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**2021-1-DE04-KA220-YOU-000029209**  
**Think Green for the World**



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# Environmental Literacy Handbook

**Think Green for the World Project: Addressing Sustainability Challenges**



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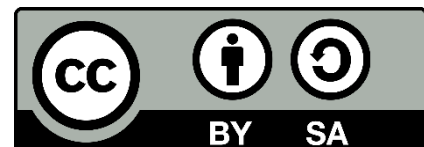
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## Abbreviations

CEE	Central and Eastern European
DG	Directorates-General
EAPs	Environment Action Programmes
E-PRTR	European Pollutant Release and Transfer Register
EEA	European Environment Agency
EU	European Union
GDP	Gross Domestic Product
GNM	National Environmental Guard
LTTA	Learning, Teaching, and Training Activities
MEPs	Members of the European Parliament
NGO	Non-Governmental Organization
SEA	Single European Act
TEU	Treaty on the Functioning of the European Union
TFEU	Treaty on the Functioning of the European Union (duplicate entry)
UN	United Nations
WWF	World Wildlife Fund



## Introduction

### Part A – Information on the project GREENWORLD

Hasan BABA

#### 1. “Think Green for the World” Project:

The "Think Green for the World" project recognizes the critical link between environmental health and human well-being, as emphasized in the EU's long-term strategies for 2023 and 2030. Our project focuses on cultivating **environmental literacy** among young people and empowering them to become **green entrepreneurs**.

#### Why Green Entrepreneurship?

We believe a focus on five key sectors within the Green and Renewable Economy is crucial for building a sustainable future:

- Renewable Energy
- Sustainable Transportation
- Green Construction
- Sustainable Tourism
- Energy Efficiency & Management

By fostering a new generation of green thinkers and entrepreneurs, we aim to address environmental challenges and create a more sustainable world.

Our Project is a Strategic Partnership for Youth Education, specifically a Cooperation Partnership. This framework fosters collaboration between educational institutions across Europe. Our project capitalizes on this collaborative spirit by bringing together six European partners from **Germany, Turkey, Portugal, and Romania**. Through this partnership, we aim to achieve our project goals by working together and sharing expertise.

**prUnec GmbH, Germany:** prUnec is active as the project coordinator and offers cooperation contacts between youth groups in Germany and Türkiye.

**Universität Paderborn - UPB, Lehrstuhl Wirtschaftspädagogik II – Chair Business and Human Resource Education II, Germany:** UPB is the concept- and research partner and focusses also on didactic and pedagogical issues. It is the university partner in GREENWORLD.

**E-digital software, Türkiye:** E-digital software is responsible for technical issues and work as the technical partner in the project.

**Doganin Cocuklari Ceroki Ekolojik Yasam Ve Ingilizce Koyu Kulubu Dernegi - Ceroki, Türkiye:** Ceroki is the implementation and testing partner in the project and has access to a broad variety of youth groups.

**Associação BioLiving, BioLiving, Portugal:** BioLiving is a development, implementation and testing partner in the project and has access to a broad biological settings and to youth groups.





**Asociatia Share Education. Impartasim Educatiein Arad, ASE, Romania:** ASE is also involved as a development, implementation and testing partner in GREENWORLD and offers youth work experiences and access to youth groups.

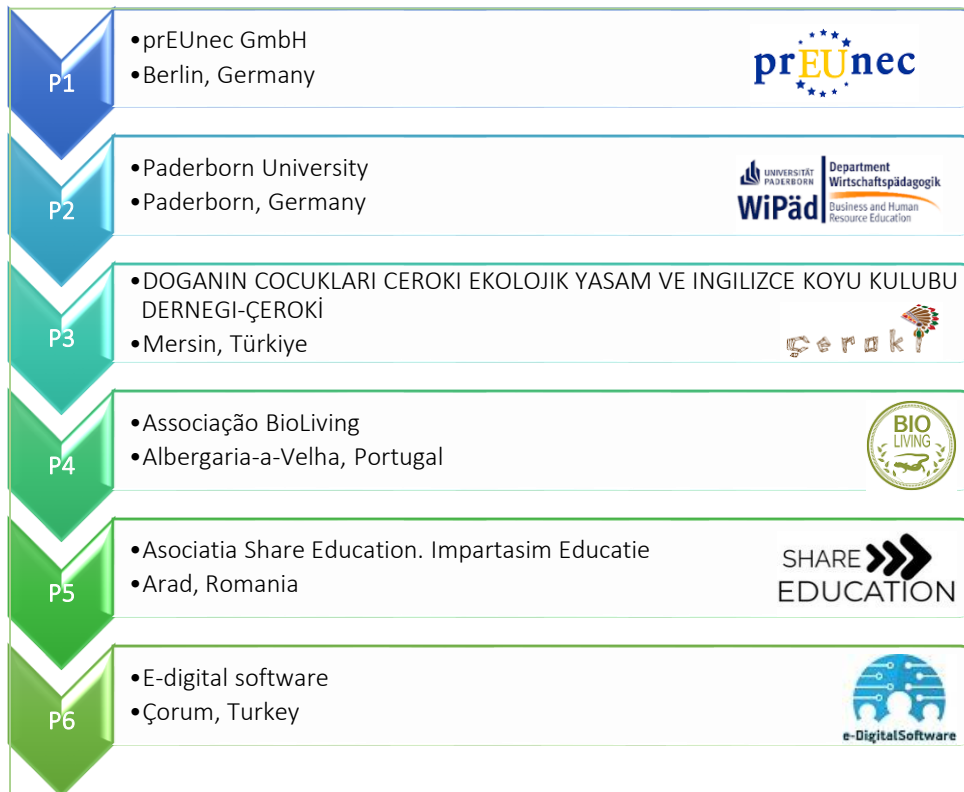


Figure 1: Information about partnership.

### Project Outputs:

- Green entrepreneurship and environmental literacy handbooks (available online and on Moodle). You can reach each on our link for the website.
- Project website: <https://www.e-greenworld.org/>
- "Thinking Green Center": <https://www.e-greenworld.org/green-thinking-centers/>

This online platform will connect educators, experts, young people, NGOs, and business owners, fostering collaboration for a sustainable future.

### Project Activities:

Short-term learning, teaching, and training (LTT) activities are planned for both staff and youth groups across partner institutions:

- Green Entrepreneurship for Staff (Germany)
- Green Entrepreneurship Idea Contest and Events for Youth (Romania)
- Environmental Literacy for Staff (Turkey)
- Climate Change Awareness Studies for Youth (Germany)
- Environmental and Climate Short Film Creation by Youth (Portugal)



These LTT activities will be complemented by local studies and initiatives in each partner country.

We believe the "Think Green for the World" project will equip young people with the knowledge, skills, and motivation to become active participants in building a greener and more sustainable future.

### **Our Methodology Project Management and Budget Control**

The project grant will cover all administrative tasks, project management activities, and educational materials needed to run the program. This includes things like printing costs, project planning, and even workshops. To keep everything on track, the project will utilize several tools. A Gantt chart will visually represent progress, while a timetable keeps activities in each country organized. Financial planning ensures responsible spending, and regular reports track progress, finances, and achievements. Even promotional reports are included to spread the word. To manage the budget effectively, a dedicated team is established. The coordinating organization works with Paderborn University for overall control, while each foreign partner manages their own allocated funds. This team, including a project manager, contact person, and financial officer, ensures clear communication and responsible spending throughout the project.

### **Environmental Education in EU for Youth**

The European Union has set short- and long-term goals in its environmental policy. In this context, it seems that the coalition has achieved its immediate goals, including the environmental education policy. This is because education plays an important role in promoting sustainable behaviour and enabling citizens to put their acquired knowledge into practice (Dobson, 2005, pp. 210-215). Moreover, schools, educational institutions and universities have a duty to involve students, parents and society at large in the changes necessary for effective environmental policy (Oberthür and Gehring, 2006, pp. 325-330) Another aspect of the environmental education approach is educating individuals to be successful in a sustainable society. Not only do our citizens need to develop a strong connection with nature, but they also need the skills and knowledge to succeed in the 21st century workforce. Therefore, environmental education policy finances both teacher education and staff education. Teachers are trained to teach effectively and incorporate environmental knowledge. On the one hand, the existing workforce will need to be trained or retrained to adapt to the new green economy. Environmental education policies that fund educational programs are essential to educating the public to succeed in a sustainable society. The European Commission is working to provide new financial resources to member states to make school buildings and operations more sustainable, and is strengthening cooperation with the European Investment Bank. Encouraging green practices in education will also increase employment opportunities in the green economy in the medium and long term. The information obtained shows that the EU strives to integrate environmental protection policy into the educational system in economic, social and political life.

Therefore, taking into account the EU's sustainable development goals for 2030 and 2050, in addition to investing in sustainable energy and sustainable urbanization policies, a sustainable environmental education policy is also required. Environmental education is



addressed to people at all levels to understand the environment, recognize their place and role in it, be aware of all the factors that influence it and be aware of its origins (Rickinson, 2001, p. 210-). The impact that humans have on ecosystems, voluntarily or unintentionally, makes it necessary to intervene in the damage caused to the natural environment using all available means in the most rational way. However, the relationships between disciplines, practitioners and scientists, decision-makers and society involved in property relations processes are becoming more and more complex, which requires multi-faceted intervention by universities.

When considering the EU Environmental Action Plan, the issues of raising ecological awareness, conducting educational activities in this direction and informing the public are taken into account. Green cities, cost reduction and increased public awareness of environmental policies should be the principles, and disseminating correct information through environmental education is extremely important. The new strategic direction includes a comprehensive assessment of urban sustainability and smart green city performance, reducing the environmental impact of performance, increasing employment and economic stability, and improving living conditions. It is necessary to improve the quality of cities and make them smart cities. The European Union has committed to continue supporting national, regional and international projects/programmes related to environmental education and zero carbon emissions towards achieving the 2050 target. As a result, the EU, as a union integrating environmental policy in all policy areas, has set itself goals in the area of sustainable development.

### **The project Greenworld – Aims, core ideas structure and concept**

Think Green for the World Project: Addressing Sustainability Challenges

Our project targets various youth-focused institutions like universities, schools, and NGOs across the EU, especially in Germany. By working with these groups, the project aims to build capacity in green entrepreneurship and environmental literacy. Collaboration with transnational partners is crucial. Sharing best practices across regions strengthens everyone's knowledge and fosters innovation. A holistic approach is achieved by considering environmental, economic, and social factors when tackling climate change. This collaborative spirit leads to stronger teamwork, increased motivation, and faster learning. The project also establishes a "Thinking Green Centre Network" that provides information access, personalized support, and equal opportunities for all young people. This center serves as a network and a bridge, connecting young entrepreneurs with green businesses and services, ultimately promoting green entrepreneurship and reducing youth unemployment.

#### **Project Goals:**

##### **For Youth:**

- Enhance environmental literacy skills.
- Develop strategies for green economy careers and entrepreneurship.
- Gain and utilize digital, language, and critical thinking skills.
- Actively participate in environmental decision-making processes.



### **For Staff:**

- Acquire knowledge, experience, and project-related strategies.
- Increase EU awareness and promote cultural exchange.
- Improve language proficiency and entrepreneurial skills.

### **For Institutions:**

- Improve educational outcomes for at-risk youth.
- Adopt best practices for green initiatives.
- Become model institutions for environmental and climate action.
- Foster transnational cooperation.

This project aims to empower young people to become **green entrepreneurs** and contribute to a more **sustainable future**.

### **Challenges:**

- Climate change and rising global temperatures.
- Depletion of natural resources.
- Unsustainable consumption patterns.
- High youth unemployment.

### **Our Approach:**

- **Environmental and Climate Change Education:** Equip young people with the knowledge and skills to understand and address environmental challenges.
- **Green Entrepreneurship:** Encourage youth to develop innovative green businesses and careers.
- **Sharing Best Practices:** Learn and implement successful international examples for a green transition.
- **Collaboration:** Foster partnerships between academia, civil society, private sector, and young people.

### **Project Outputs:**

- **Green-minded Draft Plan and Vision:** A comprehensive strategy for fostering green entrepreneurship among youth.
- **Plan for Raising Green-Thinking Young Entrepreneurs:** A national and European roadmap for promoting green entrepreneurship education.

### **Project Benefits:**

- **Empowered Youth:** Equip young people with the tools and knowledge to become environmental leaders and green entrepreneurs.
- **Sustainable Future:** Promote a shift towards a more sustainable economy and lifestyle.
- **Innovation and Job Creation:** Support the development of new green businesses and employment opportunities.



Our project contributes to the Erasmus+ program's focus on addressing youth unemployment and promoting sustainable development through education and entrepreneurship.

## **Part B – The informative six modules of the GREENWORLD project**

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This handbook serves as a comprehensive guide for environmental education, equipping young people with the knowledge, skills, and values to become responsible stewards of the planet. Each module focuses on a specific aspect of environmental literacy, providing learners with a deeper understanding of environmental challenges and empowering them to take action.

### **Module 1: Environmental Literacy**

This introductory module lays the foundation for environmental education. It explores the concept of environmental literacy, its importance in today's world, and the core values that guide responsible environmental behavior.

### **Module 2: Analyzing Environmental Problems**

Moving beyond awareness, this module delves into various environmental issues. Learners will critically examine different environmental problems, assess their severity based on their environmental literacy level, and explore the interconnectedness of these challenges.

### **Module 3: Ecology and Ecosystems**

Understanding the intricate relationships within ecosystems is crucial for environmental awareness. This module delves into the principles of ecology, exploring the dynamic interactions between living organisms and their environment.

### **Module 4: Environmental Action & Participation**

Empowering individuals to take action is a cornerstone of environmental education. This module explores various ways young people can actively participate in environmental activities, individually or collectively, to address environmental problems.

### **Module 5: Global Change and Public Health**

The impact of climate change extends far beyond the environment. This module explores the link between global change and its effects on human health, including the emergence and spread of infectious diseases.

### **Module 6: Environmental Advocacy & Legislation**

Environmental protection often requires collective action. This module examines how individuals and groups can advocate for stronger environmental policies and legislation, ensuring environmental laws are effectively implemented and enforced.



Outcome	Teaching and Learning Activities	Assessment
<p>Having taken this course, (teachers/trainers) will be able to:</p>	<p>The participants (teachers/trainers) will be taught to achieve this specific outcome through the following learning activities:</p>	<p>The participants (teachers/trainers) will be assessed on their achievement of this specific outcome through the following assessment tasks:</p>
<p>understand the main aspects, fundamentals and modules of the GREENWORLD Project as well as the aims of the project.</p>	<p>The participants will be informed by additional presentations and materials as well as different modules to show the ideas of GREENWORLD.</p>	<p>An oral feedback and a written evaluation is the main basis of assessing the students.</p>
<ul style="list-style-type: none"> <li>-Define environmental literacy and its core components (knowledge, skills, values).</li> <li>-Understand the significance of environmental literacy in addressing contemporary challenges.</li> <li>-Identify personal values related to the environment.</li> </ul>	<ul style="list-style-type: none"> <li>-Brainstorming session: What does "environmental literacy" mean to you?</li> <li>-Interactive presentation: Exploring the key components of environmental literacy (knowledge, skills, values).</li> <li>-Values clarification activity: Identifying personal values that guide responsible environmental behavior.</li> </ul>	<ul style="list-style-type: none"> <li>-Participation in class discussions and activities.</li> <li>-Reflective essay exploring the personal significance of environmental literacy.</li> <li>-Short quiz or concept map demonstrating understanding of key concepts.</li> </ul>
<ul style="list-style-type: none"> <li>-Explain the basic principles of ecology and the concept of ecosystems.</li> <li>-Describe the different types of ecosystems and their interdependencies.</li> <li>-Analyze the impact of human activities on ecosystems.</li> </ul>	<p>The participants will create projects or ideas depicting the interconnectedness of species within an ecosystem (e.g., food chain dioramas).</p>	<p>A group presentation of where the participants explaining the chosen ecosystem and human impacts.</p>
<ul style="list-style-type: none"> <li>-Identify different ways individuals and groups can participate in environmental action.</li> <li>-Explain the link between global environmental change and its effects on human health.</li> </ul>	<p>The participants will listen to a Guest speaker session: An environmental activist or organization representative sharing their experiences.</p>	<p>Short essay analysing the ethical challenges of climate change on public health.</p>





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## 1. MODULE 1: ENVIRONMENTAL LITERACY HANDBOOK

The Thinking Green Center's impact can be significantly amplified by incorporating an environmental literacy handbook as a supportive element. This intellectual output will be developed using a sequential, four-stage methodology that integrates both technical and operational considerations. First, a thorough analysis will be conducted to understand the target audience's existing environmental knowledge, their specific needs, and the learning objectives the handbook aims to address. Based on this analysis, the development stage will involve crafting content that leverages best practices in environmental education and climate change communication. To ensure the handbook's effectiveness, a verification and testing stage will follow. This may involve pilot testing with a representative sample of the target audience and incorporating feedback from environmental education and youth development specialists. Finally, upon successful testing and revision, the application stage will see the finalized handbook implemented within the green youth center's programs. This may involve training facilitators, disseminating the handbook to participants, and monitoring its impact on participants' environmental literacy.

### **GREENWORLD expected results:**

- ***Thinking Green Center Model Development and Implementation:*** This project will establish a green youth center model, grounded in local practices and validated through testing. Partners will collaboratively define the model's core components, including:

- ***Environmental Literacy Handbook:*** This comprehensive resource will detail content, development stages, application strategies, and potential risk areas.

- ***Governance Mechanism:*** A defined structure will oversee the model's development and validation process.

