amount. Reducing your luggage by 15kg could save between 100-200kg of CO_2 emissions on a return flight from London, England to Tenerife, Spain. Also, avoid the use of 4x4 vehicles, aircrafts and helicopters when possible.

All in all, becoming a responsible consumer is not an easy task whatsoever. For this reason, education in general, and in particular, adult education shall focus on developing the knowledge and skills of adult learners on issues pertinent to responsible consumption.



Learning about responsible consumption necessitates changes at the behavioural level. Appropriate information and knowledge on the environmental and social impacts of our daily choices, as well as workable solutions and alternatives towards more sustainable lifestyles, by limiting inefficient use of resources and environmental degradation, can bring about change at the individual, local, national, and global level. According to the Institute for Global Environmental Strategies (2019), behaviour changes can bring potentially quick greenhouse gas emissions savings, especially for those activities that don't require major infrastructural change. Individual lifestyles are, therefore, considered a major potential agent for change in emissions. This implies a radical transformation of consumption patterns and cultural attitudes towards topics, such as environmental sustainability and the governance and business models that shape them.

Inspiration for the future

If you are looking for inspiration, check out the Map Your Meal project coordinated by the Cyprus-based organisation, Future Worlds Center. Map Your Meal is a Europe Aid funded project, and as the name suggests, its primary goal was to enable consumers to trace the origins of their food through the usage of a mobile phone application, by scanning the barcode of a product; an action which in turn brought consumers vitally closer to the production process and allowed an understanding of the conditions and standards producers work.



According to numerous reports, nearly all (over 90%) raw shrimp available in the US are farmed in Asian countries, including Thailand, Vietnam, India and Indonesia.

Designed and produced 3 one and a half minute animations, 2 posters and a series of postcards.Client // Map Your Meal

PREVIOUS PROJECT
MANGROVE SPECIES ON THE BRINK

Inspiration for the future

Through the Map Your Meal project the team aspired to highlight the vast extent of global interdependencies, on a personal, national, and international level (i.e., consumer – producer). The activities were purposely crafted to raise awareness about sustainability, equity, global justice, and global interdependencies, in young people, youth workers/trainers, community educators, and the general public. Through the project the team aspired to generate a strong and active coalition of citizens promoting human rights, equity, and sustainable ways of living. Based on a comprehensive smartphone application and accompanying interactive learning materials the project aimed at exploring the origins of our food, their individual components, and the socio-economic and environmental impact of these, as well as increasing young people's awareness about global interdependencies and injustices and the need for more sustainable food systems.

You can find all relevant information in the link below:
https://www.mapyourmeal.org/index.php/mobile-application



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Chapter 4: Zero Waste and Upcycling

Check out this short video to see the chapter overview https://youtu.be/VKwOYcCuHjI

Introduction

Each European citizen produces an average of 500 kilos of garbage every year, together with industries and economic operators, in general. Therefore, an enormous amount of waste is produced in the world on a yearly basis and one of the consequences is the so-called "islands of plastic" that float in our seas [1].

That enormous amount of garbage produced is made up of: Food, iron, glass, plastic, aluminium, paper, wood, construction debris ... almost materials that might have a new use (recycling) or even give a new life (upcycling and reuse) to other objects.

Every country, every city, up to every individual has its own waste management strategy. In general, the choices of the institutions and public administrators regarding waste disposal determine how much to reduce or eliminate, opting, first, for incinerators or for separate collection. However, the EDUCATION OF CITIZENS too can play an important role: responsible consumption, 0 km purchases, reuse of materials, recycling of clothes and food, sustainable lifestyles can facilitate the responsible reduction or elimination of waste on the territory.

4.1 Towards "Zero Waste Communities"

Learning objectives

The educator should:

- Define "Zero waste"
- Have an understanding of the internationally recognised practical steps to Zero Waste paradigm
- Convey knowledge around living a zero-waste lifestyle
- Be able to share the example of Zero waste Cities: A European best practice

Moving towards "Zero-waste Communities" firstly means to have clear in mind what "Zero Waste" is. The first definition of "Zero Waste" was conceived by the "Zero Waste International Alliance" in 2002, stating: "Zero Waste: the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health."

The revised definition adopted by the Zero Waste international Alliance in 2019 is the following, that can be also considered the most spread definition globally in use. "Zero Waste is a goal that is ethical, economical, efficient, and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal, or plant health."



4.1 Towards "Zero Waste Communities"

Beside the definition, the Zero Waste international Alliance has define and list the main steps to be faced to become a "Zero Waste" reality, starting for "Zero Waste Communities". Those steps represent a sort of guideline embedding the "Zero Waste Paradigm":

Principles and Practical steps towards Zero Waste

"We encourage ALL communities to:

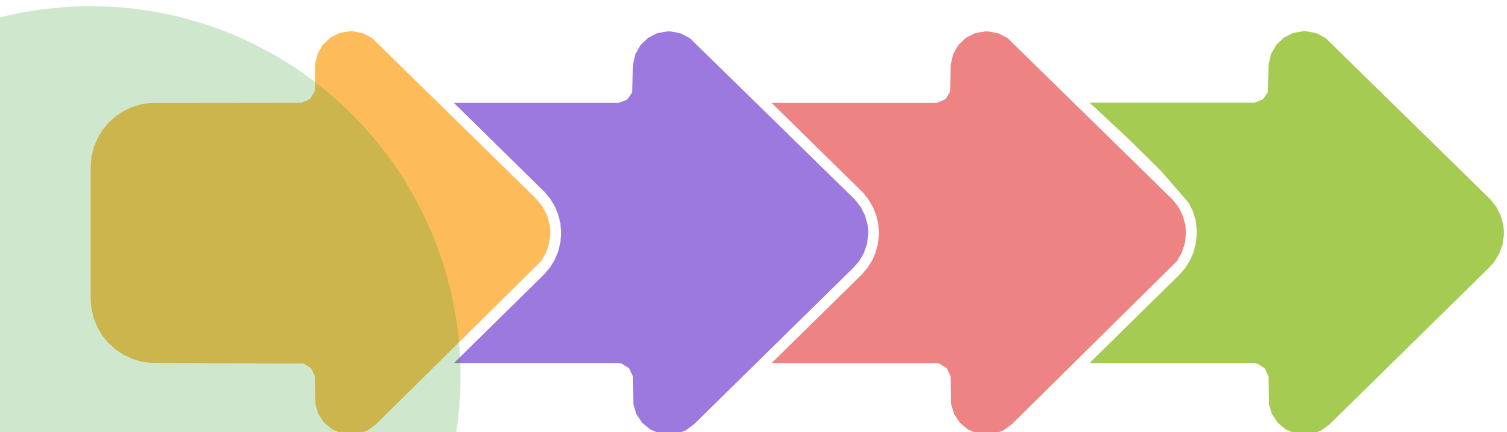
- Adopt the Zero Waste definition of the Zero Waste International Alliance: "Zero Waste: The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health."
- Establish benchmarks and a timeline to meet goals for measuring success and monitoring accomplishments. Communities should aim to make significant strides within five years and to invest local resources and leadership in achieving tangible and visible accomplishments that demonstrate to the public this new direction as quickly as possible. A key part of the planning process is establishing what is a reasonable goal for your community while recognizing the urgency of moving quickly to address climate change.
- Engage the whole community. It is important not to leave Zero Waste to "waste experts." Many different skills need to be deployed in the movement towards Zero Waste and sustainability. Everyone has a role to play. All organizations that provide waste reduction, takeback, reuse, recycling and composting services should be involved in order to achieve Zero Waste. All of these groups and individuals should be challenged to pursue Zero Waste at home, at school, at university, at work while their communities develop longer term policies and programs for the entire community.