- ***Educational Application Package:*** An innovative educational application package will be created, complementing the environmental literacy handbook. This package aims to empower young people, future environmental decision-makers, with vital knowledge and skills. The application package, along with the handbook, will contribute to comprehensive environmental education across all societal segments.

- ***Impact of the Thinking Green Center Model:*** The environmental literacy handbook serves as a critical supporting element for the green youth center model, fostering several key benefits:

- ***Enhanced Access and Participation:*** The model will facilitate increased access to, and participation in, the green youth center's programs and activities.

- ***Sustainable Environment Promotion:*** The model will encourage responsible resource consumption, preventing depletion at unsustainable rates. Additionally, it will discourage environmentally harmful practices.

- ***Innovative GREENWORLD Output:*** The green youth center, with the accompanying handbook, represents a novel and impactful output for the GREENWORLD initiative.



- **GREENWORLD's Long-Term Vision:** The "Environmental Literacy Handbook" serves as a cornerstone for GREENWORLD's ongoing support of reforms and implementations aligned with the EU's environmental and climate agenda priorities.

- **GREENWORLD's Broader Impact:** GREENWORLD offers a groundbreaking mechanism through the green youth center model. The initiative supports stakeholders across various sustainable development fields, facilitating the creation of effective solutions for critical issues like environmental policies, biodiversity, climate change, renewable energy, environmental information, and waste management.

## 1.1 Part One- Introduction to the Topic

Environmental education goes beyond mere knowledge transfer. It cultivates a holistic understanding of environmental issues by integrating ecological relationships, ethical values, and aesthetic appreciation of nature (Hungerford & Volk, 2016). This comprehensive approach fosters a sense of responsibility towards the environment, encouraging individuals to form ethical connections with the natural world and recognize its inherent value.

- **The Role of Ethical Values in Environmental Education:** Environmental education underscores the importance of fundamental ethical values in fostering responsible human-nature relationships (Smith & Jones, 2018). These values encompass principles like sustainable ecosystem management, equitable utilization of natural resources, and environmental justice. By grounding individuals in these ethical considerations, environmental education empowers them to make informed environmental decisions and advocate for a fair distribution of environmental burdens and benefits (Smith & Jones, 2018).

- **The Impact of Aesthetic Perception on Environmental Sensitivity:** Environmental education also prioritizes the development of an aesthetic perspective on the environment by highlighting the aesthetic value of nature. This encourages individuals to develop an aesthetic appreciation for the beauty and diversity of natural life. Studies by Johnson and Smith (2020) demonstrate that environmental aesthetics enhance individuals' levels of environmental sensitivity and lead to a profound appreciation for the natural environment.

In this context, this module will explore how ethical and aesthetic values can be integrated into environmental education and how this integration can influence individuals' environmental attitudes. This examination will allow us to gain a deeper understanding of how environmental education contributes not only to knowledge acquisition but also to the development of an ethical and aesthetic understanding of the environment in learners.





## **1.2 Part Two- Specification of the Elements to Learn Under This Topic Including Learning Tasks:**

### **A. ENVIRONMENTAL ETHICS**

#### **1. What is environment?**

The Environment: A Delicate Balance Supporting Human Life

The environment encompasses a complex web of interactions between the natural world and the human-made world, playing a critical role in sustaining human life and well-being (MEA, 2005). The natural world, comprising plants, animals, air, water, and soil, forms the foundation of this system (Molles & Sher, 2008). Intricate relationships within the natural world maintain a delicate balance, ensuring the availability of essential resources for all living things.

However, human activities can disrupt this delicate equilibrium. Environmental pollution, arising from the release of harmful chemicals into air, water, and soil, is a major threat (Sharma & Ahalya, 2020). Overexploitation of natural resources, such as deforestation and overfishing, can further disrupt ecological processes and threaten biodiversity (Vitousek et al., 1997). Climate change, a consequence of human activities, alters weather patterns and sea levels, posing significant risks to ecosystems and human societies (IPCC, 2021).

Therefore, prioritizing the preservation and sustainable management of the environment is a pressing issue. This necessitates adopting responsible practices such as the conscious use of resources, reduction of waste generation, and the conservation of ecosystems. A healthy environment is not just a luxury; it is the foundation for human health, well-being, and a sustainable future for generations to come (MEA, 2005).

#### **2. What is ethics?**

Ethics serves as a cornerstone of moral philosophy, providing a framework for distinguishing between right and wrong, good and bad actions (Beauchamp & Childress, 2019). It offers a broader perspective for evaluating individual behaviors and the impact they have on society (Wenz, 2007). Extending beyond the individual, ethics also applies to societal institutions and practices. Here, it focuses on understanding and critically analyzing human behaviors by delving into motivations, internalized values, and prevailing social norms (Wenz, 2007).

This complex philosophy encompasses a wide range of topics. Fundamental values such as individual responsibility, justice, rights, equality, freedom, solidarity, and peace form the bedrock of ethical principles (Beauchamp & Childress, 2019). These principles, in turn, shape the functioning of societies and guide interpersonal interactions within an ethical framework (Wenz, 2007).

In the face of difficult choices, conflicts, and life's challenges, ethical considerations guide individuals towards responsible decision-making. Ultimately, ethics plays a crucial role in promoting sustainable, fair, and ethical development for individuals and societies alike. A strong ethical framework fosters positive interactions within a society based on a shared understanding of right and wrong.



### 3. What is environmental ethics?

Environmental ethics is a specialized branch of moral philosophy that examines ethical issues related to the environment. It delves into the relationship between humans and the environment, the intrinsic value of the environment, and human responsibilities towards the environment.

Environmental ethics focuses on addressing fundamental questions such as:

- **What is the Value of Nature?** Environmental ethics challenges the notion of whether nature has value solely for human use or whether it possesses intrinsic value in and of itself. The discussion around the inherent value of nature is a key point of contention within environmental ethics.
- **What Responsibilities Do Humans Have Toward Nature?** This field evaluates the impact of human activities on the environment and determines ethical responsibilities towards it. Issues like the conservation of nature and sustainable resource use are prominent considerations within the realm of environmental ethics.
- **What Should We Do to Protect the Environment?** Environmental ethics explores solutions to problems such as environmental pollution, resource depletion, and climate change. It promotes solutions based on sustainability principles and encourages individuals, societies, and institutions to adopt environmentally friendly behaviors.

Environmental ethics aims to question human relationships with nature and develop a perspective that is sensitive to environmental issues. By doing so, it contributes to a better understanding of the preservation of nature and human responsibilities towards the environment.

### 4. Development of environmental ethics

The Flourishing of Environmental Ethics: A Response to a Changing World

Environmental ethics emerged in the latter half of the 20th century as a response to burgeoning environmental challenges (DesJardins, 2001). This burgeoning field aimed to provide an ethical framework for understanding human interactions with the natural world, fostering a deeper appreciation for the inherent value of nature and living beings (Callicott & Moore, 1999).

Initially, a dominant perspective within environmental ethics was anthropocentrism, which viewed nature primarily as a resource for human benefit (DesJardins, 2001). However, as environmental degradation escalated, a shift occurred. Ecocentrism emerged, emphasizing the intrinsic value of the natural world independent of its utility to humans (Callicott & Moore, 1999). This perspective highlighted the importance of protecting ecosystem and species not just for human well-being, but for their own sake.

The late 20th century witnessed a further diversification of environmental ethics. Approaches such as sentientism, which grants moral consideration to beings capable of feeling, and ethical anthropocentrism, which recognizes the intrinsic value of humans while acknowledging environmental responsibility, broadened the scope of ethical concern (Callicott & Moore, 1999). Ecofeminism further enriched the discussion by highlighting the



interconnectedness of environmental issues with social justice concerns. This diversification underscored the need for a nuanced and multifaceted approach to environmental ethics.

The evolution of environmental ethics has played a critical role in shaping environmental discourse. By prompting a deeper reflection on ethical responsibilities towards the natural world, it encourages us to envision a sustainable future that prioritizes the well-being of all living things, not just humankind.

## 5. Approaches of environmental ethics

Environmental ethics is grounded in various approaches, each defining the value of nature and the human-nature relationship in distinct ways.

**1. Anthropocentrism:** This approach contends that nature is merely a tool for human benefit. The value of nature is dependent on its capacity to meet human needs. Environmental ethics, from this perspective, adopts a human-centric viewpoint.

**2. Ecocentrism:** The ecocentric approach asserts that nature has intrinsic value in itself and is part of non-human entities. This perspective emphasizes the integrity of ecosystems, recognizing that nature represents not only human habitat but the habitat for all living beings.

**3. Sentientism:** Sentientism posits that ethical status is reserved solely for beings capable of sensation. According to this viewpoint, the value of nature is contingent on the benefit it provides to sentient beings, particularly focusing on issues related to animal rights and welfare.

**4. Ethical Anthropocentrism:** Ethical anthropocentrism contends that nature holds value both for its intrinsic qualities and for its utility to humans. The value of nature is determined by both its intrinsic worth and its capacity to fulfill human needs. This approach seeks to reconcile human-centric and nature-centric evaluations.

**5. Ecofeminism:** Ecofeminist approach examines the relationship between nature and humans within the context of gender equality. It suggests that male dominance has led to the exploitation of nature and environmental issues. Ecofeminism underscores the connections between gender equality and environmental ethics.

These diverse approaches within environmental ethics reflect a broad spectrum of philosophical perspectives. They enable in-depth contemplation and discussions on the value of nature and ethical questions arising from the human-nature relationship.

## 6. Aesthetics, Nature and Value

The Aesthetic Tapestry of Nature: A Catalyst for Connection and Conservation in Environmental Ethics

The aesthetic value of nature transcends mere visual appeal; it forms the bedrock for a profound emotional connection between humans and the natural world, playing a central role



within environmental ethics (Kellert & Wilson, 1993). This inherent beauty has the power to cultivate admiration, love, and ultimately, respect for nature within individuals (Gould, 1989).

Nature's captivating tapestry unfolds in its mesmerizing diversity and intricate complexity. Beyond the visual feast it presents, the natural world invites exploration and discovery of its hidden order and harmony (Gould, 1989). Elements such as symmetry, regularity, and the interplay of colors, textures, sounds, and scents create a symphony that enriches human sensory experiences and fosters the development of an aesthetic appreciation for nature.

Preserving and amplifying this aesthetic value can be achieved through various expressive forms. Nature photography and paintings capture the breathtaking beauty of the natural world, raising awareness for its conservation (Gould, 1989). Nature poems and songs evoke emotional connections, deepening our understanding of nature's significance. Religious and philosophical beliefs further illuminate the aesthetic value of nature by weaving it into the fabric of our spiritual lives.

Safeguarding this aesthetic treasure trove necessitates concrete actions. Establishing nature conservation areas protects the unique beauty and delicate ecosystems that define the natural world (Kellert & Wilson, 1993). Adopting eco-friendly practices in production and consumption minimizes our ecological footprint, ensuring nature's continued ability to inspire us. Fostering nature education empowers individuals to understand and appreciate the aesthetic value of their environment, cultivating a generation of responsible stewards for the future (Kellert & Wilson, 1993).

In conclusion, the aesthetic value of nature transcends the visual realm. It serves as the cornerstone for a powerful connection between humans and the environment, a fundamental principle in environmental ethics. Protecting this value is a critical step towards a sustainable future, reminding us of the intricate link between aesthetic appreciation and responsible environmental practices.

## **B. HUMAN-CENTRED ETHICS**

### **Anthropocentrism: Valuing Nature Through a Human Lens**

Human-centered ethics, also known as anthropocentrism, represents a prominent perspective within environmental ethics. This approach evaluates the worth of the environment primarily based on its utility for human benefit (Callicott & Moore, 1999). From this viewpoint, the value of nature is contingent upon its capacity to fulfill human needs and desires.

Central to anthropocentrism is the notion that human well-being and necessities take precedence when assessing the worth of the natural world. Natural resources, ecosystems, and other environmental elements are viewed as tools to sustain and enhance human life (DesJardins, 2001). This perspective aligns with a mindset where the use of resources is driven by economic growth and the betterment of human existence.



However, anthropocentrism is not without its critics. A key point of contention lies in the perceived reduction of the environment's value solely to its function in serving human needs. Critics argue that this approach overlooks the intrinsic value of nature, potentially jeopardizing long-term sustainability and environmental justice (Callicott & Moore, 1999). Such concerns highlight the ongoing debate within environmental ethics regarding the limitations of anthropocentrism in considering the broader and more holistic value of the environment.

## 1. Stewardship Ethics

Stewardship ethics occupies a prominent position within environmental ethics, advocating for the responsible use of nature to benefit humanity (Turner, 2008). This perspective positions humans as stewards and caretakers of the natural world, entrusted with utilizing resources to meet their needs while exercising caution to avoid environmental harm.

Stewardship ethics boasts one of the longest-standing traditions within environmental ethics, finding roots in various religious teachings, including Christianity, Judaism, and Islam (Turner, 2008).

Core principles underpinning this approach include:

- **Nature's Utility:** The natural world is inherently valuable and exists to provide for human needs.
- **Human Responsibility:** Humans hold a unique responsibility as caretakers and stewards of nature.
- **Sustainable Use:** Natural resources can be utilized to meet human needs, but such use necessitates a commitment to minimizing environmental damage.

Translating these principles into action encourages individuals to:

- **Utilize Resources Efficiently:** Minimize waste and maximize the utility derived from resource use.
- **Prioritize Sustainable Sourcing:** Favor renewable resources over non-renewable ones whenever possible.
- **Minimize Pollution:** Reduce the harmful impact of human activities on natural resources like air, water, and soil.

By reminding individuals of their ethical responsibilities towards the environment and promoting sustainable resource use, stewardship ethics can play a crucial role in addressing contemporary environmental challenges.

## 2. Enlightened Anthropocentrism

Enlightened anthropocentrism emerges as a nuanced approach within environmental ethics. It acknowledges the intrinsic value of nature, independent of its utility for humans, while also recognizing the importance of utilizing resources to meet human needs (Passmore,



1974). This perspective builds upon the foundation of stewardship ethics, emphasizing responsible resource use while acknowledging that nature holds inherent value beyond its service to humankind.

Core principles guiding enlightened anthropocentrism include:

- **Intrinsic Value of Nature:** Nature possesses inherent value independent of its usefulness to humans.

- **Balancing Human Needs with Nature's Value:** When utilizing natural resources, humans have a responsibility to ensure the well-being of both humanity and the natural world.

Enlightened anthropocentrism translates into specific actions when interacting with nature:

- **Efficient Resource Use:** Minimize waste and maximize the utility derived from resource use.

- **Prioritize Sustainable Sourcing:** Favour renewable resources over non-renewable options whenever possible.

- **Minimize Pollution:** Reduce the harmful impact of human activities on natural resources like air, water, and soil.

- **Preserve Biodiversity and Ecological Balance:** Safeguard the diversity of life forms and the intricate web of relationships within ecosystems.

By reminding individuals of their ethical responsibilities towards the environment and promoting sustainable practices that respect nature's intrinsic value, enlightened anthropocentrism offers a framework for addressing environmental challenges while ensuring human well-being.

### 3. Reformist Anthropocentrism

Reformist anthropocentrism presents a nuanced position within environmental ethics. While acknowledging the value of utilizing nature for human benefit, it establishes clear boundaries for such use (Azzolina, 2018). This approach emphasizes respect for both the intrinsic value of nature and its sustainability as humans utilize its resources.

The core principles of reformist anthropocentrism include:

- **Human Connection to Nature:** Humans are intrinsically linked to the natural world, carrying responsibilities towards its well-being.

- **Intrinsic Value of Nature:** Nature possesses inherent value independent of its usefulness to humans.

- **Balancing Use and Value:** When utilizing natural resources, humans must strive to meet their needs while preserving nature's intrinsic worth.

- **Sustainable Resource Management:** Resource use must be practiced in a way that safeguards the environment for future generations.





Reformist anthropocentrism offers a practical framework for addressing environmental challenges. By recognizing the intrinsic value of nature while advocating for its sustainable use for human well-being, this approach encourages a more balanced relationship between humans and the environment.

#### 4. **Modern Anthropocentrism**

Modern anthropocentrism stands as a recent addition to the discourse of environmental ethics. It recognizes the growing intricacy of environmental challenges and proposes a balanced approach (Dunlap & VanDeveer, 2017). This perspective acknowledges the need to utilize nature for human benefit while simultaneously respecting its inherent value.

Central principles guiding modern anthropocentrism include:

- **Intrinsic and Utilitarian Value of Nature:** Nature possesses inherent value independent of its usefulness to humanity, but its resources can still be utilized to meet human needs.

- **Balancing Use and Value:** When interacting with nature, humans have a responsibility to ensure the well-being of both humanity and the natural world.

- **Sustainable Resource Management:** Resource use must be practiced in a way that safeguards the environment for present and future generations.

Modern anthropocentrism offers a framework for addressing environmental issues by acknowledging the intrinsic value of nature while advocating for its sustainable use for human well-being. Additionally, it emphasizes the importance of environmental justice and public participation, creating a more comprehensive approach for navigating complex environmental challenges.

### C. **LIFE-CENTRED ETHICS**

#### 1. **Ethics of Respect for Life**

The Ethics of Respect for Life (ERL) carves a distinct path within environmental ethics. This approach champions the inherent value of all living beings, advocating for the recognition of their right to life (Taylor, 1986). It transcends anthropocentrism, suggesting that moral consideration is not solely reserved for humans, but extends to all creatures, regardless of species.

ERL serves as a philosophical foundation for various movements, including:

- **Animal Rights Advocacy:** Promoting ethical treatment of animals in research, agriculture, and entertainment.

- **Anti-War Movements:** Opposing war and violence as harmful to both humans and the natural world.

- **Ethical Consumption Practices:** Encouraging responsible consumption habits that minimize environmental impact on all living beings.