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Principles and Practical steps towards Zero Waste

- Demand decision makers manage resources not waste. Existing incinerators must be closed down and no new ones built. Landfill practices must be reformed to prevent all pollution of air and water including pre-processing all residues at landfills before burial to stabilize the organic fraction and prevent methane generation and the use of Residual Separation and Research Facilities (see "Support Zero Waste Procurement" below). More energy can be saved, and global warming impacts decreased, by reducing waste, reusing products, recycling and composting than can be produced from burning discards or recovering landfill gases. Communities should fight any effort to introduce new incinerators, in any guise, and replace existing landfills and incinerators, with Zero Waste policies and programs, including resource recovery parks, reuse, recycling and composting facilities.
- Use economic stimulus funds and fees levied on tons of waste hauled or landfilled to fund programs to educate and train Resource Managers to use a Zero Waste approach, to develop programs for handling community discards, and to create green jobs and to enforce environmental rules.
- Educate residents, businesses and visitors. Zero Waste is a strategy not a technology. As such, it aims for better organization, better education and better industrial design. To achieve the cultural change needed to get to Zero Waste, communities must establish programs to educate and train residents, school children, college students, businesses, and visitors about new rules and programs.
- Perform Zero Waste Assessments. Communities should conduct a waste audit to find out the amount and type of waste being produced in their community. These audits should be used as a baseline to identify recovery and employment opportunities, cost savings and measure the success of the reduction and recovery program. Evaluate what additional source reduction, take-back, reuse, recycling and composting programs and facilities are needed to make those services more convenient to users than mixed material collection and disposal services.



4.1 Towards "Zero Waste Communities"

Principles and Practical steps towards Zero Waste

- Develop New Rules and Incentives to move towards Zero Waste – Communities can significantly change what is "economic" in the local marketplace with new policies, new rules and new incentives. Communities should restructure contracts and policies to make the avoided costs of collection and disposal a key engine for moving towards Zero Waste.
- Enact Extended Producer Responsibility (EPR) Rules. Communities need to help and encourage local businesses to take back products and packaging at their stores and factories from consumers. They should also advocate for state and national EPR policies and programs for brand-owners and producers. As much as possible, discard management costs for products and packaging that are difficult to reuse, recycle or compost in most local programs should be shifted from local government to the producers of the product. This gives producers the financial incentive to redesign products to make them less toxic and easier to reuse and recycle. Products and packages that cannot be reused, recycled or composted locally or are toxic should be required to be taken back at the point of sale or facilities set up by producers to conveniently receive those products at no cost from the public. All products and packaging taken back need to be properly reused, recycled or composted.





4.1 Towards "Zero Waste Communities"

Principles and Practical steps towards Zero Waste

- Remove government subsidies for wasting– Governments, all over the world have adopted many tax incentives to subsidize, directly and indirectly, the wasting of resources, instead of their reuse. Community adopted garbage rate structures have also made it cheaper to waste than recycle. Communities should remove the subsidies for wasting in its control and call for the removal of all these other subsidies.
- Support Zero Waste Procurement – Local governments should adopt the Precautionary Principle for municipal purchasing to eliminate toxic products and services; purchase Zero Waste products and services; avoid single use products and packaging; return to vendors any wasteful packaging; reduce packaging and buy in larger units; use reusable shipping containers; purchase reused, recycled and compost products; buy remanufactured equipment; lease, rent and share equipment; buy durables (using life-cycle cost analyses); and encourage businesses and institutions to follow these practices as well. [Based on list from Green Purchasing Institute.]

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4.1 Towards "Zero Waste Communities"

The above-mentioned principles must be considered a "living document" to support the growing of "Zero Waste Communities" all over the world.

The third fundamental tool that the Zero Waste International Alliance has developed to boost the movement of people, organizations and communities to Zero Waste, is the "Zero Waste Declaration", adopted by the ZWIA in 2020. It can be signed both by individuals/citizens and organizations. The Declaration embeds the commitment of all subscribers, especially manufacturers, in redesign products for highest material and energy efficiency, focusing services and products to embody durability, repairability, reuse, with recycling and/or composting as a final option and by eliminating all products demonstrated to be wasteful.

Besides the declaration advocates to promote "responsible consumption" among companies and people, while expanding reuse and repair organizations and infrastructure and expand opportunities for reuse and repair through outreach and education, promotion, and investment.

According to the promoters of the Declaration, responses to new challenges such as pandemics, natural disasters, and weather-related emergencies should not create barriers to move towards a just world of vibrant, resilient, Zero Waste communities, in harmony with nature.

Living a zero-waste lifestyle

Being "Zero waste people" is possible if everyone is strongly committed. On the other hand, living a "zero waste lifestyle" brings a variety of relevant benefits, in a win-win-win situation: for the planet, for communities, for individuals.

Social practices have largely contributed to a rapid rise in climate change, but method of reducing our carbon footprint is to go zero waste. Going zero waste is a mindset and, at societal level, a movement. The zero-waste movement is an eco-friendly lifestyle that aims to reduce the amount of waste an individual creates daily. The primary purpose of this lifestyle is a commitment to sending as little waste to landfills as possible. While it's impossible to create zero waste, there are many ways to reduce consumption that can benefit the planet. People in the movement prioritize recycling and reusing products and goods rather than purchasing single-use items that clog up landfills and contribute to climate change and global warming.

4.1 Towards "Zero Waste Communities"

Being first and foremost a "mindset", to adopt a "Zero Waste Lifestyle" asks for rethinking learnt behaviours. The following practices might be a good starting point to live in a more sustainable and less-impacting way:



1. Eliminate single-use items.

Single-use plastics or paper goods like utensils, straws, paper towels, and plastic bottles contribute to the garbage and pollution plaguing our planet. Use your own reusable items, like metal cutlery or cloth napkins, to reduce the amount of paper and plastic waste you generate with every meal. Keep your own reusable water bottle (like a stainless-steel thermos or sports bottle) on hand rather than buying new plastic bottles from the grocery store.

2. Take note of your trash.

While it may sound unappealing, examining your garbage can help you identify where most of your waste comes from. Understanding your waste habits will give you an idea of what practices you need to refine to reduce your waste production. For example, if most of your waste is food waste, you'll need to take steps to alter your shopping habits so that you only buy what you can reasonably consume.

3. Recycle

Recycling is the process by which used materials are converted into new products. There are many ways to recycle, from DIY repurposing old objects to sending used materials to facilities. Recycling cuts down on our need to harvest resources, helping to save energy, minimize greenhouse gas emissions, and reduce deforestation over time. Learn more in our beginner's guide to recycling.



4.1 Towards "Zero Waste Communities"

4. Thrift shop.

Buying second hand clothing at a thrift store is a great way to reuse pre-existing materials, rather than purchasing new, trendy, fast-fashion garments that are more likely to wind up in a landfill. You can find clothing, household items, and furniture at thrift shops, which you can repurpose or upcycle into other useful goods.

5. Repurpose household items.

There are many common household items that you can repurpose to reduce waste: Mason jars from spaghetti sauce or jam make great food storage containers and planters, for example. You can turn an old bed sheet into a reusable tote for grocery shopping. Use fabric bags to carry fresh produce, so you don't have to use the store's single-use plastic bags.

6. Compost

Much of the food waste we produce, like eggshells or fruit peels, are compostable materials. Under the right conditions, composting can turn your food scraps into pure organic nutrition without all the harmful methane byproducts that are released into the air when organic materials begin breaking down in landfills. If you have a home garden, compost is also a great, natural way to mulch your soil, rather than using store-brand versions, which are often made using chemicals.

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4.1 Towards "Zero Waste Communities"

7. Buy fresh foods.

Processed foods often come wrapped in plastic packaging that is harmful to the environment. Buying more fresh foods, if possible, is a great way to use less plastic. Fresh fruits and vegetables are not typically enclosed in plastic, and you can skip the plastic baggies that the grocery stores and farmers' markets provide by putting them in your reusable tote. If you eat meat, you can bring your own containers to the butcher or deli, reducing plastic and paper waste.



8. Use rechargeable batteries.

If you use electronics with disposable batteries, try switching to rechargeable versions. Rechargeable batteries help you save money on packages of batteries and reduce the amount of plastic packaging and empty batteries that end up poisoning the ground in landfills.

9. Connect with a zero-waste community.

Communities across the globe have successfully adapted their lifestyle to go zero waste. Look up forums, message boards, or visit local community centres that are all geared towards encouraging a zero-waste lifestyle. These groups can be supportive and helpful in providing necessary information towards your own successful zero-waste journey.