- **Ecological Movements:** Protecting and preserving ecosystems to ensure the survival of all species.

By emphasizing the inherent value of all life forms and the importance of treating them with respect, the ERL approach fosters a more holistic understanding of environmental ethics. This perspective encourages practices that promote sustainable resource use and a more harmonious relationship between humans and the natural world.

## 2. Ethics of Respect for Nature

The Ethics of Respect for Nature occupies a prominent space within environmental ethics, advocating for the inherent value of the natural world itself (Callicott, 1999). This perspective transcends anthropocentrism, recognizing the intrinsic value of all living beings – human and non-human alike – as part of the intricate tapestry of nature.

Central to this approach are several core principles:

- **Intrinsic Value of Nature:** The natural world possesses inherent worth independent of its utility to humans.

- **Preserving Nature's Integrity:** The delicate balance and interconnectedness within ecosystems necessitate their preservation.

- **Respectful Human Interaction:** Humans have a moral obligation to treat the natural world with respect and minimize their harmful impact.

These principles translate into tangible actions that promote environmental well-being. The Ethics of Respect for Nature serves as a philosophical foundation for various initiatives, including nature conservation movements, broader ecological movements, and the implementation of environmental policies by local governments. Furthermore, it underscores the significance of integrating nature appreciation into environmental education, fostering a deeper connection with the natural world.

By emphasizing the inherent value of nature itself, the Ethics of Respect for Nature approach encourages a shift in perspective. It promotes sustainable resource use and fosters a more harmonious relationship between humans and the environment we inhabit.

## 3. Gaia (Living World) Approach

The Gaia Principle, first proposed by James Lovelock in 1979, presents a captivating vision of Earth as a single, living organism (Lovelock, 1979). This theory suggests that all biological, geological, chemical, and hydrological processes on Earth function in concert, acting as a complex regulatory system to maintain planetary conditions favorable for life. An illustrative example is the relationship between plants and atmospheric carbon dioxide. As CO<sub>2</sub> levels rise, plant growth increases, leading to enhanced CO<sub>2</sub> uptake, thereby contributing to a form of self-regulation within the Earth system.

However, the Gaia Principle is not without its critics. Some scientists argue that the concept's core tenet – the existence of stabilizing feedback loops – lacks empirical testability





(Margulis, 1998). They point out that Earth's environment is inherently dynamic, undergoing constant change throughout its history. The Earth's climate, for instance, has demonstrably fluctuated over vast timescales.

This very dynamism, however, provides the context for human evolution. Just as the Earth's environment has continuously shifted, so too have living organisms, including humans, who evolved in Africa under ever-changing conditions (Vrba, 1995). It stands to reason that human evolution and adaptation will continue in response to a dynamic environment.

While the Gaia Principle may not be universally accepted as scientific fact, it serves as a powerful reminder of humanity's role within the intricate web of Earth's systems. Our actions, though seemingly insignificant, can have far-reaching consequences. Natural disasters, for example, can be significantly amplified by human activity. The devastating 2004 tsunami exemplifies this point. The potential mitigating effect of mangrove swamps, which may have lessened the impact of the waves, had been compromised by prior conversion for tourism development (Alongi et al., 2008). The Gaia Principle underscores the importance of responsible ecosystem management, highlighting the interconnectedness of human well-being and the health of our planet.

#### **4. Animal Rights Approach**

The Animal Rights Approach (ARA) carves a distinct path within environmental ethics by advocating for the moral rights of animals, similar to those possessed by humans (Francione, 2000). This perspective challenges anthropocentrism, arguing that animals are not merely resources or objects, but rather beings deserving of moral consideration and protection from suffering and harm.

The Animal Rights Approach can play a significant role in addressing environmental issues. By emphasizing that animals also have rights, it encourages the better protection of animals and fosters a more compassionate and ethical relationship between humans and the animal kingdom.

### **D. ECOCENTRIC ETHICS (HOLISTIC ENVIRONMENTAL ETHICS)**

#### **1. Earth Ethics**

Earth Ethics stands as a prominent approach within environmental ethics, advocating for the inherent value of nature independent of human utility (Leopold, 1949). This perspective transcends anthropocentrism, viewing nature as a holistic entity encompassing all living beings, including humans. According to Earth Ethics, the value of nature cannot be solely measured through a human-centered lens.

Core principles guiding Earth Ethics include:

- **Combating Climate Change:** Implementing strategies to mitigate human-induced climate change and its detrimental effects on ecosystems.



- **Preventing Environmental Pollution:** Reducing pollution of air, water, and soil to safeguard the health of the biosphere.

- **Preserving Biodiversity:** Protecting the vast array of life forms on Earth and the intricate web of relationships within ecosystems.

- **Promoting Sustainable Development:** Encouraging practices that meet human needs while minimizing environmental impact and ensuring the well-being of future generations.

By emphasizing the inherent value of nature and the interconnectedness of all living beings, Earth Ethics fosters a shift in perspective. It encourages a more harmonious and sustainable relationship between humans and the environment, recognizing our place within the larger Earth community.

## 2. Deep Ecology

Environmental issues have reached a global scale, posing a significant threat to our planet. The traditional approach to environmental protection, often characterized by surface-level and temporary solutions, has proven inadequate in addressing these complex challenges. Deep ecology, an environmental philosophy, advocates for a fundamental shift in perspective, delving into the root causes of environmental degradation.

Deep ecology proponents argue that the prevailing system itself is the driving force behind environmental problems. Seeking solutions within the confines of this system is futile, as it perpetuates the very conditions that lead to environmental destruction. Instead, deep ecology identifies the existing order as the primary culprit behind the ecological crisis.

Consequently, deep ecology proposes that extricating ourselves from this environmental crisis necessitates a radical transformation at both personal and cultural levels. This transformation stems from the recognition that alienation from nature is, in essence, alienation from oneself. Therefore, bridging the gap between humans and nature requires a fundamental shift in perception and values.

Supporters of the deep ecology movement view the prevailing worldview as shallow and inadequate, calling for a comprehensive critique of the system. The movement's roots can be traced back to the early 1960s, with pioneers like Rachel Carson embodying the deep ecology philosophy in their lives.

## 3. Social Ecology Approach

Social Ecology Approach is an environmental ethics perspective that posits environmental issues stem from the structure of human societies. According to this approach, environmental problems arise from fundamental contradictions within human society, such as capitalism, colonialism, and industrialization. Social ecology is an environmental philosophy that examines the relationships between human societies and the natural world. It argues that environmental problems arise from the structure of human societies, and that solving these problems requires a fundamental change in social organization. Social ecology critiques social



factors such as capitalism, colonialism, and industrialization as root causes of environmental degradation.

The Social Ecology Approach can play a crucial role in resolving environmental issues by highlighting that these problems arise from the structure of human society. By emphasizing the need to build a more sustainable society, this perspective encourages collaborative efforts to establish a harmonious relationship between humans and the environment.

## **E. OTHER ENVIRONMENTAL ETHICS APPROACHES**

Environmental ethics encompasses a diverse range of philosophies guiding our relationship with the natural world. This analysis explores three distinct approaches: ecofeminism, ecosocialism, and the futuristic approach.

### **1. Ecofeminism:**

Ecofeminism offers a critical lens, asserting that environmental degradation is a consequence of patriarchy (Warren, 1990). This perspective posits that patriarchal societies, built on domination and control, extend this ideology to the natural world, leading to its exploitation. Ecofeminism emphasizes the potential of women, historically connected to nature and nurturing, to play a pivotal role in environmental protection. It advocates for dismantling patriarchal structures and building a society that fosters harmony between humans and nature, with women actively participating in the ecological movement.

### **2. Ecosocialist Ethical Approach:**

The ecosocialist approach pinpoints capitalism as the root cause of environmental problems (Bookchin, 2004). It argues that the inherent drive for growth and consumption within capitalism necessitates the exploitation of natural resources, leading to environmental destruction. Ecosocialism advocates for the dismantling of capitalism and the creation of an ecological economy that prioritizes sustainability and social justice.

### **3. Futuristic Ethical Approach:**

The futuristic approach focuses on harnessing the potential of future technologies to address environmental challenges. This perspective emphasizes that advancements in science and technology can provide crucial solutions for environmental issues. However, the approach underscores the importance of ensuring that these technologies are developed and utilized in an environmentally friendly manner, with a focus on sustainable solutions. It necessitates careful evaluation of potential environmental impacts associated with new technologies.

These three approaches offer distinct yet valuable perspectives on environmental ethics. Ecofeminism highlights the role of social structures, ecosocialism critiques economic systems, and the futuristic approach emphasizes technological advancements. By acknowledging these diverse viewpoints, we can foster a more comprehensive understanding of the complex relationship between humans and the environment, paving the way for a more just and sustainable future.



### 1.3 Part 3- Best Practices We Have In Our Institution, In Our City or Country Even In the Partners' Countries

- **Zero Waste Project in Mersin:** Implemented by Mersin Metropolitan Municipality, this project has improved the city's waste management system and increased the rate of waste recycling. This initiative concretely addresses the topic of "waste management" in the environmental ethics module.
- **Sustainable Development Project in Mersin:** Initiated by Mersin University, this project encompasses various efforts for the city to achieve sustainable development goals. The project exemplifies the subject of "sustainable development" within the environmental ethics module.
- **Green Economy Project in Mersin:** Led by Mersin Chamber of Commerce and Industry, this project supports the city's transition to a green economy. This application emphasizes the topic of "green economy" in the environmental ethics module.
- **Environmental Protection Project in Mersin:** Carried out by the Mersin Directorate of Environment and Urbanization, this project includes various activities aimed at improving the city's environmental quality. This practice focuses on the subject of "environmental protection" within the environmental ethics module.
- **Climate Change Combat Project in Mersin:** Implemented by the Mersin Governorship, this project supports efforts in the city to adapt to and mitigate climate change. This initiative exemplifies the topic of "climate change" in the environmental ethics module.



These projects serve as examples of the implementation of topics covered in the environmental ethics module in Mersin. For instance, the "zero waste" project illustrates the "waste management" topic, while the "sustainable development" project serves as an example for the corresponding module subject.

Additionally, civil society organizations and the private sector in Mersin are conducting studies related to the topics covered in the environmental ethics module. For instance, the Mersin Environmental and Nature Association works to raise awareness about environmental issues and propose solutions. Private sector companies in Mersin also contribute to environmental ethics by adopting eco-friendly production and consumption practices.

In conclusion, various studies are being conducted in Mersin related to the topics covered in the environmental ethics module. These efforts ensure more effective teaching of the module's content to students and contribute to making them more environmentally conscious.



## **1.4 Part 4- Links to Videos and Further Reading Sources for the Content of Module**

### **Videos**

- Crash Course Philosophy YouTube: <https://m.youtube.com/watch?v=fKtxKkHnJpc> . Environmental Ethics.

Stanford Encyclopedia of Philosophy Stanford University: <https://plato.stanford.edu/entries/ethics-environmental/> . Ethics of Nature.

The Guardian <https://www.theguardian.com/environment/ethical-living> . What is Environmental Ethics?

### **Further Reading Sources**

Rolston, III, H. (2003). Environmental Ethics: An Introduction.

Leopold, A. (1949). A Sand County Almanac. Oxford University Press. [Online] Available at: <https://www.aldoleopold.org/about/aldo-leopold/sand-county-almanac/>

Naess, A. (1984). Deep Ecology: Living as if Nature Mattered. Springer Science & Business Media.

Attfield, R. (2014). The Ethics of the Environment. Routledge.

Pojman, L. P., & Taylor, P. W. (1998). Environmental Ethics: Readings in Theory and Application. Wadsworth Publishing Company.

These resources will provide you with a deeper understanding of the topics covered in the environmental ethics module. They will also help you to develop your own critical thinking skills about environmental issues.

## **1.5 Part 5- The Importance of the Module in Youth Education**

Ethical values help young people to understand their moral obligations to the environment. They learn to respect the environment, to protect it from harm, and to use its resources sustainably. Ethical values also help young people to develop a sense of environmental justice, so that they can advocate for policies and practices that protect all people and ecosystems.

Aesthetic values help young people to appreciate the beauty and wonder of the natural world. They learn to see the environment as a source of inspiration, joy, and spiritual renewal. Aesthetic values also help young people to connect with the environment on a personal level, which can motivate them to take action to protect it.

Here are some specific examples of how ethical and aesthetic values can be integrated into youth environmental education:



### Ethical values:

- Students can learn about different ethical perspectives on environmental issues, such as anthropocentrism, biocentrism, and ecocentrism.
- Students can discuss the moral implications of human activities that impact the environment, such as climate change, pollution, and deforestation.
- Students can develop their own environmental code of ethics to guide their actions.

### Aesthetic values:

- Students can participate in outdoor activities that allow them to experience the beauty of nature firsthand.
- Students can learn about different art forms that celebrate the natural world, such as nature poetry, landscape painting, and nature photography.
- Students can create their own artwork that expresses their appreciation for the environment.

By integrating ethical and aesthetic values into youth environmental education, we can help young people to develop the knowledge, skills, and values they need to become responsible environmental stewards.

In addition to the above, ethical and aesthetic values can also help young people to:

- Develop a sense of empathy for other living beings
- Become more aware of their own interconnectedness with the natural world
- Develop a greater appreciation for the importance of biodiversity
- Become more motivated to take action to protect the environment

Overall, ethical and aesthetic values are essential for youth environmental education because they help young people to develop a deeper understanding of the environment, its value, and their role in protecting it.

## 1.6 Part 6- Implementation Activities for the Content of Module

The Use of Ethical and Aesthetic Values in Environmental Education:



Environmental education plays a crucial role in instilling a sense of responsibility towards the environment and fostering awareness about the conservation of natural resources among students. The incorporation of both ethical and aesthetic values in this education can assist students in





forming a deeper connection with the environment.

**Ethical Values:**

1. Teaching the Importance of Respecting All Living Beings: Emphasizing the ethical responsibility of showing respect to all forms of life, from plants to animals, should be a central theme in environmental education.
2. Discussing the Ethical Consequences of Human Actions on the Environment: Providing students with an understanding of the ethical impacts of human activities on nature, such as pollution and deforestation, contributes to their comprehension of environmental issues.
3. Instilling a Sense of Responsibility for Students' Own Environmental Impact: Environmental education should teach students to comprehend the environmental consequences of their own actions and instill a sense of responsibility for mitigating these impacts.

**Aesthetic Values:**

1. Organizing Field Trips to Natural Areas: Taking students on field trips to natural areas like forests, parks, and beaches allows them to aesthetically experience the beauty and diversity of nature.
2. Presenting Nature Documentaries and Photographs: Showing students nature documentaries and photographs that capture the beauty of nature contributes to the development of an aesthetic perspective.
3. Helping Students Appreciate the Beauty of the Natural World: Conveying the aesthetic value of the natural world to students and aiding them in developing sensitivity towards its beauty is a fundamental aspect of environmental education.

By incorporating these ethical and aesthetic values into environmental education, we aim to cultivate environmentally conscious individuals who not only understand the ethical responsibilities towards nature but also appreciate its aesthetic richness.

<b>Table1: Environmental Pollution and Ecological Impacts in Mersin Province</b>	
<b>CAUSES OF ENVIRONMENTAL POLLUTION</b>	<b>ECOLOGICAL IMPACTS</b>
Population Growth	Air Pollution (Climate Change)
Industrialization	Water Pollution (Ecosystem Imbalance)
Agricultural Activities	Soil Pollution (Impaired Plant Growth)
Tourism Activities	Waste Pollution (Aesthetic Issues)
	Noise Pollution (Health Effects)



### **Causes of Environmental Pollution:**

1. *Population Growth:* Rapid population growth has led to urbanization and associated environmental issues.
2. *Industrialization:* Being a significant industrial center, Mersin contributes to air and water pollution.
3. *Agricultural Activities:* Widespread agriculture brings about chemical usage and soil pollution.
4. *Tourism Activities:* Tourism contributes to increased waste and noise pollution.

### **Ecological Impacts:**

1. *Air Pollution:* Adversely affects plant and animal health, contributing to climate change.
2. *Water Pollution:* Leads to water source contamination and disruptions in the ecosystem.
3. *Soil Pollution:* Agricultural and industrial soil pollution negatively affects plant growth.
4. *Waste Pollution:* Contributes to environmental pollution and aesthetic concerns.
5. *Noise Pollution:* Has negative effects on both human health and the environment.

### **Solution Recommendations:**

1. Control of population growth.
2. Reduction of environmental impacts from industrial facilities.
3. Environmentally sensitive agricultural practices.
4. Regulation of tourism activities to prioritize environmental conservation.
5. Awareness campaigns for waste management and source separation.
6. Implementation of measures to reduce noise pollution.





## **1.7 Part 7- You Can Include A Self-Check For The Learner At The End, A Checklist About Competences They Have Got From The Module.**

### **Student Self-Assessment Checklist: Environmental Ethics Module**

#### **Ethical Values:**

1. Have I made an effort to understand and appreciate respect for nature?
2. Have I been mindful of my actions towards the environment to develop a sense of responsibility?
3. Have I considered how principles of justice and compassion can be applied to environmental issues?

#### **Aesthetic Values:**

4. Have I appreciated the beauty of the environment by participating in trips to natural areas?
5. Have I made an effort to understand diversity and beauty through nature documentaries and photographs?
6. Do I understand my responsibility in preserving the aesthetic values of the environment?

#### **Ethical Values for Environmental Education:**

7. Have I engaged in discussions about ethical responsibilities in topics such as waste management, sustainable development, and climate change?
8. Have I raised awareness about pollution and sustainable use of natural resources?
9. Have I developed a sense of responsibility for my own environmental impacts?