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4.1 Towards "Zero Waste Communities"

Zero Waste Cities: A European best practice

Capannori is a city of 50,000 inhabitants in Tuscany, Italy, which thanks to an ecological movement of citizens became the first zero waste city in Europe in 2007. The city's politics has in fact invested in recycling, in the reuse of objects and clothing, in the collection door to door, in the short chain in agriculture, in the creation of a Research centre on zero waste, as alternative solutions to a waste system based on the construction of an incinerator. The involvement of the population, schools, associations and individual citizens have led Capannori to obtain excellent results, thus over the years the city has become an example for other national and European cities of garbage reduction and zero waste. Led by a primary school teacher, Rossano Ercolini (President of Zero Waste Europe), a small but determined movement stopped the construction of an incinerator and convinced the municipality to commit to sending zero waste to landfill by 2020. Transparency and public consultations with residents were the keys of the successful strategies:

- Creation of a door-to-door collection system
- Introduction of a Pay-As-You-Throw (PAYT) fee
- Trainings for the community and strong engagement of the residents
- Creation of the first Zero Waste Research Centre in Europe in 2011.
- Opening of a Reuse Centre where items such as clothes, footwear, toys, and furniture can be repaired and sold to those in need, thereby diverting them from landfill and serving a vital social function

In almost 10 years:

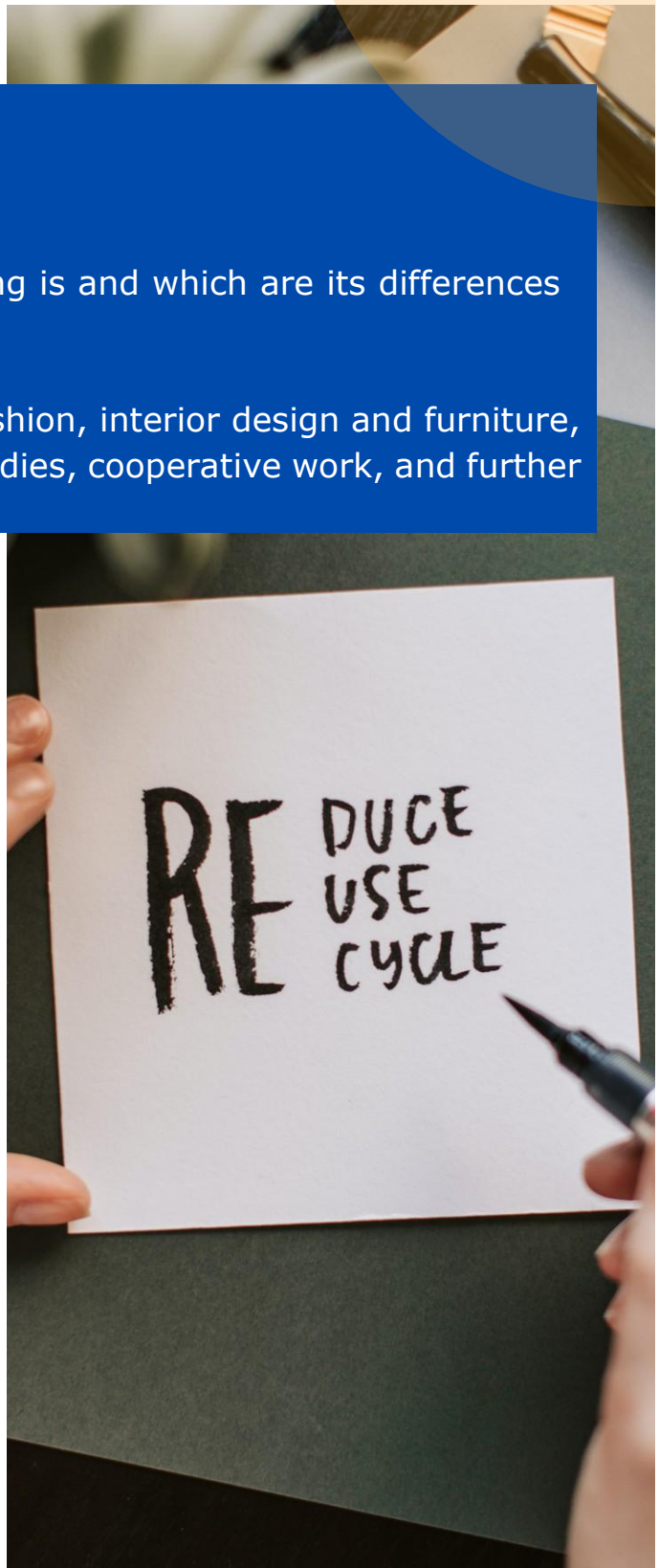
- 40% of waste reduction (average waste went from 1,92kg to 1,18 kg/person/year)
- Separate collection rate to 82%
- Residual waste per capita reduced by 57%
- Waste tariffs for residents have been reduced by 20%
- Capannori became an international example. Inspired by its success, today nearly 400 European municipalities are walking the path towards Zero Waste



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4.2 Upcycling and sustainability



4.3 The educator should:

- Have an understanding of what upcycling is and which are its differences with recycling
- Know the brief history of upcycling
- Be able to share good practices from fashion, interior design and furniture, art, and architecture, as well as case studies, cooperative work, and further examples

What is "Upcycling" and differences with recycling

Upcycling represents a variety of processes by which "old" products get to be modified and get a second life as they're turned into a "new" product. In this way, thanks to the mix and aggregation of used materials, components and items, the result is a "new product" with more value than the original value of the sum of all its components. In other others, upcycling is about materials or items that get to be re-adapted and/or re-purposed in a creative way, and whose lifespan is, therefore, expanded. Consequently, recycling can be redefined "down-cycling".

Another known definition of "Upcycling" is the following: "upcycling as the conversion

of waste materials to something useful or valuable, underlining is it a useful concept that can be applied not only to the waste design industry but also to waste recycling and resource circulation”, (Yi et al., 2018).

Data-Driven Decision Making



AI in agriculture generates a vast amount of data from various sources like sensors, drones, and weather stations. By leveraging AI-driven analytics tools, farmers can make data-driven decisions based on trends, patterns, and insights. This enables them to optimize resource utilization, implement efficient crop rotation strategies, and plan better for the future. Ultimately, this data-driven approach enhances sustainability and profitability in farming.

‹ 5-) Weather Prediction and Climate Adaptation

7-) Supply Chain Optimization ›

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4.2 Upcycling and sustainability

Upcycling: a brief history

The term "upcycling" was coined in 1994 by German engineer Reiner Pliz. Recycling at the time diminished the value of old or used products, so he suggested new value must be added instead, leading to the term of "upcycling". Author Gunter Pauli wrote the first published book on upcycling in the year 1998, however, Cradle to Cradle: Remaking the Way We Make Things, by authors William McDonough and Michael Braungart, was the first to gain mainstream recognition in 2002, that is when the public started to be familiar with these terms and its purpose.

Good practices in upcycling from fashion, interior design and furniture, upcycling art, architecture; case studies, cooperative work, and examples:

Upcycling In Fashion: The production process of the textile industry is complex and needs huge amounts of energy, water, polluting chemicals, among other resources. It's very polluting to the environment and its supply chain often isn't an ethical one. Therefore, upcycling comes as a nice solution that's starting to be developed not only by small artisans but also starting to boom in companies like Patagonia. Damaged clothes no longer fit for wearing are "disassembled" and their textiles get to reused for the creation of some other piece of clothing or as cases, bookmarks or wherever the designer's creativity takes them.

Upcycling Furniture: It's about taking old, wasted, or broken furniture and re-purposing it. From broken cabinets whose shelves can be screwed into an old door entry door that will work as a decoration piece, or putting some feet supports in a one-side opened bathtub and turning into a sofa: there are no limits to the power of creativity in upcycling furniture and other household items.



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4.2 Upcycling and sustainability

Good practices in upcycling from fashion, interior design and furniture, upcycling art, architecture; case studies, cooperative work, and examples:

Industrial Upcycling: There are established manufacturing organizations reusing the waste in products that re-enter consumer cycles. Examples of this are companies that create waste collection programmes for waste that is impossible or difficult to recycle and ends up producing things like park benches or pencil cases or tote bags from food and drink packaging.

Upcycling art: pieces of art, installations, etc. realized with second-hand materials or waste. It is a practice followed by more and more artists very day. They are becoming a movement to protect the environment. It is based on the ability to reimagine trash.







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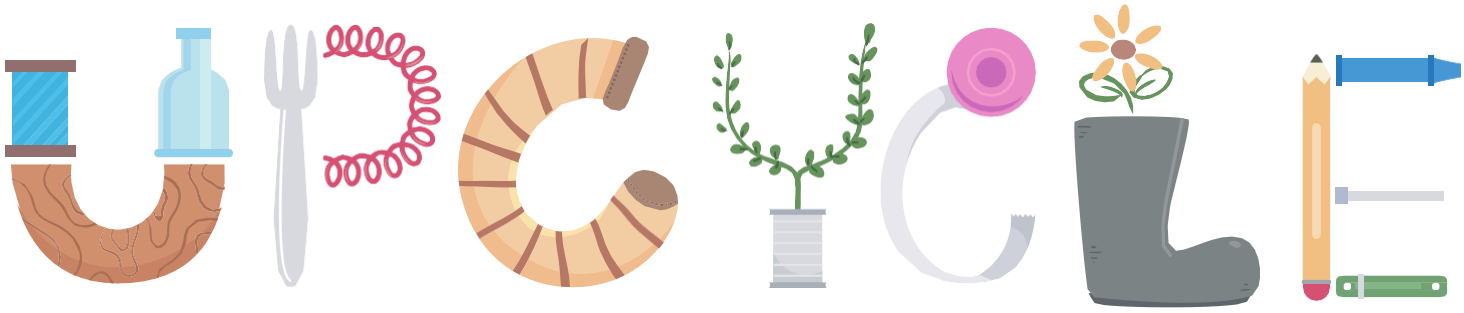
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4.3 Emerging green realities

Good practices in upcycling from fashion, interior design and furniture, upcycling art, architecture; case studies, cooperative work, and examples:

Green movements at community level have been supporting the growth of new emerging realities, as Repair Cafes, centres for creative reuse of waste and disposal, etc. Originally born in the Northern part of Europe, they have been progressively spreading all over Europe and beyond. In fact, it is possible to identify very good practices at local level.

Referring to the emerging reality of the Repair Cafes, people are invited to meet and try to repair various everyday tools, such as hoovers, toasters, radios, etc., joining forces, knowledge and capabilities to adjust. At the premises of a repair cafe people can learn how to repair through a catalogue of training courses, workshops, and laboratories.



Learning objectives

The educator should:

- Have an understanding of what the Repair Cafes are and what is their environmental and social value
- Have an understanding of what the creative reuse centres are and what are their benefits for communities and the planet
- Discuss the example of the ReMida Project- Centre for Creative Re-use of Manufacturing Company Waste Material

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4.3 Emerging green realities

Recommendations for opening a Repair Cafe

Repair Cafe Sweden prepared a guide for entities wanting to open a Repair Café. Their universal recommendations are the following:

- Keep it simple
- Start small and build from there
- Find a catchy name that people will associate with the local area of the Repair Cafe
- Create a Facebook page and/or website with practical information and pictures
- Find volunteers to help with the preparations and volunteer fixers, who can repair things on the day itself. Start out by finding a few friends or acquaintances or set up advertisements in the local area.
- You will need volunteers to help set up the Cafe, welcome people and to fix used items. As a start, you should find a minimum of 1 person to fix electronics, 1 seamstress and 1 person checking in/receiving guests. As you become more successful, you will need more fixers
- Once you have assembled your team of volunteers, you must find out what you want/can help with repairing. Remember the Café activities should not distort competition with local businesses
- Find people to give or lend you tools in your network
- Find out if you can get sponsorship from the local construction market, local committee or municipality
- Make sure to be present as often as possible and acknowledge all the volunteers for helping to make a difference
- Communicate important information in a simple and clear manner
- Find out where you can borrow a free room: local associations, cultural centres, libraries, cafes, schools, the municipality or an existing café (preferably non-profit). Most Repair Cafes have between 10-50 visitors at once, so there should be plenty of space. The room should accommodate 4-5 tables for fixers and users to sit. Involve and engage people and let them own the event. Everyone should be able to join regardless of age
- Create a cosy setting
- Keep track of all the practicalities and make sure your tools are in order
- Find out how often you want the Repair Café to open. Start with fewer times, i.e. with a pop-up event.
- Remember that everyone is a volunteer, so do not have too to high ambitions for how often you can open the Repair Café.
- We recommend opening the Repair Café once a month for approx. 3-4 hours. But most importantly, be consistent and people will start coming tool

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4.4 Emerging green realities

Creative Reuse Centres

Regarding other emerging green realities, it is important to consider the Creative reuse centres. These are business or non-profit organizations that collect usable materials, leftovers, or surplus creative supplies and redistribute them to the community for reuse. These organizations accept donations from individuals as well as manufacturers, industry partners, and businesses. Donations can be leftover craft supplies such as your craft stash.

Each centre makes decisions differently and has different donors and donations rules, but the ethos is consistent: They help people see the potential in useable waste as art. The creative possibilities of cast-off materials are limited only by the imagination of the artist. Creative reuse is all about upcycling and repurposing: elevating and reusing an unwanted material or item into something entirely new with purposeful value.

These centres demonstrate resourcefulness by showcasing alternatives to single-use packaging and bring value to unused leftovers and partially used materials. Their art is frequently used in case studies and showcased throughout the community, serving as practical demonstrations for educators, sustainability partners, and solid waste districts. They help greatly reduce landfill waste, benefitting the community as a whole and the planet!

There are different organization models for a Creative reuse centre: taking inspiration inside and outside Europe, in the USA we can found reuse centres established and coordinated by Municipalities, centres coordinated by associations of volunteers or even franchising models.



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4.3 Emerging green realities

The ReMida Project- Centre for Creative Re-use of Manufacturing Company Waste Material: a best practice in Bologna, Emilia Romagna region, Italy

ReMida Bologna_Terre d'Acqua is a Centre for Creative Re-use of Manufacturing Company Waste Material, managed by Associazione Funamboli, in cooperation with Geovest (the local recycling service) and promoted by the district of Calderara di Reno.

The Associazione Funamboli (literally the 'tightrope walker's association'), born in Bologna in 2007, is an NGO for Social Promotion (by legislative decree 383/2000), managed by 5 young ladies that promote ecological and ethical behaviours, through the ideation and realization of educational projects addressed to: children, young adults, teachers, and all categories of educators.

The Waste Material Emporium is a physical, cultural location where waste material as a resource is promoted, and where those who enter find such material, but also suggestions, sensations, curiosities, fun, emotions, cooperation opportunities and unexpected encounters. The materials are adequately collected, exhibited and readily available for users. They do not come from landfills or even waste collection bins, but are the scrap and swarf of industrial production, or mistakes and remainders left in company warehouses, no longer sellable, that companies have provided to ReMida for free.

The Creativity Lab is a space equipped with a large workbench, tools and fixtures for the manipulation of the waste materials that are assembled, purposely, without the use of glue: a corner for the development of manual skill and to complement creativity.



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Inspiration for the future

You can further read about the good practices presented in this chapter by checking out and clicking on the links below.

ZERO WASTE CITIES – The case study of Capannori, LUCCA, ITALY

- https://zerowastecities.eu/bestpractice/best-practice-the-story-of-capannori/, www.rifiutizerocapannori.it/rifiutizero/

ALTROMERCATO

- https://zerowastecities.eu/wp-content/uploads/2021/11/Milan-Case-Study-1.pdf
- https://www.altromercato.it/brand/on-earth/upcycling-creation/

SFRIIDO START UP – list of case studies on recycling and sustainability

- https://www.sfridoo.com/en/case-study/

REPAIR CAFÉ' IN BOLOGNA

- https://www.bolognatoday.it/video/video-repair-cafe-la-riparazione-degli-oggetti-social-contro-lo-spreco.html
- https://www.la7.it/storie-di-economia-circolare/video/repair-cafe-19-07-2021-387658

The REMIDA Project, Reggio Emilia, IT, Center for Creative Re-use of Manufacturing Company Waste Material

- http://www.remidabologna.it/en/about/#il-progetto-re-mida

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Ø Zero Waste International Alliance, 2018, https://zwia.org/zero-waste-community-principles/
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Ø Wikipedia, "Upcycling", https://en.wikipedia.org/wiki/Upcycling
Ø Rikke Marie Moalem et al., Critical Review of the Role of Repair Cafés in a Sustainable Circular Transition. Sustainability 2021, 13, 12351, https://doi.org/10.3390/su132212351

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Chapter 5: Green Jobs and Green Economy

Check out this short video to see the chapter overview https://youtu.be/fFSO7rnEJco

Introduction

When reflecting on the demands that humans have historically imposed on our ecosystems, it's apparent that green growth is the best approach to economic development. In fact, in the long term Green Economy is the only way to sustain economic growth and to meet people's needs — for food, transport, energy and so on — in a sustainable and equitable way.Rapid urbanisation and job growth lead to more demands for resources and services. But this comes at a prize, huge emissions of greenhouse gas, which, as already explained in this document, are the cause of climate change, harming, not only the environment (amplifying natural disasters: droughts, flooding, landslides, typhoons etc.) but also its people and communities (increasing destruction of homes and workplaces, illness, lack of food, etc.).