#### **Aesthetic Values for Environmental Education:**

10. Have I expressed appreciation for the beauty of the environment by participating in activities in natural areas?
11. Have I explored environmental beauty through visual and auditory media tools?
12. Have I developed motivation to adopt behaviors aligned with environmental aesthetic values?

#### **Social Responsibility:**

13. Have I created awareness within the community about the causes and solutions to environmental issues?
14. Have I participated in and contributed to environmental projects or initiatives?
15. Have I shared environmental ethics topics with people in my community to raise awareness?

#### **Progress and Development:**

16. Have I kept a record of my progress in understanding the module's content?
17. Have I found opportunities to apply what I learned in my daily life?
18. Have I identified interests and plans for future education and projects related to environmental ethics?



**ENVIRONMENTAL ETHICS MODULE STUDENT ASSESSMENT CHECKLIST:**

	<b>Completed</b> (✓)	<b>In Progress</b> (X)
<b>COMPETENCIES</b>		
<b>1. Ethical Values</b>		
- Understanding and valuing respect for nature.		
- Developing environmental responsibility awareness.		
- Applying principles of justice and compassion to environmental issues.		
<b>2. Aesthetic Values</b>		
- Appreciating the beauty of the environment through field trips.		
- Understanding diversity and beauty through nature documentaries and photos.		
- Recognizing responsibility for preserving the aesthetic values of the environment.		
<b>3. Ethical Values for Environmental Education</b>		
- Discussing ethical responsibilities in topics such as waste management, sustainable development, and climate change.		
- Raising awareness about ethical consequences of pollution and sustainable use of natural resources.		
- Developing a sense of responsibility for one's own environmental impact.		
<b>4. Aesthetic Values for Environmental Education</b>		
- Participating in activities in natural areas to experience and appreciate environmental beauty.		
- Exploring environmental beauty through visual and auditory media.		
- Adopting behaviors in line with environmental aesthetic values.		
<b>5. Social Responsibility</b>		
- Creating community awareness about the causes and solutions of environmental issues.		
- Participating and contributing to environmental projects or initiatives.		
- Sharing environmental ethics topics with people in the community to raise awareness.		
<b>6. Progress and Development</b>		
- Taking notes and keeping a record of what was learned throughout the module.		
- Applying what has been learned in daily life and tracking progress.		
- Expressing interest in and planning for future education and projects related to environmental ethics.		



This table will visually assist students in tracking their completed and ongoing status for each competency.

## **1.8 Part 8- Conclusion**

This module focuses on enhancing ethical and aesthetic values in environmental education. Ethical values guide us in understanding the intricacies of components, while aesthetic values allow us to appreciate the unique beauty and wonders of the natural world. Both types of values are crucial for environmental education, as they help us gain a deeper understanding of the environment and strengthen our responsibility for its conservation.

The module also provides concrete examples of how ethical and aesthetic values can be integrated into environmental education. These examples include exploring regional ethical perspectives, engaging in in-depth discussions on human issues affecting the environment, and encouraging personal ethical development. Additionally, activities such as organizing nature trips, discovering art forms that celebrate the beauty of nature, and creating their own artistic works play a significant role in providing students with a deeper context for environmental issues.

These activities can help students not only understand the environment but also assess and develop their roles in conservation more consciously.

### **Summary:**

1. Ethical values guide us in understanding the intricacies of components.
2. Aesthetic values enhance our ability to appreciate the unique beauty and wonders of nature.
3. Both types of values are vital for environmental education.
4. There are various activities available to integrate ethical and aesthetic values into environmental education.
5. This module aims to highlight ethical and aesthetic values in environmental education, contributing to students' deeper understanding of environmental awareness and fostering a more responsible relationship with the environment.



## 1.9 References

- Alongi, S., Muthiga, N., Rojas, V., Chandra, F., Sridhar, A., & Jagatap, S. (2008). Mangrove restoration: A potential for mitigating regional tsunami effects. *Estuarine, Coastal and Shelf Science*, 76(1), 1-13.
- Azzolina, D. (2018). *Mindfulness and the environment: A path to ecological wisdom*. Routledge.
- Beauchamp, T. L., & Childress, J. F. (2019). *Principles of biomedical ethics*. Oxford University Press.
- Callicott, J. B., & Moore, F. (1999). *Readings in environmental philosophy*. Routledge.
- DesJardins, J. R. (2001). *Environmental ethics: An introduction*. Wadsworth Publishing Company.
- Dobson, A. (2005). *Citizenship and the Environment*. Oxford: Oxford University Press. (pp. 210-215)
- Dunlap, T. R., & VanDeveer, D. A. (2017). *The nature of environmental ethics*. Routledge.
- Francione, A. (2000). *Introduction to animal rights: Your companion to the most important moral issue of our time*. Philadelphia: Temple University Press.
- Gould, S. J. (1989). *Wonderful life: The Burgess Shale and the nature of history*. W. W. Norton & Company.
- Hungerford, H. R., & Volk, T. L. (2016). *Environmental education for the next generation*. Springer.
- Intergovernmental Panel on Climate Change (IPCC). (2021). *Climate Change 2021: The Physical Science Basis*. <https://www.ipcc.ch/>
- Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis*. Shearwater Books.
- Leopold, A. (1949). *A Sand County almanac, and essays on conservation*. Oxford University Press.
- Lovelock, J. E. (1979). *Gaia: A new look at life on Earth*. Oxford University Press.
- Margulis, L. (1998). Gaia is not a living organism. *Nature*, 397(6716), 1028.
- Millennium Ecosystem Assessment (MEA). (2005). *Ecosystems and human well-being: Synthesis*. Island Press.
- Molles, M. C., & Sher, A. (2008). *Ecology: Concepts and applications*. McGraw-Hill Higher Education.
- Naess, A. (1973). The shallow and the deep, long-range ecology. *Inquiry*, 16(1), 95-100.
- Passmore, J. (1974). *Man's responsibility for nature*. Charles Scribner's Sons.



Rickinson, M. (2001). *Learners and Learning in Environmental Education: A Critical Review of Research*. Kluwer Academic Publishers. (pp. 210-215)

Sharma, R. K., & Ahalya, N. (2020). *Environmental pollution and its control*. Springer Nature Singapore Pte Ltd.

Smith, A. A., & Jones, B. B. (2018). *Environmental education for a sustainable future: A moral imperative*. Routledge.

Oberthür, S., & Gehring, T. (2006). *Transforming Institutions for Environmental Policy Integration: Innovation and Change in Theorie and Practice*. MIT Press. (pp. 325-330)

Turner, R. K. (2008). *Stewardship: A history of environmental philosophy*. Routledge.

Vitousek, P. M., Mooney, H. A., Lubchenco, J., & Melillo, J. M. (1997). Human domination of Earth's ecosystems. *Science*, 277(5325), 494-499.

Vrba, E. S. (1995). The interplay of niche construction and selection in mammalian evolution. *Paleobiology*, 21(4), 462-472.

Wenz, H. (2007). *Reflections on ethical theory*. John Wiley & Sons.



## **2. MODULE 2: ANALYSIS OF PERCEIVED ENVIRONMENTAL PROBLEMS ACCORDING TO ENVIRONMENTAL LITERACY LEVEL**

### **2.1 Part 1- Introduction to the Topic**

Climate change and environmental degradation are issues we face nationally and internationally. Climate change is a major challenge that will mark future generations. Tackling them must take into account radical changes at both economic and social levels. Education is one of the pillars of improving the response to climate change by changing human behaviour to protect nature and resources, and it is recognised that climate education plays a fundamental role in society's behavioural and mental adaptation to climate change.

In the medium and long term, as a prerequisite for the implementation of the principles of sustainable development, it is a priority objective of strategic importance in Romania to radically improve and diversify the educational offer of the entire education and training system.

There is a growing interest among young people in Romania in education on climate change and the environment and their participation in actions related to climate change prevention is increasing. In addition, commitments have been made to broaden access to environmental and climate education through participation in international agreements (e.g. the Paris Agreement) and recent government programmes. At the same time, amendments were made to the National Education Law 1/2011 to include environmental competences among the key competences in the law. The National Recovery and Resilience Plan (NRRP) has also provided for the support and development of a network of "Green Schools", the purchase of electric minibuses and the renovation of a significant proportion of existing school buildings to increase their energy efficiency. The "Green School" concept is also described in the "Educated Romania" Project, initiated and endorsed by the President of Romania. Supporting and developing a network of "Green Schools" is a strategic objective of the priority area "Education System Infrastructure" of the "Educated Romania" project, which is the strategic public policy framework for education reform in Romania for the period 2021-2030, and is also reflected in the report of the Presidential Administration: "Climate and Environmental Education in Sustainable Schools". Also, in June 2022, in a European and national context of the transition towards "green" and intelligent buildings, the framework methodology for the organisation and operation of "green schools" was approved by ministerial order of the Ministry of Education.

By "climate change and environmental education" we mean education that promotes sustainable lifestyles through the development of eco-social skills. This type of education aims to familiarise young people with the natural and socio-economic problems caused by climate change and how to improve the response to them. The aim is to raise awareness of climate change and environmental issues, so that children can be both the bearers of the message to their families and communities and a direct stakeholder in actions to halt



environmental degradation. At the same time, education is essential in developing public policies and implementing measures to protect the environment and combat climate change.

## **2.2 Part 2- Environmental Literacy Level**

Analysis of Perceived Environmental Problems According to Environmental Literacy Level" along with a brief explanation;

### **4.2.1. Knowledge Based Themes**

**Understanding of Environmental Issues:** This theme would explore how a person's grasp of scientific concepts related to the environment influences their perception of environmental problems. For example, someone with a strong understanding of climate change might perceive it as a more pressing issue than someone with limited knowledge of the science.

**Awareness of Different Environmental Problems:** This theme would examine how environmental literacy affects the range of environmental issues a person recognizes. People with higher literacy might be aware of a wider variety of problems, like deforestation or biodiversity loss, compared to those with lower literacy who might focus on more common issues like pollution.

### **The Interplay Between Scientific Understanding and Perceived Environmental Problems: A Deeper Dive**

The environment, a complex tapestry woven from intricate ecological processes, presents a multitude of challenges in the 21st century. Understanding these issues goes beyond mere observation; it requires a grasp of the underlying scientific concepts. This section delves into the theme of "Understanding of Environmental Issues" within the broader context of environmental literacy and its influence on the perception of environmental problems.

### **The Power of Knowledge: Decoding Environmental Challenges**

Environmental literacy encompasses the knowledge, skills, and dispositions necessary to understand and address environmental challenges [Molavi et al., 2017]. A crucial component of this literacy is a solid foundation in scientific concepts related to the environment. This scientific understanding empowers individuals to move beyond superficial observations and grasp the root causes and potential consequences of environmental problems.

For instance, consider climate change. Someone with a rudimentary understanding might perceive it as a fluctuation in weather patterns. However, an individual with higher scientific literacy would recognize the human-driven greenhouse gas emissions causing global warming, leading to rising sea levels, melting glaciers, and disruptions in weather patterns [NASA, 2023]. This scientific knowledge fosters a more nuanced and pressing perception of climate change.

### **Nuance and Urgency: The Impact of Scientific Literacy**





The level of scientific understanding not only influences the identification of environmental problems but also shapes their perceived urgency. Take the case of deforestation. Someone with limited knowledge might recognize the loss of trees, but an individual with a stronger scientific background would understand the cascading effects of deforestation. This includes habitat loss for diverse species, disruptions in water cycles, and increased soil erosion [Food and Agriculture Organization of the United Nations, 2020]. This deeper comprehension fosters a sense of urgency to address deforestation before it triggers more widespread environmental degradation.

### **Beyond the Obvious: Unmasking Hidden Environmental Concerns**

Scientific literacy allows individuals to move beyond commonly recognized environmental problems and identify more obscure issues. For instance, while plastic pollution in oceans captures significant public attention, someone with a background in environmental chemistry might also be concerned about the presence of persistent organic pollutants (POPs) in the environment. These POPs, which bioaccumulate in the food chain, pose significant health risks to wildlife and humans [Stockholm Convention, 2019]. This scientific awareness broadens the scope of perceived environmental problems, prompting action on a wider range of issues.

### **Bridging the Knowledge Gap: The Role of Education**

The relationship between scientific understanding and perceived environmental problems underscores the importance of environmental education. By integrating science-based learning into educational curricula, we can equip individuals with the knowledge necessary to accurately assess environmental challenges. This includes not just the basic scientific principles but also the ability to analyze data, evaluate evidence, and critically think about environmental issues [Hungerford et al., 1987].

### **Empowering Action Through Knowledge**

In conclusion, a strong grasp of scientific concepts related to the environment plays a critical role in shaping the way individuals perceive environmental problems. This understanding allows for a more nuanced identification of issues, a heightened sense of urgency, and recognition of a wider range of environmental concerns. By prioritizing environmental education that fosters scientific literacy, we can empower individuals to become informed advocates for our planet's well-being.

#### **4.2.2. Attitudinal Themes:**

**Level of Concern for Environmental Problems:** This theme would delve into how environmental literacy shapes a person's level of worry or urgency regarding environmental issues. People with a strong understanding of the consequences might express greater concern than those with limited knowledge.

**Environmental Values:** This theme would explore how environmental literacy influences a person's core beliefs about the environment. Someone with high literacy might hold strong values of sustainability or conservation compared to someone with lower literacy.



## Beyond Knowledge: The Emotional and Philosophical Dimensions of Environmental Literacy

Environmental literacy encompasses not just a knowledge base of scientific concepts, but also the emotional and philosophical dimensions that shape our relationship with the environment. This section delves into two key themes: Level of Concern for Environmental Problems and Environmental Values. These themes explore how environmental literacy influences the way we feel about environmental issues and the core beliefs that guide our actions.

### **Feeling the Weight: Level of Concern and Environmental Literacy**

A crucial aspect of environmental literacy is the ability to grasp the potential consequences of environmental problems. Individuals with a strong understanding of these consequences are likely to experience a heightened level of concern. This concern can manifest as worry, anxiety, or a sense of urgency to address environmental challenges.

Consider the issue of plastic pollution. Someone with limited awareness might see it as a primarily aesthetic issue – beaches littered with plastic debris. However, someone with a deeper understanding might recognize the broader consequences. They might be aware of the microplastics entering the food chain, the harm inflicted on wildlife, and the potential health risks to humans [Eriksen et al., 2014]. This scientific knowledge fosters a greater sense of concern about plastic pollution, motivating them to seek solutions.

The level of concern also influences an individual's willingness to engage in pro-environmental behaviors. Research suggests a positive correlation between environmental concern and actions such as reducing consumption, recycling, or supporting environmentally friendly policies [Schultz et al., 2005]. When individuals feel a sense of urgency or worry about environmental issues, they are more likely to take action to mitigate the problems.

### **Shaping Our Relationship with Nature: Environmental Values**

Environmental literacy doesn't just shape how we perceive problems; it also influences our core beliefs about the environment, known as environmental values. These values encompass our ethical principles and fundamental beliefs regarding our relationship with nature. Individuals with high environmental literacy are more likely to hold strong values of sustainability, conservation, and ecological balance.

For instance, someone with a strong understanding of biodiversity might value the intrinsic right of all species to exist. This value might translate into supporting efforts to protect endangered species or advocating for habitat preservation. Conversely, someone with lower environmental literacy might prioritize economic development or resource extraction over ecological concerns.

Environmental values are not static; they can be shaped through education and personal experiences. Environmental literacy programs that go beyond scientific knowledge and delve



into environmental ethics and philosophy can foster a deeper connection to nature and encourage the development of pro-environmental values [Hungerford & Volk, 1990].

### **The Interplay Between Emotion and Philosophy**

The level of concern and environmental values are not independent concepts. They work in tandem to influence our environmental decision-making. A strong understanding of the consequences of environmental problems fuels concern, which in turn, motivates us to act in accordance with our environmental values.

For example, someone who deeply values sustainability might become increasingly concerned about climate change due to its impact on future generations. This concern might then lead them to adopt a more sustainable lifestyle, support renewable energy sources, or advocate for climate action policies. This interplay between scientific understanding, emotional response, and core beliefs ultimately determines the actions we take to address environmental challenges.

### **Cultivating a Deeper Connection**

Environmental literacy is not just about acquiring factual knowledge; it is about cultivating a deeper connection with the environment. By fostering a heightened level of concern and nurturing pro-environmental values, environmental literacy empowers individuals to become not just informed observers, but passionate advocates for our planet's well-being.

#### **4.2.3. Behavioral Themes:**

**Perception of Individual Impact:** This theme would analyse how environmental literacy affects a person's belief in their ability to make a difference. People with higher literacy might feel more empowered to take action because they understand the connection between their choices and environmental outcomes.

**Engagement in Pro-Environmental Behaviour's:** This theme would examine how environmental literacy translates into concrete actions. People with higher literacy might be more likely to adopt sustainable practices like recycling, reducing consumption, or participating in environmental activism.

Environmental literacy, while essential for understanding environmental challenges, is ultimately incomplete without translating knowledge into action. This section explores two key themes: Perception of Individual Impact and Engagement in Pro-Environmental Behaviors. These themes delve into how environmental literacy empowers individuals to believe in their ability to make a difference and motivates them to adopt sustainable practices.

### **Breaking Down the Bystander Effect: Perception of Individual Impact**

One of the psychological barriers to pro-environmental behavior is the perception of individual insignificance. People with limited environmental literacy might feel overwhelmed by the scale of environmental problems and believe their actions have negligible impact. This fosters a bystander mentality, where individuals feel powerless to address seemingly insurmountable challenges [Amato et al., 1997].