This has become an unsustainable situation as businesses and all human activity has greatly contributed to greenhouse emissions. Therefore, in the roadmap to make the economy and businesses greener, investing in green jobs help restore the environment and fight climate change, acting as a mitigating force in the effects of climate change.

Introduction

New industries are growing, and green jobs are a key part of climate change prevention, mitigation, and adaptation.

This has opened a whole new series of possibilities for professionals wanting to enter the green workforce, with green jobs following a tendency of exponential growth that is not assumed to be slowing down. Developing the skills demanded by Green Companies and/or discovering how to apply previously acquired skills to a green position will guarantee professional stability. Pursuing green qualifications and studies will also increase the value of an individual in the market. Learning more about the Green Economy can also make all of us reflect on our own work practices and revaluate where we stand on the impact our company has on the planet.

To make sure that we can live in a clean environment with sustained economic growth we need to make the world greener, and building a green economy is one of the major paths that our societies should take today.

5.1 Building a Green Economy

Learning objectives

The educator should:

- Have an understanding of what the Green Economy is and its principles.
- Know the benefits of a Circular Economy.
- Have an understanding of the Green Economy growth tendencies in the context of international regulations.

A Green Economy is driven by the desire to achieve economic growth while facilitating sustainable development, by considering the environmental risks and ecological scarcities that the business practices inflict on the environment.

Historically, economic expansion has continuously imposed excessive demands on natural systems — both in terms of the number of resources that are extracted and the volume of emissions and waste that are left to the environment to absorb and neutralise. As is increasingly understood, this production and consumption system is not sustainable: the environment has natural limits in terms of how much it can provide and endure.

In contraposition to this damaging economic philosophy, a green economy is defined by the European Environment Agency as low carbon, resource-efficient and socially inclusive economy.

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5.1 Building a Green Economy

It aims for economic and employment growth through investments that ensure that the infrastructures and processes reduce carbon emission and pollution, promote clean and renewable energy, enhance resource efficiency and biodiversity is conserved.

Green Economy is founded on the Resilience Principle, it strives for economic, social and environmental resilience. To deliver sustainable development in all sectors, the Green Economy is based on three main pillars – People, Profits and Planet.

People

Growing wealth that will support the wellbeing of all the citizens and is built on collective action while giving importance to individual choices. This economy delivers social protection and access to essential services. The green economy is equitable, within and between generations and countries, it is inclusive, fair, non-discriminatory and offers equal opportunity. An economy needs to have healthy communities and thereby a healthy workforce, and it promotes and creates decent work and green jobs. Within a green economy, businesses do not exploit labour or decrease the quality of life of their employees and/or the communities where their activities.

Profits

The run to profit will be sustained in the concept and ideas of sustainability without degrading nature of its components and considering the environmental and social impact of the business decisions. A green economy sees capital as a medium to obtain specific objectives and does not consider profit or unlimited growth and benefits as its main goal. Progress is measured beyond GPD using appropriate indicators and metrics that include all dimensions of sustainable growth. The green economy improves governance and the rule of law to have more ethical economic gain: it is inclusive, democratic, participatory, accountable, transparent, and stable.

Planet

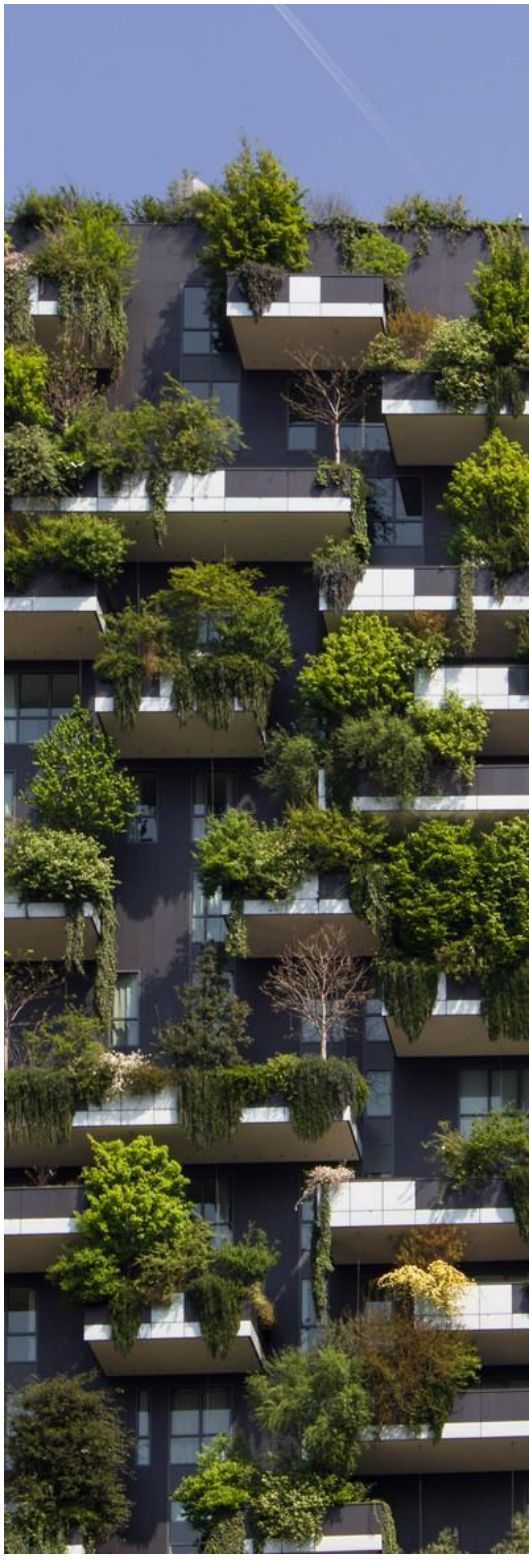
Green economy respects planetary boundaries and ecological limits and secrecy and it aims at safeguarding, restoring, and investing in nature. It protects biodiversity and ecosystems, it focuses on ecosystem resilience — the status, trends, and limits of natural systems. The products and services offered within a green economy system contribute to the regeneration of the planet. Efficient measures of waste disposal and energy management are followed, and sanctions are put in place for those organisations that do not comply.

5.1 Building a Green Economy

In balancing environmental, economic, and social elements, the green economy concept has much in common with the notion of sustainable development. Albeit it can be argued that there is a focus primarily on the planet and profit aspects, the trends experienced in the strategies aimed at green economic growth will inevitably be linked with the labour market and, therefore, with people. Specific sustainable labour regulations and protocols are implemented in numerous industries to ensure sustainable, fair, and equitable use of the Human Capital. The demand for Green Jobs or Sustainable Jobs has increasingly been rising, serving as a very clear path for defining which areas of expertise and skills will become futureproof.

Circular Economy

Moving away from the linear "take-make-use-dispose" model and transitioning to a regenerative growth model is essential to keep resource consumption within planetary boundaries. Within Green Economy, we can talk about Circular Economy, when the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimized.



As stated by the Ellen MacArthur Foundation, circular economy is based in three principals: eliminate waste and pollution, circulate products and materials and regenerate nature. According to the Ellen MacArthur Foundation (2022), "the circular economy is a systems solution framework that tackles global challenges like climate change, biodiversity loss, waste, and pollution."

Circular consumption measures in business practices at all levels can substantially reduce the impacts of human economic activities on the environment. The circular economy allows to separate economic growth from resource use, protecting natural resources while boosting healthy, creative, and innovative business growth. New industries have been emerging to give green alternatives to traditional polluting resources, including wind energy, electric grid upgrades, industrial efficiency, walking and cycling infrastructure, and electric vehicle charging infrastructure.

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5.1 Building a Green Economy

The circular economy will:

- enable a healthier planet and reduce pollution
- reduce pressure on natural resources such as water and land use
- create new business opportunities and local quality jobs
- enable more resilient value chains, particularly in four main areas: mobility, energy, raw materials, and food

The Green Economy in Europe

Intending to become the first climate-neutral continent, the EU has put in place numerous environmental strategies and action plans. The EU has a range of laws to improve environmental standards for Europeans and protect their quality of life. The EU ensures that national governments correctly implement these environmental laws. These laws directly affect corporations and business and consequently will have an incident in the job market and the particular functions or skills of the workers.

Transitioning to a circular economy is in full force to reduce pressure on natural resources, create sustainable growth and jobs and achieve the EU's 2030 target to reduce 55% greenhouse gas emissions and 2050 climate neutrality target and halt biodiversity loss. The EU intends to balance economic growth with the need to protect the environment and has s itself challenging targets for reducing greenhouse gas emissions, increasing energy efficiency and promoting renewable energy, and reducing waste.



5.1 Building a Green Economy

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To make Europe cleaner and more competitive, specific policies are put in place in the following main areas:

- Plastics
- Waste and recycling
- Circular economy at the global level
- Critical raw materials
- Industrial emissions
- Sustainable products
- Textiles

The Green Economy and the SDGs

Environmental sustainability and green economy are integral components of Sustainable Development Goals (SDGs); as they have an effect in: improving basic infrastructure, provision of clean and safe water and sanitation; enhancing solid waste management facilities; fostering convenient and accessible transport system, providing affordable and clean sources of energy and harnessing natural habitat and biodiversity, among other principles.

All aspects of green economy and green transition are interrelated to the sustainable growth, having several direct and indirect connections with the SDGs. The strive for a Green Economy is in great part based on SDG 8: promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.



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5.1 Building a Green Economy

In addition to committing to entrepreneurship and to the creation of decent jobs for all, SDG 8 also supports green jobs for focusing on improving global resource efficiency in consumption and production. Based on the principles of the Green or Circular Economy regarding people, planet and profit, the link with some other SDGs is evident: "SDGs 6 Clean water and sanitation" and the specific targets of improving water quality by reducing pollution, eliminating dumping and minimizing the release of hazardous chemicals and materials to the water and of increasing water-use efficiency; "SDG 7 Affordable and clean energy" and the goals to ensure universal access to affordable and reliable energy, to increase the proportion of renewable energy used globally and to improve in energy efficiency; "SDG 9 Industry, innovation and infrastructure" by promoting an inclusive and sustainable industrialization and by re-examining the industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes; and "SDG 15 Life on Land", under the target of ensuring the conservation, restoration and sustainable use of natural resources and the target

There is also a high influence of environmentally aimed Sustainability goals:

- SDG 2: zero hunger
- SDG 13: Climate action
- SDG 14: Life below water
- SDG 15 Life on land

As well as social SDGs:

- SDG 1: No poverty
- SDG 5: Gender equality
- SDG 10: Reduced inequalities
- SDG 16: Peace, justice and strong institutions
- SDG 17: Partnerships for the goals

5.1 Building a Green Economy

The EU level regulations and the specific milestones included in the SDGs regarding green economy create a trickledown effect on all levels of national and local government. Regional governments create their own targets related to the different SDGs considering the characteristics of the area. These will have a direct impact on the local business and organisations and will determine the landscape of the green jobs in each area.



5.2 Green Organisations and Green Jobs

Green Organisations

An enterprise that has a positive impact (and minimal negative impact) on the global or local environment, community or economy is a sustainable business. Sustainable organisations strive to meet the triple bottom line of pillars on which the Green Economy is based: Planet, People and Profit.

- Planet: regardless of their main service or product, the businesses analyse the impact of their actions regarding energy, waste, water, climate change and biodiversity.
- Profit: green organisations understand growth as a way of contributing further to the pursuit of sustainability fair pricing and fair business practices.
- People: ethics becomes the focus point of decisions and employees, suppliers, customers, investors, communities, etc. are taken into consideration at all levels

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5.2 Green Organisations and Green Jobs

Learning objectives

The educator should:

- Have an understanding of the characteristics that make a green organisation.
- Be able to describe green organisations and give examples.
- Know what a green job and what it entails.

Sustainable development within a business can create value for customers, investors, and the environment. A sustainable enterprise faces the challenge of creating value for customers while not negatively affecting the environment. Businesses have a strong capability to affect their surrounding societies and environments because sustainability and global systems are built on interdependencies.

With increasing consumer pressure to make a positive impact as an organisation, the future does not look bright for companies that do not make change (or that are simply too slow to respond to this trend). Organisations that seize the opportunity now to move to a future-proof and sustainable business model or that initiate change themselves are bound to excel in the future.



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5.2 Green Organisations and Green Jobs

Types of green organisations

- Social enterprises: businesses that offer products and services with specific social objectives. The purpose of undertaking all their actions comes primarily from a social mission (impact first). Social enterprises have an earning model, seeking to maximize profits while maximizing benefits to society and the environment, the profits are principally used to fund social programs or to expand their reach. Entrepreneurs are the main source of new green skills and sustainable alternatives to traditional enterprises.

- B-Corps: corporations that voluntarily meet the highest standards for social and environmental performance. They go through a rigorous certification process, completing a comprehensive assessment of their company's impacts on all stakeholders. The assessment is verified by B Lab, the non-profit behind the B Corp certification.

- Non-profit organisations (NGOs): an entity whose main objective is to help or attend a community, charitable, social, environmental, cultural or artistic matter, among others. These organisations do not aim to make a profit and have no commercial intentions. A non-profit can generate income and make a profit as long as this is reinvested in the organisation and their social work.

- Traditional corporations: many traditional corporations are responding to the social and political pressure towards sustainability, transforming pre-existing business model practices or diversifying their actions to include green products/services. Although changes towards sustainability are being taken, this comes from a desire to continue making profit in the market.

- Green Entrepreneurship: a green entrepreneur works with the limits of resources, builds on traditional knowledge, and considers people and how they get fair and decent work, making profit within those constraints. Green entrepreneurship requires social innovation, incorporating ideas and innovations that meet social needs by solving existing social, cultural, economic and environmental challenges.



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5.2 Green Organisations and Green Jobs

A Green Job: what does it mean?

The green sector offers enormous potential for job creation. The environmental policies and business interests of the new economy have given rise to a wide range of green jobs — jobs which contributes to preserving the environment or restoring it to what it was. They can be in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency.

Green jobs help

- Improve energy and raw materials efficiency
- Limit greenhouse gas emissions
- Minimize waste and pollution
- Protect and restore ecosystems
- Support adaptation to the effects of climate change

At the enterprise level, green jobs can produce goods or provide services that benefit the environment, for example, solar panel installation or recycled plastic water bottles. However, green jobs can also be distinguished by their contribution to more environmentally friendly processes. For example, you can have a green job if it is your goal to reduce water consumption or improve recycling systems within the internal processes of the organisation. In this case, green jobs defined through production processes do not necessarily produce environmental goods or services, as would be the case of a traditional hairdresser salon that only uses the most sustainable products available.



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5.2 Green Organisations and Green Jobs

A Green Job: what does it mean?

For Green Jobs to be truly sustainable, it must be ensured that these jobs provide safe, healthy and decent working conditions. Green jobs need to be good for workers, as well as good for the environment. To achieve this, Green Jobs are provided under the principles of:

- Well-being: support the wellbeing of the individual and all the stakeholders of the work community.
- Justice: inclusive, non-discriminatory, equal, and fair job opportunities.
- Good Governance: offered by integrated, accountable and resilient institutions.
- Intergenerational: with investment in the future.

Green jobs are among the fastest growing and the most resilient employment of the European economy. Skills are being sought in sectors like energy efficiency of buildings, pipe insulation, recycling and innovative renewable technologies and there are expansion plans in other sectors that can ensure employment growth. Eco-innovation and sustainable employment are one of main environmental success indicators assessed by the EU.

In high-income countries, green jobs can provide avenues to the middle class, including for workers with only a high school diploma. For green jobs and all jobs alike, it's essential to formalise the workforce and promote career progression through training, capacity-building and skills certification.

5.3 Green Skills for Green Jobs

Learning objectives

The educator should:

- Know what aspects to consider when looking for a green job
- Have an understanding on how people's skills can be applied to a green job/green organisation
- Be able to motivate the learners into considering a career in green jobs.