However, environmental literacy equips individuals with the knowledge to understand the cumulative effect of individual actions. They learn that seemingly small choices, when multiplied across a population, can create a significant positive impact. For example, someone with a strong understanding of climate change might recognize the collective benefit of reducing their carbon footprint through actions like using public transportation or adopting energy-efficient appliances [Gifford, 2011].

Environmental literacy programs can further enhance the perception of individual impact by promoting the concept of efficacy. This refers to an individual's belief in their ability to successfully perform a specific behavior [Bandura, 1997]. By showcasing successful environmental campaigns or highlighting the collective efforts of communities addressing environmental issues, these programs demonstrate the power of individual action and inspire participation.

### **Knowledge into Action: Engagement in Pro-Environmental Behaviors**

The ultimate goal of environmental literacy is to foster a shift from mere awareness to active engagement in pro-environmental behaviors. These behaviors encompass a wide range of actions, from simple lifestyle changes like reducing consumption and conserving resources to supporting environmentally friendly businesses or advocating for environmental policies.

Environmental literacy equips individuals with the knowledge and skills necessary to adopt these behaviors effectively. For instance, someone with a good understanding of waste management might not just recycle, but also be adept at identifying different recyclable materials, separating waste streams correctly, and composting organic matter.

Furthermore, environmental literacy fosters a sense of agency, empowering individuals to seek out opportunities to contribute. This might involve participating in community clean-up efforts, volunteering for environmental organizations, or even starting their own initiatives. Research suggests a positive correlation between environmental literacy and engagement in pro-environmental behaviors, demonstrating its effectiveness in translating knowledge into action [Liu & Wei, 2015].

### **Beyond Individual Action: The Ripple Effect**

The impact of environmental literacy extends beyond individual actions. Individuals with a strong environmental ethic often act as catalysts for change within their social circles. By sharing their knowledge, encouraging sustainable practices among friends and family, and advocating for environmental awareness, they create a ripple effect that can inspire broader societal change.

Environmental literacy programs can further amplify this effect by fostering a sense of community and shared responsibility. These programs can provide opportunities for individuals to connect with like-minded people, collaborate on projects, and advocate for change collectively.

### **Empowering Action for a Sustainable Future**



Environmental literacy is not just about understanding environmental problems; it is about empowering individuals to become agents of positive change. By fostering a sense of efficacy, promoting sustainable behaviors, and inspiring collective action, environmental literacy equips us with the tools necessary to build a more sustainable future for ourselves and generations to come.

#### **4.2.4. Additional Themes:**

**Influence of Media and Education:** This theme could explore how different sources of information, like media or educational background, shape environmental literacy and consequently, the perception of problems.

**Sociodemographic Factors:** This theme could analyze how factors like age, income level, or location might influence environmental literacy and the perception of environmental problems.

By using these subtitles and exploring the related themes, you can gain a deeper understanding of the relationship between environmental literacy and how people perceive environmental challenges.

Environmental literacy is not solely shaped by individual knowledge acquisition. External factors such as media portrayals, educational experiences, and sociodemographic characteristics all play a significant role in influencing how people perceive environmental challenges. This section delves into two key themes: Influence of Media and Education and Sociodemographic Factors. Exploring these themes helps us understand the broader context that shapes environmental literacy and its impact on perceptions of environmental problems.

#### **Shaping the Narrative: The Influence of Media and Education**

The media plays a powerful role in shaping public understanding of environmental issues. News outlets, documentaries, and social media all contribute to the information individuals receive about environmental challenges. The accuracy, depth, and framing of these narratives significantly influence perceptions [Anderson, 2016].

For instance, media that focuses primarily on catastrophic environmental events like wildfires or hurricanes might cultivate a sense of despair and helplessness. Conversely, media highlighting successful environmental initiatives or scientific advancements can foster hope and a sense of agency. Additionally, the accessibility and quality of environmental education can significantly impact environmental literacy. Educational programs that integrate environmental science with critical thinking skills equip individuals to analyze environmental information critically and develop informed perspectives on environmental challenges [Hungerford & Volk, 2010].

The disparity in educational quality and access across socioeconomic groups can create environmental literacy gaps. Unfortunately, communities with limited educational resources may have less exposure to environmental science, potentially leading to a different understanding of environmental issues compared to those with greater access to quality education.





## **The Interplay of Demographics: Age, Income, and Location**

Sociodemographic factors such as age, income level, and location also influence environmental literacy and the perception of environmental problems. Younger generations, who have grown up with increased awareness of environmental issues, may tend to have higher levels of environmental literacy compared to older generations who may have received less exposure to environmental education throughout their lives [Arcury et al., 2011].

Income level can also play a role. Individuals with greater financial resources may have the ability to adopt more sustainable practices like purchasing energy-efficient appliances or organic food, which can shape their perception of environmental solutions. Furthermore, location plays a significant role. Individuals living in areas directly affected by environmental problems like pollution or resource scarcity may have a heightened perception of the challenges and a stronger sense of urgency compared to those living in areas less directly impacted.

## **Mitigating the Disparities: The Need for a Multifaceted Approach**

Understanding the role of media, education, and sociodemographic factors necessitates a multifaceted approach to fostering environmental literacy. Media literacy programs can equip individuals with the skills to critically evaluate environmental information and discern fact from sensationalism. Additionally, prioritizing environmental education across all socioeconomic groups can ensure a more equitable foundation of knowledge and a more cohesive public understanding of environmental challenges.

Furthermore, targeted communication strategies can bridge the gap between different age groups and sociodemographic backgrounds. Tailoring environmental messages to resonate with specific communities and addressing the concerns most relevant to their experiences can foster a sense of ownership and encourage participation in solutions.

## **Building a Bridge Between Knowledge and Action**

Environmental literacy is not solely built in isolation; it is shaped by the interplay of information sources, educational experiences, and individual circumstances. By understanding the influence of media, education, and sociodemographic factors, we can identify areas for improvement and develop strategies to foster a more comprehensive and inclusive approach to environmental literacy. Ultimately, our goal is to bridge the gap between knowledge and action, empowering everyone to become active participants in building a more sustainable future for our planet.

Conclusion; the school will create bridges and meeting places, not only with the families of the students, but also with local institutions and organizations, to involve them in joint environmental projects that benefit the whole community. In this way, the school can create the context for pupils to take co-responsibility for the environment, but also teach them a model of cooperation to solve community problems. As early as 2015, in the graduate profile<sup>2</sup> (a component of the National Curriculum), the expectations expressed towards pupils in relation to environmental care are inserted: use of environmental data; investigation of the environment; showing interest in one's own health and a clean environment; showing interest



in a healthy lifestyle and a clean environment - critical reflection on the changes produced by human activity in the environment.

Among the values, behaviours and attitudes that environmental and climate change education addresses are:

- empathy, connection with nature; care and compassion for all life;
- respect, interest in and appreciation of nature and the services it provides for people;
- responsibility for the use of natural resources;
- responsibility in managing one's own decisions impacting on the environment and climate, including in everyday consumption behaviour;
- involvement in solving environmental and climate problems;
- participation and civic responsibility.

Climate change and environment education is designed to help shape individual, group and system behaviours that lead to the degradation of nature and the environment and to empower people to contribute to problem solving and systemic change. In addition, the aim of climate change and environment education is to contribute to long-term sustainability goals, to support relevant actors (including central and local public authorities) in tackling the serious impacts of pollution, environmental degradation and climate change and to increase their capacity to intervene. This education therefore aims at change and action orientation, taking into account the following dimensions:

### **1) Culture of complexity**

Climate change education is linked to complexity education. In this context, complexity is understood as a way of thinking and acting, taking into account variables such as risk, uncertainty, permanent change. Values associated with this level are: participation, valuing strategic thinking, collective responsibility.

### **2) Capacity for action**

Educating to act involves building competences, understood in terms of the ability to train knowledge and skills to analyse a given situation/problem, find a solution and act to implement it.

### **3) Co-responsibility for the environment**

The school will create bridges and meeting places, not only with pupils' families, but also with local institutions and organisations, involving them in joint environmental projects that benefit the whole community. In this way, the school can create the context for pupils to take co-responsibility for the environment, but also teach them a model of cooperation to solve community problems.

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environment - critical reflection on the changes produced by human activity in the environment.

### **2.3 Part 3- Best Practices We Have In Our Institution, In Our City Or Country Even In The Partners' Countries**

Subjects with implications for environmental education and climate change

**Early childhood education:** Optional subject: 'Environmental education and protection

**Common core subjects - primary education:** Geography (4th grade) - with learning activities: acquiring interest in understanding the role of the environment for the life and activity of society; understanding the need for protection of the living environment; participating in environmental conservation activities; forming a civic attitude regarding knowledge, conservation and protection of the environment.

**Civic education** (3rd and 4th grades) - with learning activities: participation in simple projects with a moral-civic content in the classroom, school or local community; involvement in simple projects in the classroom, school or local community on various topics with a moral-civic content; active participation in projects proposed by the teacher on various topics (e.g. the use of traditional activities/traditions in the local community, protection of the immediate environment).

**Counselling and personal development** (1st and 2nd grades) - the learning content is organised according to areas: self-awareness and healthy lifestyle; emotional and social development; specific aspects of the organisation of learning and preparation for life in young schoolchildren.

**Curriculum subjects by school decision - national offer for primary education: Create your environment** - examples of learning activities for grades 3 and 4: organizing environmental activities; establishing rules of conduct towards the environment; illustrating important dates in the calendar of environmental activities; organizing poster competitions, publicity materials to publicise the effects of pollution in the area; creating and acting out sketches, dramatizations, on environmental themes; selective waste collection; making models and publicity objects from waste; organizing competitions.

#### **1. Common core subjects - secondary education:**

In secondary school, increasingly complex topics are introduced relating to weather and climate, climate zones, the diversity of climatic forms, ways of warning, extreme phenomena, the influence of climate and weather on activity in the local horizon, behavior in the event of extreme phenomena. **Geography** (grades 5-8) - helps to identify and explain findings (and truths) resulting from the interaction between the components of the natural terrestrial environment and those of society, as well as from the overall human-nature interaction (examples of contents: grade VI - effects of human activities on the environment and quality of life; grade VII - identification of existing problems in the environment, grade VIII -



identification of solutions for the protection of the geographical environment in the local or remote horizon).

**Technological education and practical skills** - contributes to the creation of contexts that favour the formation of responsible attitudes towards health, environment, work by applying occupational safety measures, fire prevention and extinguishing rules, workplace ergonomics, reducing energy consumption, rational use of material resources needed to produce a product.

**Civic culture** - respect for human dignity and rights, for the Constitution and laws; tolerance and respect for individuals and groups who hold different values, opinions and beliefs; trust in oneself and others; willingness to engage in dialogue, to relate positively to others and to cooperate; taking responsibility for personal actions and citizenship responsibilities; critical and flexible thinking; equality before the law - respect for the law; freedom of expression, of opinion, freedom of conscience; civic involvement in community life; active citizenship.

*Social education* - examples of content:

- 5th grade: children's rights; responsibilities associated with them, examples of rights in concrete contexts (e.g. right to identity, right to family, right to education, right to play and recreation, right to protection against violence, abuse and exploitation, right to security and social protection, protection of the environment - condition of life);
- 7th grade - activities: active participation in the realisation of proposed projects on different themes (e.g. projects on preventing and combating violence, social and educational inclusion, projects on influencing local public decisions/policies in different fields, projects on environmental protection/protecting cultural heritage).

**Counselling and personal development** - contributes to the adoption of a responsible attitude towards one's own health and the environment from a wellness perspective by adopting a healthy lifestyle and managing risk behaviours.

**Curriculum subjects to be decided by the school - national offer for secondary education: Health Education** (grades I - XII) - environmental health domain (for all grades).

**Create your environment (grades 5 - 7)**

- Activities: identify types of waste from the household, school, neighbourhood, etc..
- Contents: Effects of man-made environmental degradation and its activities; Waste - sources of waste - collection, transport and disposal of waste - recycling of waste; Effects of pollutants on ecological balance; Global issues - greenhouse effect (formation, influence and mitigation measures) - acid rain (formation, influence and measures to avoid acid rain formation) - ozone layer (what is ozone, how the ozone layer is affected and consequences of its destruction); Environmental protection measures and pollution control: water purification and treatment (types of purification, treatment plants); purification of gaseous emissions; combating vibration and noise; desiccation, drainage, fixation and stabilisation of land; rational management of resources; recovery, recycling and reuse of materials.

**Common core subjects high school education**



**Geography** - 9th grade (Physical Geography) and 11th grade (Problems of the Contemporary World), 12th grade (Geography of Romania - Climate chapter: influences, factors, elements, evolution).

**Biology** (grades IX - XII) - care for the environment (skills: protection and conservation of the environment; organism-environment relationship).

**Technological secondary education** - profile-specific subjects for vocational qualifications: environmental technician and protection of environmental quality, agronomist, hydro-meteorologist, veterinary technician, etc.

#### **Curriculum subjects at the school's decision - national offer for high school education:**

- **Education for development** (OMECS no. 3542/2016).
- **Education for democracy** (OMECS no. 5817/2010)
- **Extracurricular and extracurricular activities included in the Calendar of National Educational Activities funded by the Ministry of Education** (2017, 2018, 2019) - (on the website [www.edu.ro](http://www.edu.ro)), examples:
  - National Environmental Project Competition
  - National ecology and environmental protection competition "Let's love nature"
  - National ecology and environmental protection competition "A healthy child in a clean environment".
  - National Programme "School in a different way" - Environmental education and protection component (OMENCŞ no. 5034/2016 for the approval of the Methodology for the organisation of the National Programme "School in a different way")

## **2.4 Part 4- Links to Videos and Further Reading Sources for the Content of Module**

The provided resources offer a valuable starting point for exploring the link between environmental literacy and perceived environmental problems, with a specific focus on Romania (based on the reading sources). Here's a breakdown of the links and their titles in the context of the module's main theme:

### **4.4.1 Links to Videos:**

**Life on Our Planet:** This documentary by Sir David Attenborough highlights the devastating effects of human activity on the natural world. While not directly addressing environmental literacy, it serves as a powerful reminder of the environmental problems we face.

**2040:** This documentary presents a more optimistic vision, showcasing existing solutions to environmental problems. By showcasing successful innovations, it can inspire viewers to take action and potentially increase their perceived sense of agency regarding environmental issues.



**Drawdown:** Based on the book "Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming," this video explores various solutions to climate change. This aligns directly with the theme by demonstrating how increased knowledge of solutions can influence the way we perceive environmental problems – shifting them from insurmountable challenges to solvable issues.

**What is Environmental Literacy?:** This video provides a direct explanation of environmental literacy, its components (knowledge, skills, and attitudes), and its importance in addressing environmental challenges. This foundational knowledge serves as a prerequisite for understanding the relationship between environmental literacy and perceived problems.

Overall, the video selections offer a well-rounded perspective. They depict the urgency of environmental problems, showcase potential solutions, and define environmental literacy – all relevant aspects for understanding how environmental literacy shapes our perception of these issues.

#### 4.4.2. Further Reading Sources:

**Climate Change Communication and Education in Romania** (<https://unesdoc.unesco.org/ark:/48223/pf0000230309>) : This resource provides a regional context by exploring the specific strategies employed in Romania for climate change communication and education. This allows for a deeper understanding of how environmental literacy is fostered within the Romanian context, potentially influencing perceptions of environmental problems specific to the region.

#### **Advocacy for Ecological Education in Romania Under the Information and Knowledge Society**

([https://www.academia.edu/82570031/Energy\\_and\\_the\\_Environment\\_The\\_Case\\_of\\_Romania](https://www.academia.edu/82570031/Energy_and_the_Environment_The_Case_of_Romania)) : This academic paper delves deeper into the need for ecological education in Romania. By advocating for a more comprehensive approach, it can highlight the gaps in current environmental literacy efforts and their potential impact on how Romanians perceive environmental problems.

#### **Section 2.3: Environmental Education for Sustainable Development**

([https://www.researchgate.net/publication/324924663\\_Environmental\\_education\\_and\\_education\\_for\\_sustainable\\_development\\_in\\_Romania\\_Teachers\\_perceptions\\_and\\_recommendations](https://www.researchgate.net/publication/324924663_Environmental_education_and_education_for_sustainable_development_in_Romania_Teachers_perceptions_and_recommendations)) : This resource offers a broader perspective on environmental education for sustainable development in Romania. By outlining national strategies and goals, it provides context for understanding how Romania aims to shape environmental literacy and potentially influence perceptions of environmental issues.

**The Importance of Environmental Education in Today's World** (<https://www.romania-insider.com/p-importance-environmental-education-todays-world>) : This online news article highlights the general importance of environmental education in addressing contemporary environmental challenges. While not specific to Romania, it serves as a reminder of the global need for environmental literacy and its potential to translate knowledge into action.



Overall, the reading sources offer valuable insights into the Romanian context. They provide details on national strategies, highlight the need for improved environmental literacy, and emphasize the importance of communication and education in addressing environmental challenges. This regional context is crucial for understanding how environmental literacy levels in Romania might influence the way people perceive environmental problems.

### **Connecting the Resources to the Module**

These resources effectively support the module's main theme by exploring different facets of environmental literacy and its relation to perceived environmental problems. While the videos provide a broader introduction to the urgency of environmental issues and potential solutions, the reading sources anchor the discussion within the specific context of Romania.

By combining these resources, learners can gain a comprehensive understanding of the following aspects:

The gravity of environmental challenges we face globally (videos 1 and 2).

The importance of environmental literacy in addressing these challenges (video 4 and all reading sources).

Specific strategies for fostering environmental literacy in Romania (reading sources 1, 2, and 3).

The potential influence of environmental literacy levels on how Romanians perceive environmental problems (reading sources 1 and 2).