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5.3 Green Skills for Green Jobs

What to consider when looking for a green job?

The broad range of Green Job and Sustainable Business Practices allows to envision a wide range of employment opportunities that encompass many different functions at all levels. The definition of a green job will not always be so much related to the activity or the skills themselves, but rather to the framework in which the function is performed. Green jobs - jobs that need green skills - are found in a wide range of sectors, from healthcare to construction and the green talent in the workforce has been steadily growing in the last years. Demand for green talent is already outstripping supply. By having identified this trend in the job market, workers at all levels of education are growing their green skills. This is made possible by the numerous new courses and certifications offered by educational organisations.

But having a green job is much more than simply having employment granted. It requires taking the impact that the organisation you work for has on the planet. To do a good job, two important things are needed: time and effort, limited resources. This forces people to decide to best use their time and effort when it comes to spending their working day. In terms of impact - both directly and indirectly - your activities help a company either to continue with unsustainable activities or to apply positive changes.

Where to find a green job?

There are increasingly more and more online job boards devoted to green careers and to showing vacancies for green functions. These websites can help narrow your search and point you in the right direction for careers that align with your green experience and skills.

When looking into starting a career in the Green Sector consider the job openings offered by green companies: B-Corps offer jobs at all levels of specialisation, considering their large scale and the broad number of industries included in the certification. Public administrations, and in particular local government, play a key role in facilitating technology transitions in homes and businesses, informing constituents, supporting local businesses and upskilling the local workforce. Local administrations also offer green jobs with a low entrance threshold.

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5.3 Green Skills for Green Jobs

The Green@AI Project at the CEIP Bilingüe Almerimar Primary School aims to equip students with the essential skills needed to meet the demands of a rapidly evolving green economy. Recognizing that social enterprises require a specialized set of skills for the innovative services or products they offer, the school actively integrates environmental education into its curriculum.

Through partnerships with local businesses and organizations, students learn about corporate social responsibility (CSR) strategies that companies employ to contribute to a sustainable future. By understanding each company's main green objectives, students can better relate these goals to the job opportunities available in the green sector.

Additionally, the exploration of global challenges provides a framework for students to discover new opportunities for innovation and entrepreneurship. Problem-solving is highlighted as a vital form of value creation, which can lead to paid opportunities in creating solutions to real-world issues

Sectors in the Green Economy with the highest growth of green jobs according to the World Economic Forum are:



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5.3 Green Skills for Green Jobs

Green Skills

Within these rapidly growing sectors there are many jobs that can use every person's unique skill set. Consider how to apply your pre-determined unique set of skills to any of these sectors. How can you make an impact?
Jobs in the technical sector (manufacturing, construction/installation and operation & maintenance) are specially demanded and will experience an even greater growing trend in the future. Research and Consultancy are also a fast-growing subsector within Green Jobs. But also positions such as accountants, administrative staff, finance and sales, human resources, customer managers, legal team, marketing and communication, project managers and project employees, etc.

Challenge yourself by thinking about how your dream job can be combined with making a positive sustainable impact. What is that job? Many education institutions include environmental sustainability and learning outcomes in their curricula related to growing an inclusive green workforce and economy.

To become sustainable talent (even in a non-green organisation), one must:

- Choose for a sustainable career
- Research the impact of their organisations (considering: Planet, Profit and People)
- Pitch: present themselves/ideas as a good match to address a social or environmental problem
- Grow the green best practices in the profession

When looking for a job, career opportunities, activities and salary should be considered. Additionally, your personal beliefs and aspiration should be aligned with the interest of the organisation. Your (new) sustainable employer should invest in society and nature and be concerned with the impact they generate on the world. This impact should be genuine, going beyond the mandated CSR regulations (Corporate Social Responsibility).

Working in a sustainable job or on a sustainable assignment gives positive impact on the world and gives purpose to the worker's efforts, beyond just making money. Salaries may be lower in the green economy (especially in non-profit organisations and emerging social enterprises), but truly sustainable Green Jobs provide safe, healthy, and decent working conditions, caring about the personal development of each employee.

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5.3 Green Skills for Green Jobs

Finding the core energy means becoming aware of one's talents and particular skills. However, discovering your talent is not easy: sometimes people are not aware of their talent because it comes as natural to them and in some other instances the talent cannot be discovered is it is never explored. However, the core energy is not only based on skills. Many people also excel at things they don't like at all. That is why it is crucial to find out what every person feels passion for, as this will determine their drive to succeed and their overall life satisfaction.

Having an impactful job that aligns with your talents and passion will fulfil you, giving you a sense of purpose and authenticity.

All in all, there is an urgent need for a green economy for the following reasons:

- The initiative towards a green economy has been born out of several crises and resource scarcity
- This economy works towards sustainable development
- It can result in better social inclusion, decrease in poverty etc.
- This economy is a new economic paradigm that can result in the growth of income as well as jobs, without posing threats to the environment
- It is developed in common interest between both developed as well as developing countries around the world.

Green Jobs are correctly defined as decent jobs because they foster the fair development of every individual and community: a green job means having a voice at work, equality, fair income, safe working conditions, all while having a positive impact and protecting the environment.



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Inspiration for the future (Job with a Future)

CEIP Bilingüe Almerimar Primary School in Spain:

This project was set up by the CEIP Bilingüe Almerimar Primary School in Spain to inspire enthusiasm for careers in this sector, especially among individuals seeking retraining and those entering the profession later in life. By collaborating with educational institutions, the school offers an abridged training course for people from social welfare or similar backgrounds, serving as a preliminary pathway to regular training. Once individuals pass the selection process for regular training, they begin working immediately, with their training funded by the employer (ONO funds). Almerimar takes into consideration factors such as debts, employee skills, and childcare when assessing the suitability of the program for each individual.

Requirements for education: a high language level (mother tongue), strong learning ability, physical strength, and possession of a driving license. It is challenging for individuals who speak different languages to gain entry into the program. The municipality is currently advocating for the inclusion of individuals who speak English as well. The employer/trainer retains the authority to decide who is accepted into the program.

The CEIP Bilingüe Almerimar Primary School plays a vital role in promoting language development and providing the educational support necessary for enhancing language proficiency among participants.



Greenjobs (Almerimar vacatures - Greenjobs)

Job banks exclusively dedicated to prompting green job vacancies.

FutureProof and Starters4Communities (Starters4Communities)

Starters4Communities works on a social entrepreneurial society, bottom-up shaped by changemakers. They offer practice-oriented training programmes through which various target groups gain knowledge and skills in social entrepreneurship, work on their entrepreneurial leadership and make an immediate impact with an existing social enterprise or develop their own social goals.

Futureproof is a programme that aim to make social entrepreneurship accessible for young people in the Netherlands and stimulate them to take action with social impact. All this while they develop themselves and increase their future prospects. They make social entrepreneurship accessible to young professionals, especially vulnerable young people who would normally not come into contact with it, coming from different sectors (law, marketing, education, language, etc.). It allows the participants to work with social enterprises from the area, being able to make the difference directly and experience how inspiring it can be and that everyone can contribute something.

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ADDENDUM The Green AI Pedagogical Framework

Introduction

Multiple expansions of the urban landscape, resulting from advances in science and technology, have put pressures on the natural environment in recent years. These pressures have negative consequences, including but not limited to climate change and global warming, pollution, desertification, flooding, deforestation, the extinction of plant and animal species, and ecosystem imbalance. Environmental degradation and its impacts on the environment can only be effectively addressed by educating the citizenry (young and adult) on knowledge of environmental concepts, issues and problems affecting the environment, skills to identify and resolve environmental problems, and right attitudes and behaviour to improve and maintain the environment, according to various global meetings and conferences. Young learners constitute the majority in the production process, and they are closer to the environment than children and are hugely responsible for environmental degradation through their actions, activities and other manners of relationships with the environment. There is therefore the need to develop and convey right knowledge, skills and behaviour for proper use, management, and maintenance of environmental resources.

Introduction

Both in formal and nonformal adult education there is an identifiable gap with regards to environmental education. Adult education still needs to be reoriented to help both adult educators and learners to develop knowledge, skills, values, and behaviours to address and bring issues, such as climate change into teaching and learning. In that sense, it is important now to speak about environmental adult education which will be directed towards bringing about change and initiating action.