1. Links to videos for the content of module

<https://www.youtube.com/watch?v=WQ2tMzysmik>

<https://www.youtube.com/watch?v=x20dHsTORTg>

<https://www.youtube.com/watch?v=f1T64QP3TKM>

<https://www.youtube.com/watch?v=SxH6oKJjxp8>

2. Further reading sources for the content of module

<https://education-profiles.org/europe-and-northern-america/romania/~climate-change-communication-and-education>

[https://www.academia.edu/62387110/Advocacy\\_for\\_Ecological\\_Education\\_in\\_Romania\\_Under\\_the\\_Information\\_and\\_Knowledge\\_Society](https://www.academia.edu/62387110/Advocacy_for_Ecological_Education_in_Romania_Under_the_Information_and_Knowledge_Society)

<https://stec.univ-ovidius.ro/html/anale/RO/wp-content/uploads/2021/03/Section%203/8.pdf>

<https://www.romania-insider.com/p-importance-environmental-education-todays-world>

## **2.5 Part 5- The Importance of the Module in Youth Education**

We start from the premise that educational establishments can and must play an important role in building a sustainable future. This requires that students and teachers understand the importance and severity of the climate and environmental crises, are familiar



with their causes and effects, and are aware of ways to improve society's response to these challenges. At the same time, by 'climate change and environmental education' we mean education that promotes a sustainable lifestyle through the development of eco-social skills, the development of a sustainable school environment. Students develop the ability to reflect and act to protect the environment. At the same time, they develop basic skills for a circular economy based on a sustainable use of natural resources and strive to adopt a lifestyle and culture of sustainability that favours the protection of biodiversity and the restoration of natural ecosystems.

The current trend in environmental education and climate change is towards an integrated approach at school level (management, principal, teacher, students, staff).

This strategy proposes a number of solutions to increase environmental and climate change education and awareness among pupils. The strategy includes objectives and measures that can be implemented in the coming years, but also in a longer implementation horizon until 2030. The objectives and measures are multi-pronged: education (formal and non-formal); human resources, including teacher training; investment; open resources; partnerships, etc.

#### The Crucial Role of the Module in Youth Education: Cultivating Informed and Engaged Citizens

The provided resources on environmental literacy and perceived environmental problems hold immense significance for youth education. This section will analyse the importance of this module within the context of youth education, highlighting how it empowers young people to become informed and engaged citizens capable of addressing environmental challenges.

### **Equipping the Next Generation: The Necessity of Environmental Literacy**

Young people today are inheriting a planet facing unprecedented environmental challenges. Climate change, biodiversity loss, and pollution threaten the future of our planet. Equipping them with environmental literacy is no longer a luxury, but an absolute necessity. This module, by focusing on "Analysis of Perceived Environmental Problems According to Environmental Literacy Level," tackles this critical need head-on.

The module empowers young people by fostering a deeper understanding of the relationship between environmental knowledge and how we perceive environmental issues. Through the exploration of themes like understanding of environmental issues, level of concern, and environmental values (as outlined in previous responses), young people gain the critical tools to analyze environmental information critically and develop informed perspectives on the challenges they face.

### **Beyond Knowledge: Fostering Action and Agency**





The module extends beyond mere knowledge acquisition. By analyzing the influence of media and education on environmental literacy, it highlights the importance of critical thinking skills. This equips young people to navigate a world bombarded with environmental information, identifying biases and seeking reliable sources. Furthermore, by exploring the role of sociodemographic factors, the module fosters empathy and a sense of global citizenship. Young people gain a deeper understanding of how environmental challenges may be experienced differently across communities, a crucial step towards building inclusive and equitable solutions.

Perhaps most importantly, the module focuses on the impact of environmental literacy on pro-environmental behaviors. By understanding the power of individual action and the collective impact of informed choices, young people are empowered to become agents of change. The module can serve as a springboard for encouraging participation in environmental initiatives, from volunteering for local clean-up efforts to advocating for sustainable policies.

### **The Power of Youth: A Catalyst for Change**

Young people are not just passive recipients of information; they are powerful catalysts for change. They possess the energy, idealism, and technological fluency to drive innovation and push for a more sustainable future. This module, by fostering environmental literacy and a sense of agency, helps them translate their passion into action.

Consider the impact of youth-led movements like Fridays for Future, which has inspired millions of young people around the world to demand climate action from world leaders. This exemplifies the power of a generation equipped with knowledge, critical thinking skills, and a strong sense of environmental responsibility.

### **Empowering Informed Engagement: Resources in Action**

The provided resources further enhance the impact of the module. Videos like "A Life on Our Planet" and "2040" serve as powerful wake-up calls, highlighting the urgency of environmental challenges while also showcasing potential solutions. This balance between awareness and hope is vital for motivating young people to engage with environmental issues.

Reading sources specific to Romania, like "Climate Change Communication and Education in Romania" and "Advocacy for Ecological Education in Romania Under the Information and Knowledge Society," offer a valuable regional context. Young Romanians can gain insights into national strategies and identify areas where they can contribute their talents and passion.

### **Investing in the Future: The Long-Term Impact**

The importance of this module extends far beyond youth. By empowering young people to become informed and engaged citizens, we are investing in the future of our planet. These young people will become leaders, policymakers, scientists, and educators of





tomorrow. Their environmental literacy will shape environmental policies, technological advancements, and ultimately, the trajectory of our planet's health.

### **Looking Forward: Building a Sustainable Future**

The module on "Analysis of Perceived Environmental Problems According to Environmental Literacy Level" is not just an educational tool; it is a crucial step towards building a more sustainable future. By nurturing environmental literacy among youth, we are empowering the next generation to become informed, engaged, and collaborative changemakers. The resources explored provide a strong foundation for this journey, equipping young people with the knowledge, skills, and motivation needed to create a brighter, more sustainable future for themselves and generations to come.

### **2.6 Part-6- Implementation Activities for the Content Of Module**

Love for NATURE cannot be reduced to mere declarations of its beauty and is not just a desire to be in its midst, but to act on its behalf.

Every teacher must make pupils aware that the notion of protecting nature does not require them to give up the resources it offers, but only to use them rationally, without abuse. It is necessary to cultivate an interest in maintaining a balanced natural environment that is conducive to life, but also in behaviour that is conducive to improving relations between man and the natural environment in which he lives.

A few years ago, an educational program called "**Green Week**" was implemented in Romanian schools, a non-formal education program organized in Romanian schools, which aims to promote environmental education and raise students' awareness of the importance of protecting the environment. **Green Week** can be considered both a challenge and an opportunity for Romanian education. On the one hand, organising and carrying out non-formal activities can be a challenge for schools and teachers, especially for those who are not used to working outside the traditional methodology. On the other hand, Green Week is an opportunity for schools and teachers to provide alternative and attractive learning opportunities for students and to engage in non-formal learning activities focused on the environment and sustainability. The following activities could be implemented in schools:

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- **Greening the area around the school** - organise a general clean-up of the area around the school and involve students in this activity to understand the importance of cleanliness and respect for the environment.
- **Tree or flower planting** - organise a tree or flower planting activity in the school yard or a nearby park to encourage students to care for the environment and learn about the importance of plants in ecosystems.
- **Visit a recycling station** - organise a trip to a recycling station to show students the recycling process and teach them how to recycle properly.
- **Recycling projects** - divide students into groups and ask them to come up with innovative ideas to recycle different materials such as paper, bottles, cans, etc.
- **Organise an organic produce fair** - ask students to bring organic produce from their gardens or make homemade products and organise a fair at school to encourage healthy and sustainable eating.
- **Conferences and presentations on the environment** - invite an environmental specialist or environmental activist to give a presentation or lecture to students on current environmental issues and how these issues can be addressed.
- **Participate in an environmental campaign** - involve students in a local environmental campaign, such as a litter collection or tree planting campaign, animal/bird protection campaign to teach them how to act for the benefit of the environment.

**Green Week** projects can be set up as interdisciplinary projects to be coordinated by teams of teachers from different specialities. The skill will be to prepare such projects, and to help you, I offer a list of activities/miniprojects that can be combined according to the creativity and originality of teams of teachers from different specialities to create successful educational projects.

There are several ways to integrate **language and foreign languages** into **Green Week** projects. Some examples include:

- **Writing compositions and essays** on environmental protection in Romanian or in the foreign language studied.
- **Developing communication skills** through role-playing or debating activities on environmental issues, where students are encouraged to express their opinions and argue.
- **Reading children's and adult literature** on environmental themes, which can be discussed and analysed in class, giving students the opportunity to develop their reading and reading comprehension skills.



- **Participate in cultural exchanges** with students from other countries and languages to discuss and compare the different ways in which the environment is perceived and approached in different parts of the world.
- **Watching and analysing films or documentaries** on the environment, followed by discussions and debates in Romanian or the foreign language studied.

**Green Week** can be a great opportunity to incorporate **maths** into non-formal environmental and ecological activities. Here are some examples of such activities:

- **Studying animal populations** - In this project, students can learn about the rise and fall of populations, using statistical data about how many animals are found in a particular area and how this number changes over time.
- **Water Quality Study** - Students can learn about ratios, volume, and other mathematical concepts while collecting data about water quality in a local river or lake. They can then use this data to plot graphs and determine whether or not the water quality is acceptable.
- **Calculating Carbon Footprint** - In this project, students can learn about the concept of carbon footprint and how it can be calculated. They can then calculate the carbon footprint of their school or town and make suggestions for reducing it.
- **Studying weather patterns** - In this project, students can learn about the concepts of temperature, atmospheric pressure and precipitation. They can use weather data to draw graphs and learn about how these phenomena are interconnected.
- **Calculating waste** - Students can learn about ratios and fractions as they calculate the amount of waste their school or town produces. They can then make suggestions for reducing waste.

**Astronomy** is a fascinating subject and there are many ways in which practical astronomy can be integrated into **Green Week**. For example:

- **Stargazing** - you can organise an outdoor stargazing evening. Choose a dark place and organise a field trip with your students at night to see constellations, planets and other interesting celestial objects. If you don't have a telescope, you can use binoculars for an equally interesting experience.
- **Planning an “astronomical garden”** - you could organise an activity where students plan and plant an astronomical garden, in which they grow plants named after constellations, planets or other celestial objects (sunflowers, Petunia Night Sky, but also plants named after asteroids: Azalea, Camellia, Clivia, Datura, Magnolia, Petunia, Primula, etc.) You can use star maps and apps to help students identify constellations and associate them with the corresponding plants.
- **Building solar models** - you can organise an activity where students build solar models. This can be done by using small solar panels or even using LEDs and batteries to demonstrate how solar energy is converted into electricity.



- **Organise a portable planetarium** - you can do an activity where you build a portable planetarium using a projector, screen and specialised software. Students will be able to see different celestial objects and learn more about the cosmos.
- **Building rockets and satellites** - you can organise an activity where students build their own rockets or satellites. This can be done using simple materials such as recycled plastic bottles and cardboard.
- **Participate in NASA EarthKam student missions** - with this programme students can learn about Earth's geography, climate, life on Earth and space exploration.
- **Build a sundial** - this activity allows students to learn about the apparent motion of the Sun in the sky and how it can be used to measure time in a simple and natural way.
- **Observing the movement of the Sun** at different times of the day - together with students, you can make regular observations of the Sun's movement in the sky, watching how its position changes with the time of day.
- **Observe the Moon** with a telescope or binoculars to discover craters, mountains and lava fields. Depending on when Green Week takes place, a special Moon-watching session can be organised at night in a place with the darkest possible sky.
- **Studying human impact on the Moon's surface/ outer space.** Students can learn about the different space missions that have landed on the Moon/space and research the impact of these missions on the Moon's surface.

**Art** can be incorporated into **Green Week** by involving students in art activities related to themes such as nature, environmental protection, recycling, biodiversity, sustainable agriculture and more. Here are some examples of activities:

- **Painting on canvas:** Students can create their own nature-inspired artwork and be encouraged to use sustainable and environmentally friendly art materials.
- **Nature photography:** Pupils can explore their surroundings and photograph local flora and fauna, weather phenomena or other elements of the environment, then organise an exhibition of their photos to raise awareness of the beauty of nature.
- **Theatre:** Students can write and stage their own plays with themes related to the environment and its protection. These can then be performed in front of other students, teachers or parents.
- **Sculpture with recycled materials:** Pupils can create sculptures using recycled materials such as plastic bottles, paper or cardboard to teach them about the importance of recycling and reuse.
- **Public art projects:** Students can work with local authorities and create public art projects to encourage people to be more environmentally aware, such as painting public benches with bright colours or creating murals.



**Sports activities** can be integrated into **Green Week** to encourage an active and healthy lifestyle, but also to promote the importance of outdoor activities and environmental protection. Some of the sports activities that can take place during **Green Week** include:

- **Guided nature walks and hikes** - Organise walks in the park or forest to explore nature and learn about the environment. Encourage students to observe and record the plants and animals they see.
- **Bicycles and other eco-friendly transport** - Organise bike rides to promote eco-friendly transport and outdoor exercise.
- **Outdoor games** - Encourage students to play outdoor games that involve physical activities such as Frisbee, volleyball or soccer.
- **Outdoor yoga exercise** - Organise outdoor yoga classes to encourage relaxation, balance and connection with nature.
- **Water activities** - Organise swimming activities or boat/hydrobike rides etc on nearby lakes or rivers to learn about the importance of protecting water.

During **Green Week**, a variety of activities can be carried out in the **science curriculum area**, such as:

- **Studying and analysing the biodiversity** of an area by collecting plant and animal samples, identifying and classifying them;
- **Visiting a botanical garden**, arboretum or nature reserve to study the plants and ecosystems present in those places;
- Making a **herbarium** by collecting plants and making drawings and sketches of them;
- **Urban ecology** experiences, by visiting a park or green area in a city and analysing the ecological implications of urbanisation;
- Conducting **scientific experiments** on natural resources and their sustainable use, such as experiments on recycling materials or reducing water and energy consumption;
- Organising **debates** and discussions on the impact of climate change on the environment and possible solutions to reduce greenhouse gas emissions.

There are many **geography** and **geology** activities that can be done during **Green Week**, which I will list below:

- **Identifying and classifying rocks and minerals:** students can be taught how to identify different types of rocks and minerals using characters such as colour, shape, texture and density, but they can also use digital applications for this purpose.
- **Visiting interesting geological areas:** pupils can go on a trip to an important geological area, where they can learn about the geological processes that have taken place there and their impact on the environment and local communities.
- **Mapping:** pupils can learn to interpret maps and create their own maps, using tools such as GPS or simple topographical instruments.
- **Climate study:** students can learn about how the environment is affected by climate



change and how action can be taken to reduce its impact.

In the context of **Green Week**, there are a variety of non-formal activities in the field of **technology education** that can be carried out, among them:

- Building a **mini-irrigation system** from recycled materials to show how water resources can be saved and energy consumption reduced.
- Designing and building a simple **solar panel** to show how we can use solar energy sustainably.
- Creating a **waste recycling and recovery project** involving the use of technology tools.
- Creating an **engineering project** involving the construction of a prototype electric car or electric bicycle using renewable energy.

Among the **ICT** activities that can be implemented in **Green Week**, I propose:

- **Develop a website or app** to monitor air quality in a specific area. This activity may also involve the development of sensors to measure air quality.
- **Creating video presentations or graphics highlighting** environmental problems and possible solutions.
- **Using online tools** to calculate the carbon footprint of an individual or community and identifying solutions to reduce this footprint.
- **Using apps** to identify plants and animals in a given area and collect related data to map biodiversity.
- **Develop games/quizzes or mobile apps** to raise awareness of environmental issues and encourage students to take action to protect the environment.

## 2.7 Part- 7 You Can Include a Self-Check For the Learner at the End, a Checklist about Competences They Have Got From the Module.

### EVALUATION

1. Give at least five examples of behaviours and attitudes that are relevant to environmental education and climate change:
2. Environmental education aims at change and action orientation, taking into account three dimensions. Make the correspondence:

1. The culture of complexity		A) Educating to act involves building competences, understood in terms of the ability to train knowledge and skills to analyse a given situation/problem, find a solution and act to implement it.
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<p><b>2. Capacity for action</b></p>		<p><b>B)</b> The school will create bridges and meeting places, not only with the families of the students, but also with local institutions and organizations, to involve them in joint environmental projects that benefit the whole community. In this way, the school can create the context for pupils to take co-responsibility for the environment, but also teach them a model of cooperation to solve community problems.</p>
<p><b>3. Co-responsibility for the environment</b></p>		<p><b>C)</b> Climate change education is linked to complexity education. In this context, complexity is</p>
		<p>understood as a way of thinking and acting, taking into account variables such as risk, uncertainty, permanent change. Values associated with this level are: participation, valuing strategic thinking, collective responsibility.</p>

3. A few years ago, an educational program called "Green Week" was implemented in Romanian schools. What is the aim of this programme?
4. Give examples of two activities that can be organised with students and which, in your opinion, have a great impact on the formation of an ecological attitude. Please justify your choice!

## 2.8 Part -8 Conclusion

The correlation of human interests according to the laws of nature is the only prerequisite for the continuity of life on Earth.

Environmental protection can only be fully achieved by combining legal and administrative measures with educational ones. Changing people's mentality is not easy, but without education in this respect, any action to protect the environment is doomed to failure.

Environmental education can be achieved in particular through schools and the media, with a logical motivation. Ecological education is based on awareness which has this single purpose - to protect nature, to make it preserve its health, on which our health, our human health, ultimately depends. Healing nature from all kinds of harmful substances in the





atmosphere, soil and water cannot be done without awareness and without effective ecological training of all of us.

Ecological education starts, or should start, from early childhood. It contributes to the formation of an ecological awareness and an ecological thinking about nature, which results in a careful and correct behaviour towards it. In lessons, depending on the case, it is necessary to address ecological issues that contribute gradually to the formation of ecological awareness.

The informational and correlative values are multiple. They become effective if they are consistent and attractive.

The objectives of environmental education are equally concerned with the acquisition of skills, the acquisition of attitudes, the clarification of values and the practical approach. From a school perspective, the pupil must be helped:

to understand that man is inseparable from his environment and that the negative effects of his actions have consequences for the environment to obtain the basic knowledge necessary to solve the problems of his environment immediately to judge individual and collective responsibilities, to engage in obtaining cooperation in solving problems develop tools for analysis, reflection and action to understand, prevent and correct environmental damage

On the behavioural level, to develop knowledge, problems and attitudes that take into account social values.

Environmental education will not achieve its goal if the actions it suggests to the pupil are not carried out around him - in the family, in the community in which he lives.

The effectiveness of environmental education can only be judged by the long-term effects on the behaviour of the future citizen, but the obligation to have an immediate usefulness (through practical applications, through student intervention, concrete situations) remains in force. Environmental education must show that success cannot be achieved without a judicious combination of general principles and relevant data on what is particular to a concrete situation.

In conclusion, the school has the task of organising and carrying out a lively and sustained activity on ecological education and environmental protection, and pupils, under the guidance of teachers, can and must form nature defenders. True ecological education will achieve its goal only when it succeeds in convincing pupils - tomorrow's citizens - of the need to protect nature and become active factors in the reconciliation of man and nature.

## **2.9 References**

Amato, R. P., Devine-Wright, P., & Walker, L. (1997). The relationship between environmental concern and knowledge about environmental protection. *Journal of Environmental Education*, 28(3), 30-36.

Anderson, A. (2016). *Media and environmental communication*. Routledge.



Arcury, T. A., Greenhäuser, B., Stedman, R. C., Marshall, J. A., Bharadwaj, L. A., Griffith, D. C., ... & Mohrenweiser, H. (2011). Social science and the environment. *Environmental Health Perspectives*, 119(3), 365-371.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Eriksen, M., Lebreton, L. C., Carson, H. S., Thiel, M., Christiansen, C. H., Klassouw, R., ... & Jambeck, J. R. (2014). Plastic pollution in the world's oceans: more than 5 million metric tons dumped annually. *Science*, 347(6223), 1244252.

Gifford, R. (2011). The integration of environmental psychology and economics. *The American Psychologist*, 66(4), 313-322.

Goron, A-M. (2014). Contributions to the environmental education of students through formative activities specifically designed for secondary school level - Methodological and Scientific work for obtaining the teaching degree I (Unpublished master's thesis). Scientific coordinator: Conf. Univ. Dr. Momeu Laura.

Hungerford, H. R., & Volk, T. L. (1990). Encouraging responsible environmental behavior through environmental education. *Journal of Environmental Education*, 21(3), 18-26.

Hungerford, H. R., Peyton, R. B., & Wilke, R. J. (1987). The implications of environmental education research for innovation in curriculum development. *The Journal of Environmental Education*, 18(1), 4-9.

Hungerford, H. R., & Volk, T. L. (2010). Educating for a sustainable future. *International Journal of Sustainability in Higher Education*, 11(1), 88-108.

Liu, X., & Wei, X. (2015). The relationship between environmental literacy and pro-environmental behavior in primary school students in China. *The Journal of Environmental Education*, 46(2), 122-131.

Mayer, M. (1997). Action research and the production of knowledge: The experience of an international project on environmental education. In S. Hollingsworth (Ed.), *International action research: A casebook for educational reform* (pp. 112-123). Flamer Press.

Molavi, G., Wagstaff, M., & Larson, C. L. (2017). Reframing environmental literacy for the digital age. *Journal of Environmental Education*, 48(4), 366-379.

Schultz, P. W., Zinserman, J., & Winkler, R. (2005). Psychology and global warming. *Current Opinion in Psychology*, 18.

### **Books:**

Dobrotă, C., & Barna, A. (1996). Ecological education, the foundation of a way of life: The teacher as a teacher. In A. Marcu (Coord.), *Environmental days for students in Cluj*. Cluj-Napoca.

Louv, R. (2011). *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books.



Sobel, D. (2009). Place-based education: Connecting classrooms & communities (3rd ed.). Stenhouse Publishers.

**Websites:**

- Institutul de Științe ale Educației [Institute of Educational Sciences]. (2015). Graduate training profile. <https://www.edu.ro/Institutul%20de%20C8%98tiin%C8%9Be%20ale%20Educa%C8%9Biei%20%28ISE%29> (In Romanian)
- Ministerul Educației și Cercetării [Ministry of Education and Research]. (n.d.). Metodologia Săptămâna Verde [Methodology - Green Week]. [https://www.edu.ro/metodologie\\_Saptamana\\_Verde](https://www.edu.ro/metodologie_Saptamana_Verde) (In Romanian)

**Other website links:**

- Săptămâna Verde - Ciclul liceal [Green Week - High School Cycle]. (2022, May 5). <https://www.saptamanaverde.edu.ro/ro> (In Romanian)
- Săptămâna Verde - Ciclul gimnazial [Green Week - Middle School Cycle]. (2022, May 5). <https://www.saptamanaverde.edu.ro/ro> (In Romanian)
- Săptămâna Verde - Ciclul primar [Green Week - Primary School Cycle]. (2022, May 5). <https://www.didactic.ro/materiale-didactice/saptamana-verde> (In Romanian)
- Green Report: <https://green-report.ro/> (In Romanian)
- Mai Mult Verde: <https://maimultverde.ro/> (In Romanian)
- Polaridad: [https://es.wikipedia.org/wiki/Polaridad\\_de\\_un\\_disolvente](https://es.wikipedia.org/wiki/Polaridad_de_un_disolvente) (In Romanian)
- Necesitatea educației ecologice în școală: <https://you.com.ro/2019/12/09/rolul-educatiei-ecologice-in-viata-viitoarelor-generatii/> (In Romanian)



### **3. MODULE 3: ECOLOGY AND ECOSYSTEM**

#### **3.1 Part 1- Introduction to the Topic**

We aim to provide you with a clear overview of what to expect in the upcoming sections of this module. We will touch upon the significance of studying ecology and ecosystems, emphasizing the role they play in shaping our natural world. As we progress, you'll gain insights into the interdependence of life forms, the delicate balance maintained in ecosystems, and the impact of human activities on these intricate systems.

Ecology is the science that studies the relationships between living organisms, as well as between organisms and their environment. It aims to understand how individuals, species, communities, and ecosystems interact, and the patterns and processes of these interactions in the natural world.

The term "ecology" originates from the Greek words "oikos" (meaning home) and "logos" (meaning study) (Miller, 2009). Therefore, ecology can be literally understood as the "study of domestic life" (Miller, 2009). However, its scope extends beyond the physical house to encompass the intricate web of relationships between organisms and their environment (Merriam-Webster, 2020).

This understanding of ecology highlights its critical role in comprehending human dependence on the natural world. Even in our technologically advanced societies, humans remain reliant on nature for fundamental needs such as air, water, and food (Daily, 1997). The benefits provided by nature, like waste assimilation and recreational opportunities, are often taken for granted until a crisis arises (Daily, 1997). This tendency to view natural resources as limitless or easily replaced with technological solutions can lead to unsustainable practices and environmental degradation (Odum & Odum, 2000).

Historically, environmental concerns have fluctuated in prominence. The 1970s witnessed a surge of environmental awareness with the first Earth Day in 1970 (Earth Day Network, n.d.). However, the following decades saw environmental issues recede into the background due to competing political priorities (Barrett, 2001). As we enter the 21st century, the consequences of environmental neglect are becoming increasingly apparent, prompting a renewed focus on ecological solutions (Barrett, 2001). Ecology offers valuable insights into preventing environmental damage and promoting ecosystem health (Barrett, 2001).

Ecosystem models are tools used to understand the complex relationships and processes within natural systems. By simulating the structure, functioning, and dynamics of an ecosystem, these models help predict how it may respond under various scenarios. They enable the evaluation of future changes in ecosystems, the impacts of human activities, and the consequences of different management strategies.

Specific ecosystem models are tools that focus on the characteristics and dynamics of a particular ecosystem, modeling the interactions among organisms, resources, and processes within that ecosystem in detail. These models are often developed for specific purposes, such as managing the habitat of a particular species or understanding the biological diversity within a specific ecosystem.

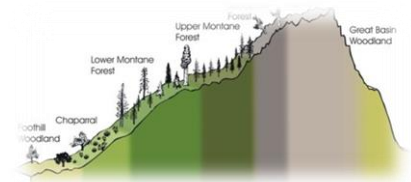
Specific ecosystem models;



1. **Savannas:** Savanna ecosystem models focus on unraveling the complex interplay between vegetation cover, rainfall patterns, and soil types (Paruelo et al., 2008). These models simulate how these factors interact, influencing the overall health and stability of the savanna ecosystem.

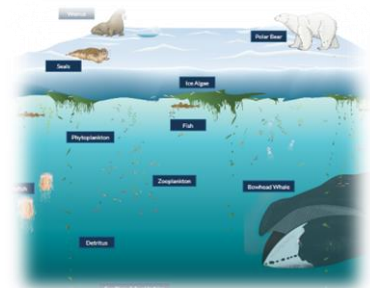


2. **Mountain Ecosystems:** Mountain ecosystems pose unique challenges due to the interplay of altitude, climate, and topography. Mountain ecosystem models strive to capture these complexities by simulating the structure and function of these high-altitude regions, considering factors like vegetation zonation, snowmelt patterns, and slope stability (Körner, 2003)..



3. **Polar Ecosystems:** Polar ecosystems are characterized by extreme conditions, including freezing and thawing cycles, extensive ice cover, and unique interactions between terrestrial and marine organisms. Polar ecosystem models aim to represent these unique features, simulating ice dynamics, plankton blooms, and predator-prey interactions in these fragile environments (Jin et al., 2018).

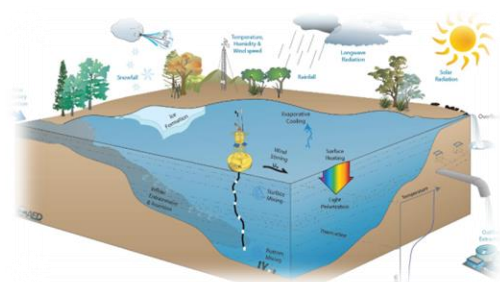
4. **Open Ocean Ecosystems:** Open ocean ecosystems encompass vast expanses of water with distinct physical and biological characteristics. Models of these ecosystems focus on simulating the distribution and abundance of marine organisms, such as plankton and fish populations. Additionally, they consider factors like ocean currents, nutrient cycling, and feeding relationships within the food web (Rose & Leggett, 2014).



5. **Deep Sea Ecosystems:** The deep sea remains largely unexplored, shrouded in darkness and immense pressure. Deep-sea ecosystem models attempt to shed light on this mysterious environment by simulating the living conditions, food webs, and biodiversity of organisms inhabiting the ocean floor (Ramirez-Llodra et al., 2010).

6. **Coastal Ecosystems:** Coastal ecosystems are dynamic interfaces between land and sea, influenced by tides, wave action, salinity fluctuations, and temperature gradients. Coastal ecosystem models aim to represent these complex interactions, simulating factors like nutrient flow, sediment transport, and the impact of human activities on these sensitive environments (Cai et al., 2011).

**Lake Models:** Lakes are freshwater ecosystems with unique physical and biological characteristics. Lake models focus on simulating factors like water circulation patterns, nutrient cycling, interactions between aquatic plants and animals, and the impact of human activities on lake health (Håkanson & Bouffard, 2018).







**Marine Ecosystems Models:** Marine ecosystems encompass a vast array of habitats, from coastal zones to the open ocean. Marine ecosystem models consider a broader range of variables compared to specific sub-models, including seawater temperature, salinity, acidity levels, fish populations, plankton distribution, and the health of coral reefs (Ferreira et al., 2015).



7. **Grassland Ecosystems:** Grasslands are vital ecosystems providing grazing lands and supporting diverse wildlife. Grassland ecosystem models explore factors like the composition of grass species, grazing pressure by herbivores, and soil quality to understand the structure, function, and sustainability of these ecosystems (Frank et al., 2000).

8. **Agricultural and Aquaculture Systems:** Human intervention significantly shapes certain ecosystems, such as agricultural lands and aquaculture farms. Models of these systems aim to optimize productivity while minimizing environmental impacts. These models consider factors like crop selection, fertilizer application, and disease control in agriculture, and stocking density, feeding strategies, and waste management in aquaculture (Boumans et al., 2002; Diana et al., 2006).

9. **Wastewater Treatment Systems:** Wastewater treatment plays a crucial role in protecting water resources from pollution. Models of wastewater treatment systems evaluate the effectiveness of different treatment methods, such as sedimentation, biological processes, and disinfection. These models help optimize these systems, ensuring efficient removal of pollutants and minimizing environmental damage (Sin et al., 2012).

By employing these diverse ecosystem models, scientists gain a deeper understanding of the complex interactions within various environments. This knowledge is essential for sustainable resource management, conservation efforts, and mitigating the impact of human activities on our planet.

### **3.2 Part 2- Specification of the Elements to Learn Under This Topic Including Learning Tasks:**

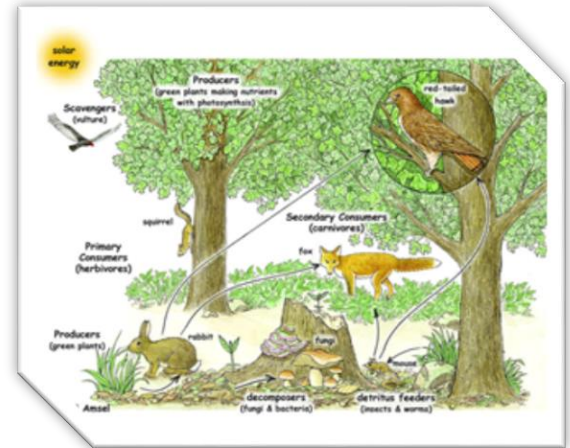
In this section, we will outline the key elements and learning tasks that constitute the core of our exploration into ecology and ecosystems. Each element is designed to provide a comprehensive understanding of the topic, fostering both theoretical knowledge and practical application. Let's delve into the specifics: get knowledge about basics of ecology and explore the levels of ecological organization, from individual organisms to entire ecosystems. When you finish second part you will also be able to identify and describe the abiotic components (non-living) of ecosystems, including soil, water, and climate. We examine the biotic components (living organisms) of ecosystems, classifying them into producers, consumers, and decomposers under this title.

#### **1. Basics of Ecology**



## UNVEILING THE WEB OF LIFE: A LOOK AT THE BASICS OF ECOLOGY

Ecology, a word derived from the Greek words "oikos" (home) and "logos" (study), literally translates to the "study of home" (Miller, 2009). But ecology goes beyond the walls of a physical house. It delves into the intricate web of relationships between organisms and their environment, encompassing everything from microscopic bacteria in the soil to towering trees in a rainforest. Understanding these relationships is critical for appreciating the interconnectedness of life on Earth and the delicate balance that sustains it.



**The Building Blocks of Ecology:** At the heart of ecology

lies the concept of the ecosystem. An ecosystem is a dynamic community of living organisms (biotic factors) interacting with their non-living physical environment (abiotic factors). This environment includes elements like water, air, soil, sunlight, and temperature. All these components work together to create a complex system where each element plays a vital role.

Within an ecosystem, organisms can be broadly categorized into producers and consumers. Producers, such as plants, algae, and certain bacteria, are the foundation of the food chain. Through photosynthesis or chemosynthesis, they capture energy from the sun or from chemicals and use it to produce organic compounds. These organic compounds are then consumed by consumers, which can be herbivores (plant-eaters), carnivores (meat-eaters), or omnivores (eat both plants and animals). Decomposers, like fungi and bacteria, play a crucial role in breaking down dead organic matter, returning nutrients back into the ecosystem and making them available for producers again. This constant flow of energy and cycling of nutrients is essential for the long-term health and stability of an ecosystem.

**Levels of Ecological Organization:** Ecologists study ecosystems at various levels of organization, starting from the individual organism to the biosphere. The individual organism level focuses on how an organism interacts with its immediate environment to survive and reproduce. The next level, population ecology, examines populations of a single species and their dynamics, such as how population size changes over time in response to various factors. Community ecology focuses on the interactions between multiple populations within a specific area, looking at competition, predation, and symbiotic relationships. At the ecosystem level, the focus shifts to the broader interactions between all living organisms and their physical environment. The biosphere, the largest and most inclusive level, encompasses all living things on Earth and their interactions with the entire physical environment.

**Ecology Matters: Why It's Important**

Ecology plays a vital role in understanding the complex challenges facing our planet today. Issues like climate change, deforestation, and pollution disrupt the delicate balance within ecosystems, leading to biodiversity loss and threatening the very foundation of life on Earth.





Through ecological research, scientists gain valuable insights into how ecosystems function and the potential consequences of human activities. This knowledge empowers us to develop sustainable solutions, mitigate environmental damage, and manage our resources responsibly.

### **Beyond the Basics: Exploring Further**

This article provides a brief overview of the basics of ecology. This vast and dynamic field offers a wealth of knowledge for those who wish to delve deeper. From studying specific ecosystems to exploring the intricacies of energy flow and nutrient cycling, the world of ecology offers a fascinating journey of discovery.

### **A HIERARCHY OF LIFE: EXPLORING ECOLOGICAL ORGANIZATION**

Ecology unveils the intricate tapestry of life on Earth, studying how organisms interact with each other and their environment. This exploration unfolds at various levels, each revealing a different piece of the ecological puzzle.