The Green AI pedagogical framework will address and offer a concrete solution to the existing gap in environmental education within adult education in Europe. It aims to help Member States in their efforts to integrate life-long learning about environmental issues in mainstream adult education, including environmental competences required by educators to teach in an inclusive manner. The pedagogical framework of The Green AI is intended to support national, regional, and local efforts in creating understanding and awareness on environmental issues, as well as developing skills, creating a sense of commitment, and stimulating individual and collective action, by offering a common frame of reference, with a common language and logic. The Framework aims to become a widely recognised tool for the integration of environmental education in the larger structure of school education, and to be utilized as a foundation for educators' training and professional development throughout Europe and beyond.

Definition

Environmental Education (EE) is a method of allowing people to learn about environmental issues, solve problems, and take steps to improve the environment. Individuals have a better grasp of environmental challenges and the ability to make educated and responsible actions as a result. In that sense, EE is a process in which individuals gain awareness of their environment and acquire knowledge, skills, values, experiences, and also the determination, which will enable them to act - individually and collectively - to solve present and future environmental problems. In its most basic form, EE entails learning about the environment. However, according to Lucas (1972)[1], and many more scholars, EE can be defined as education in, about, and for the environment (Figure 1).

[1] Lucas, A. M. (1972). Environment and environmental education: Conceptual issues and curriculum implications. PhD Dissertation, Ohio State University. ERIC D

Figure 1: Environmental Education as education in, about, and for the environment. Source: Mikael Chuaungo, ENVIRONMENTAL EDUCATION: Meaning, Importance and Dimensions.

Definition

This implies that environmental education must assume the role of helping individuals develop knowledge about their environment, which they can get through interacting with the environment, and finally they can use the knowledge and skills to conserve or take care of the environment.

This simple description reinforces the various purposes that EE frequently serves: programs provide opportunities to explore nature in the outdoors, information about conservation and environmental issues, and opportunities to learn and practice skills that can be used to defend, protect, conserve, or restore the environment. This multidimensional definition was confirmed by the delegates at the Tbilisi Intergovernmental Conference in Georgia, USSR in 1977 (UNESCO, 1980)[1].

[1] UNESCO. (1980). Environmental education in the light of the Tbilisi Conference. Paris: Unesco.



Definition

EE is not only multifaceted, but also continually evolving. More current methods intend to emphasize the social aspect of environmental problems, to target behaviour change more explicitly, and to support rather than lead learning. For this reason, the main focal point of EE has shifted from natural science and conservation to a more social and political perspective (Johnson & Mappin, 2005) [1].

According to Monroe et al. (2007)[2], the components of environmental education are:

1. Awareness and sensitivity to the environment and environmental challenges
2. Knowledge and understanding of the environment and environmental challenges
3. Attitudes of concern for the environment and motivation to improve or maintain environmental quality
4. Skills to identify and help resolve environmental challenges
5. Participation in activities that lead to the resolution of environmental challenges

All in all, as we have already understood, there are many definitions of the term EE. In the framework of The Green AI project, we will adopt the definition that was given by UNESCO:

"Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action" (Borah, 2007) [3].

[1] Johnson, E. A., & Mappin, M. J. (eds.). (2005). Environmental education and advocacy. Cambridge, UK: Cambridge University Press.
[2] Monroe, M.C., Andrews, E., & Biedenweg, K. (2007). A Framework for Environmental Education Strategies. Applied Environmental Education and Communication, 6:205–216.
[3] Borah, P. (2007). 4th International conference on environmental education: Environmental education towards a sustainable future--partners for the decade of education for sustainable development: Final report. Ahmedabad: Centre for Environment Education

Strategies

We determined five overarching strategies of intervention, that will form the foundation for the methods and tools used in The Green AI Curriculum. These strategies can be implemented according to the educator's insight and interchanged and combined as is seen fit.

These strategies are:

1. Direct Instruction. We will use this strategy to disseminate information, raise awareness and inform. This strategy is centred on educators. The goal is to develop skills in learners, involving sequential steps. Conveying information is a broad strategy that can be readily combined with other teaching strategies. Examples of direct instruction are: giving a presentation, handing out informative materials or inviting an external expert. Disseminating information can be the foundation to build a training on but should not be the focus point. Especially in themes like sustainability and green action, it is essential to create a support level among the learners. The goal is to actively involve them and make them feel like they can play an important part in moving towards a greener world. At the same time, people might have different views, ideas or knowledge on these topics, and it is important to create a space in which these ideas can be shared and will not be judged.

2. Self-Directed Learning. There will be different viewpoints and value sets in a learning environment with adult learners. Concepts should be explained from more than one viewpoint and appeal to learners in different age groups and with different ethno-cultural backgrounds. Self-directed learning means involving other people as recourses and experts. It does not mean to learn alone and can be done outside or inside of the classroom. Learners take initiative in their learning. They plan, carry out and evaluate their learning process.



Strategies

3. Interactive Learning and Group Learning. These are hands-on approaches to education, founded upon building learner's engagement through cooperation and social interaction. Creating structured group activities can be a tool for learners to process new concepts and topics together. The goal here is to build understanding: To exchange ideas and provide dialogue, to build a sense of place, to clarify and enhance the understanding of information and issues, and to generate concern.

4. Transformative learnings. This approach is focused on changing the way learners think about the world around them and how they think about themselves. We want to reach a certain sense of involvement and need with the learners, not only providing them with information, but turning them into active agents of change. To do this, it is necessary to make learners aware of the position and space they take in the world. Sometimes this approach uses dilemmas or situations to challenge assumptions and principles. Learners use critical thinking and questioning to evaluate their underlying beliefs and assumptions and learn from how they perceive themselves in the process.[1]

5. Project Based Learning and Experiential learning. These 'learning by doing' approaches can be used to build, improve, and practice skills. Both are focused on doing something concrete, instead of receiving information in text (audial or visual). It's hands-on and reflective at the same time. In project-based learning, the educator makes use of real-world situations, either inside or outside of the classroom. Experiential learning is similar in the sense that it is focused on experiencing something, instead of just processing facts and information. Experiential learning is defined as "a process through which a learner constructs knowledge, skill, and value from direct experiences" (Environmental Management Programs Director, 2015) [2].



[1] Western Governors University, 'Adult learning theories and principles', 2020, Adult Learning Theories and Principles (wgu.edu)

[2] Environmental Management Programs Directory. (2015). EnviroEducation.com. Environmental Management Programs Directory, EnviroEducation.com. N.p., n.d. Web. 26 Dec. 2015

Strategies

All these strategies can succeed in the development of environmental school education which can be acknowledged as an effective means for resolving and confronting environmental challenges. Environmental adult education is critical for bringing transformation and change by creating awareness, enhancing values, changing attitudes, and improving skills for the actualisation of environmental sustainability. Environmental adult education goes beyond creating awareness, imparting knowledge, and disseminating information about the environment. The emphasis is on bringing about changes in behaviour and causing individuals to initiate actions, develop skills, create sense of commitment, and stimulate individual and collective actions at personal, community and governmental levels. Environmental adult education ensures that the adult learner gets involved in and with the environment through building of individual and group capacities by exposing them to relevant knowledge, skills that enable informed actions, and it considers opinions of adult individuals, problem solving skills are employed, efforts are result oriented and focused towards resolving environmental issues. In environmental adult education, adult individuals are made to understand that their decisions and actions have direct consequences on the environment.

Effective Methods & Tools

Having identified some of the most important pedagogical strategies that are used both in formal and nonformal education, it is important now to discuss some methods and tools that can be used in order to engage learners in educational processes in, about, and for the environment.

Taking the strategies above into consideration, four different categories can be created that signify four overarching processes that are applicable to a wide range of educational projects, including teaching environmental issues in adult education. The categories are as follows:

1. **Convey information**
2. **Build understanding**
3. **Improve skills**
4. **Enable sustainable actions**

The most important variable in all four categories is audience participation. In this case, the extent to which the educators engage and collaborate with their learners will improve the educational methods and tools that are suggested in each category and will increase our chances of accomplishing the educational objectives and goals indicated with this framework and in the curriculum.



"AI@Green: Harnessing Artificial Intelligence and Interactive Tools For Climate Change Mitigation and Gaining Green Skills"

Project Web Platform. : https://aigreenerasmus.com/

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