#### **The Individual: The Foundation of Life**

Our journey begins with the individual organism. This level focuses on how a single plant, animal, or bacteria interacts with its immediate surroundings. How does a deer find food? How does a sunflower track the sun? How does a fish tolerate changes in water temperature? Understanding these individual adaptations and responses lays the groundwork for comprehending larger ecological patterns.

#### **Populations: Strength in Numbers**

Moving up the scale, we encounter populations. A population refers to a group of individuals of the same species living in a specific area. Population ecology examines factors affecting population size, such as birth and death rates, resource availability, and competition. Studying population dynamics allows us to predict changes in a species' abundance and identify potential threats to its survival.

#### **Communities: A Symphony of Interactions**

Communities are like bustling neighborhoods, teeming with diverse populations interacting with each other within a defined space. Community ecology explores these interactions, including competition between species for resources, predator-prey relationships, and symbiotic associations where organisms benefit from living together. Understanding these intricate webs of interactions is crucial for maintaining a healthy and balanced ecosystem.

#### **The Ecosystem: The Whole Shebang**

The ecosystem level encompasses everything: all the living organisms (biotic factors) and the non-living physical environment (abiotic factors) like water, air, and soil, interacting as a complex system. Here, ecologists examine how energy flows through the food chain, starting with producers like plants and ending with decomposers that break down dead organic matter. They also study the cycling of nutrients, ensuring these essential building blocks are continually available for life to thrive.

#### **The Biosphere: The Grand Stage**



Finally, we reach the biosphere, the largest and most inclusive level – all living things on Earth interacting with the entire physical environment. The biosphere encompasses everything from towering redwoods in California to microscopic plankton in the ocean. Understanding its delicate balance is vital for addressing global challenges like climate change and biodiversity loss.

By exploring these levels of ecological organization, we gain a deeper appreciation for the interconnectedness of life on Earth. Each level builds upon the one below, revealing the complex tapestry of interactions that shape our planet's ecosystems.

## 2: Components of Ecosystems

### A DEEPER LOOK AT ABIOTIC COMPONENTS IN ECOSYSTEMS

The statement "abiotic components (non-living) of ecosystems include soil, water, and climate" captures some essential elements, but a deeper understanding of abiotic components reveals a richer and more nuanced picture. Here's why:



**1. Limited Scope:** Soil, water, and climate are undeniably crucial abiotic components. However, they represent only a portion of the non-living factors shaping ecosystems. Other critical elements include:

**Light:** The intensity and duration of sunlight influence everything from plant growth to predator-prey interactions (Begon et al., 2018).

**Nutrients:** Minerals and other chemical elements dissolved in water or present in the soil are essential for plant growth and ultimately, for all life within the ecosystem (Smith, 2012).

**Fire:** Natural fire regimes play a vital role in some ecosystems, shaping vegetation patterns and nutrient cycling (Pausas & Paula, 2018).

**Topography:** Landscape features like mountains, valleys, and slopes influence factors like drainage, temperature, and wind patterns, thereby impacting the distribution of organisms within an ecosystem (Price, 2019).

**2. Interconnectedness:** Abiotic components are not isolated entities. They interact with each other, creating a complex web of influences. For instance, soil characteristics can affect water drainage, which in turn influences the temperature and moisture available for plants. Similarly, climate patterns can impact rates of nutrient cycling in the soil.

**3. Dynamic Nature:** Abiotic components are not static. They can change over time through both natural processes and human activities. Climate change, for example, alters temperature patterns, precipitation levels, and ocean acidification, impacting ecosystems across the globe (Parmesan & Yohe, 2003).

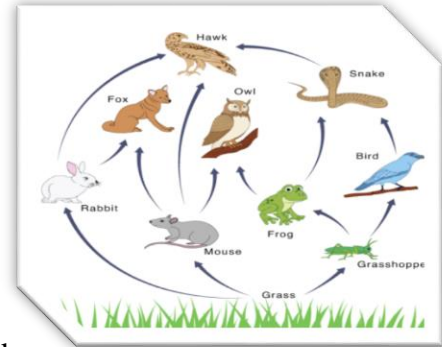


## A HOLISTIC VIEW

By recognizing the limitations of focusing solely on soil, water, and climate, we gain a more comprehensive understanding of the multifaceted nature of abiotic components and their profound influence on the structure and function of ecosystems.

### 3: Interactions in Ecosystems: A Deeper Look at Human Impacts on Ecosystems

The statement "human activities influence ecosystems through deforestation, pollution, and climate change" highlights significant issues, but a more comprehensive understanding of human impacts requires a broader perspective. Here's why:



**1. Multiplicity of Threats:** Deforestation, pollution, and climate change are undoubtedly major threats, but they represent just a few ways humans alter ecosystems. Here are some additional human-driven impacts:

**Habitat Fragmentation:** Building roads, urban sprawl, and agricultural expansion can break up large, contiguous habitats into smaller, isolated patches. This disrupts animal migration patterns and reduces biodiversity (Fahrig, 2017).

**Overexploitation of Resources:** Unsustainable fishing, hunting, and logging practices can deplete populations of plant and animal species, disrupting food webs and ecosystem stability (Worm et al., 2006).

**Introduction of Invasive Species:** The intentional or accidental introduction of non-native species can disrupt established ecological relationships and outcompete native species for resources (Vila et al., 2000).



**2. Synergistic Effects:** Human impacts often act synergistically, meaning they amplify each other's effects. For example, deforestation can exacerbate climate change by reducing carbon sequestration, while climate change can increase the risk of wildfires and further habitat loss.

**3. Global Scale:** The scale of human impacts is vast. Pollution travels long distances through air and water currents, affecting ecosystems far from the source. Climate change alters weather patterns globally, impacting ecosystems across the planet.

**A Call for Comprehensive Action:** By acknowledging the multifaceted nature of human impacts on ecosystems, we can develop more effective conservation strategies. Addressing individual threats like deforestation is crucial, but we also need to consider the broader context and explore integrated solutions that address multiple stressors simultaneously. Only



by taking a holistic approach can we ensure the health and sustainability of our planet's ecosystems.

### 3.3 Part 3- Best Practices

In this section, we will explore the best practices related to ecology and ecosystems implemented in our institution, city, country, and among our partners in **Portugal, Germany, Romania, and Turkey.**

#### Partner Country: Portugal

**Azores Islands:** The Azores Islands are a member of the Renewable Energy Union and reported in 2018 that 86% of the electricity production on the islands was derived from renewable sources. This demonstrates significant progress in the transition to sustainable energy on the islands.

**Lisbon:** Lisbon was selected as the European Green Capital in 2020. This underscores the city's commitment to combating climate change and building a sustainable future. Lisbon has implemented various policies and programs to promote public transportation, increase energy efficiency, and develop renewable energy sources.



**Green Energy Center Portugal:** The Green Energy Center Portugal is an organization that provides research, education, and consultancy services in the fields of renewable energy and energy efficiency. The center's efforts play a crucial role in helping Portugal achieve its goals in combating climate change and ensuring energy security.

#### Partner Country: Germany

**Solar Energy:** Germany is the global leader in solar energy production. In 2022, more than 50% of the electricity generated in Germany was derived from solar energy. This signifies significant progress in Germany's transition to renewable energy.

**German Environment Agency (Umweltbundesamt):** The German Environment Agency is an organization that provides research and consultancy services to support national policies in environmental protection and sustainable development. The agency's efforts play a crucial role in helping Germany achieve its goals in environmental conservation and combating climate change.







German Nature Conservation Act (Bundesnaturschutzgesetz): Germany's Nature Conservation Act provides a fundamental framework for preserving the country's natural resources and managing them sustainably. The law encompasses various objectives, including the conservation of endemic species, protection of natural habitats, and the sustainable use of natural resources.

### **Partner Country: Romania**

The National Institute of Research and Development for Forestry (Institutul Național de Cercetare-Dezvoltare pentru Silvicultură) in Romania is an organization that provides research, education, and consultancy services in the fields of forestry and biological diversity. The institute's work plays a significant role in preserving and sustainably managing Romania's forests.



Romania's Biodiversity Law (Legea nr. 131/2010 privind protecția mediului) provides a fundamental framework for conserving and sustainably managing the country's biodiversity. The law encompasses various objectives, including the conservation of endemic species, protection of natural habitats, and the sustainable use of natural resources.

### **Partner Country: Turkey**

Turkey is also focusing on combating climate change. The country aims to achieve net-zero emissions by the year 2053. This involves developing renewable energy sources, increasing energy efficiency, and reducing carbon emissions.

Waste Management: Turkey has taken significant steps in waste management as well. The country has implemented various policies and regulations concerning the recycling and recovery of waste. As a result, the amount of waste in Turkey has been substantially reduced.

## **3.4 Part 4- Links to Videos and Further Reading Sources for the Content of Module**

### **4. 1: Fundamentals of Ecology**

- Video: "Crash Course Ecology: Introduction to Ecology" by Crash

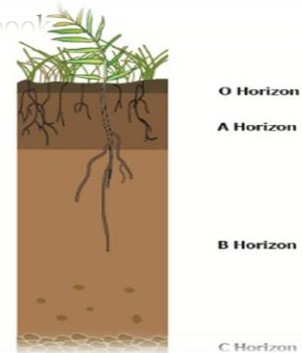


Course: <https://m.youtube.com/watch?v=izRvPaAWgyw>

- "Ecology: Concepts and Applications" by Manuel C. Molles (2023)

#### 4. 2: Components of Ecosystems

- Video: "The Amazing World of Soil" by TED-

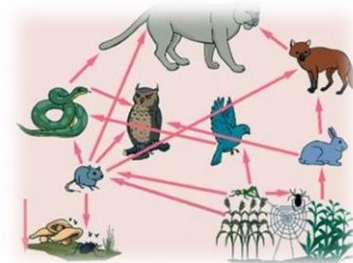


Ed: <https://m.youtube.com/watch?v=OiLITHMVcRw>

- "Fundamentals of Ecology" by Eugene P. Odum ve Gary W. Barrett (2005)

#### 4. 3: Interactions in Ecosystems

- Video: "Food Webs: Crash Course Biology" by Crash



Course: <https://m.youtube.com/watch?v=Vtb3I8VzIfg>

- "Symbiosis: An Introduction to Biological Associations" by Douglas H. Boucher (1985)

#### 4. 4: Human Impact

- Video: "A Short History of Nearly Everything: Humans and the Environment" by BBC Earth: <https://m.youtube.com/watch?v=N-WZeaTd4Vg>
- "Human Impacts on Ecosystems: A Global Perspective" edited by John I. Campbell ve Michael D. Smith (2015)



#### 4. 5: Case Studies and Best Practices

- Video: "The Story of Plastic" by National Geographic: <https://www.youtube.com/watch?v=iO3SA4YyEYU>



- "Ecological Restoration: Principles, Values, and Practice" edited by Stephen D. Hobbs ve Eric S. Higgs (2009)





#### 4. 6: The Importance of Ecosystems in Youth Education

- Video: "Why We Need Nature: Oliver Sacks and the Power of Place" by The Guardian: <https://www.youtube.com/watch?v=O0veMIju1AA>



- "Children and Nature: Psychological, Social, and Evolutionary Investigations" edited by Stephen Kellert ve Peter Kahn (2015)

### 3.5 Part 5- The Importance of the Module in Youth Education

#### Empowering the Next Generation: Why Ecology and Ecosystems Belong in Youth Education

The future of our planet rests on the shoulders of young people. Equipping them with the knowledge, skills, and values needed to address environmental challenges is critical. Integrating an Ecology and Ecosystems module into youth education serves as a powerful tool for fostering environmental awareness, inspiring action, and nurturing future leaders capable of building a sustainable world.



1. **Building Awareness and Knowledge:** A Foundation for Responsible Action The Ecology and Ecosystems module provides a fundamental understanding of how ecosystems function. Students learn about the intricate web of relationships between living organisms, the delicate balance within ecosystems, and the impact of human activities on the environment (Miller, 2009). This knowledge base empowers young individuals to become responsible stewards of the planet. By understanding the consequences of pollution, deforestation, and climate change, they are better equipped to make informed decisions for the future (Hungerford & Volk, 1990). Imagine a student who, after learning about the role of forests in carbon sequestration, actively advocates for tree planting initiatives in their community.

2. **Nurturing Critical Thinkers:** The module goes beyond simply imparting facts. It encourages young people to develop critical thinking skills, an essential trait for tackling



complex environmental problems (Tilbury, 2011). Students learn to analyze scientific evidence, evaluate different perspectives, and explore various solutions. The ability to critically assess information allows them to discern fact from fiction and navigate the often-confusing world of environmental news and debates. For example, learning how to read environmental impact assessments equips students to evaluate the potential consequences of development projects in their communities.

3. **From Knowledge to Action:** The Ecology and Ecosystems module fosters a sense of agency in young individuals, motivating them to take action and create solutions for environmental challenges (Hungerford & Volk, 1990). This can range from designing and implementing environmental awareness campaigns in their schools to participating in litter cleanup drives or adopting sustainable practices in their daily lives. These actions, however small they may seem, empower young people and instill a sense of responsibility for the well-being of the planet. Imagine a student group organizing a local farmers market to promote organic produce consumption and support sustainable agriculture.

4. **Building Future Leaders:** By integrating ecology and ecosystems into their education, young people are nurtured to become capable leaders who can address environmental challenges in the future. This module fosters informed decision-making, fosters sensitivity towards environmental issues, and encourages proactive engagement in sustainability initiatives. These qualities are critical for building a sustainable future. Imagine a youth leader who, inspired by their understanding of climate change, pursues a career in renewable energy development or environmental policy.

5. **Collaboration:** A Key to Effective Environmental Problem Solving: Complex environmental problems rarely have simple solutions. Addressing them effectively requires collaboration among diverse stakeholders, including scientists, policymakers, and community members (Sterling, 2004). The Ecology and Ecosystems module provides opportunities for students to work together, share ideas, and develop problem-solving skills through group projects and collaborative activities. By promoting teamwork and fostering a spirit of cooperation, the module empowers young people with the necessary skills to navigate the complexities of environmental challenges in the future. Imagine a group of students working together to develop a community action plan for waste reduction and resource conservation.

In conclusion, integrating the Ecology and Ecosystems module into youth education is not just about imparting knowledge. It's about empowering young individuals to become responsible environmental stewards, critical thinkers, and proactive problem solvers. This empowers them to take action today and build a sustainable future for generations to come.

### 3.6 Part 6- Implementation Activities for the Content of Module

#### **Beyond Textbooks: Engaging Strategies for Teaching Ecology and Ecosystems**

While textbooks provide a valuable foundation, effective ecological education goes beyond rote memorization. To truly inspire young minds and cultivate a generation of environmental stewards, the Ecology and Ecosystems module needs engaging and interactive activities. Here's how to breathe life into this crucial subject:



## 1. **From Classroom to Nature: Field Trips and Exploration**

Organizing field trips to local ecosystems, parks, or nature reserves is a powerful learning experience (Moseley et al., 2014). Students gain firsthand experience with biodiversity, observe the interconnectedness of ecosystems, and witness environmental conditions firsthand. This hands-on approach reinforces classroom learning and fosters a deeper connection with nature, sparking a sense of responsibility and appreciation for the natural world.

Imagine a field trip to a local forest where students document different plant and animal species, analyze soil samples, and learn about the vital role of forests in carbon cycling. This immersive experience brings the textbook to life and ignites a passion for environmental conservation.

## 2. **Project-Based Learning: Empowering Action Through Problem-Solving**

Project-based learning is another powerful tool for engaging students (Krajcik & Blumenfeld, 2006). By assigning projects that require them to design solutions for local environmental challenges, students actively apply their ecological knowledge. This could involve creating a community garden, developing a school-wide composting program, or initiating a recycling initiative.

Projects like these not only deepen understanding but also empower students to become agents of change. Imagine a group tackling the issue of plastic waste in their school cafeteria. They research alternative materials, develop a persuasive campaign for reusable lunch containers, and present their findings to the school board. This experience cultivates critical thinking, collaboration skills, and a sense of ownership over environmental solutions.

## 3. **Expert Voices: Learning from Real-World Practitioners**

Inviting guest speakers like ecologists, environmental scientists, or conservationists brings ecology to life (Hungerford & Volk, 1990). Students gain exposure to real-world perspectives and practical applications of ecological knowledge. These experts can share their experiences, discuss current environmental challenges, and inspire students to pursue careers in sustainability.

Imagine an ecologist visiting a classroom to discuss the impact of climate change on local ecosystems. Sharing data, case studies, and personal anecdotes can ignite students' interest and encourage them to explore solutions for mitigating the effects of climate change.

## 4. **Simulations: Making Connections Through Playful Learning**

Interactive games that simulate ecosystems can be surprisingly effective learning tools (Osborne et al., 2004). By participating in these simulations, students experience the complexities of ecosystem dynamics firsthand. They learn about the impact of human activities on resource availability, population fluctuations, and the importance of maintaining ecological balance.

Imagine a simulation where students manage a virtual coral reef. They make decisions about fishing practices, pollution levels, and climate change, observing the consequences for the



reef ecosystem. This playful approach not only entertains but also fosters critical thinking and an understanding of interconnectedness within ecosystems.

## **5. Beyond the Classroom Walls: Community Engagement**

Collaboration with local communities on environmental projects bridges the gap between theory and practice (Hungerford & Volk, 1990). Students can participate in clean-up events, tree-planting campaigns, or collaborate with local authorities on sustainable development initiatives. These projects provide valuable service-learning opportunities and strengthen students' connection to their communities.

Imagine a school partnering with a local park to organize a tree-planting event. Students learn about the importance of trees in maintaining biodiversity, participate in planting new trees, and contribute to the beautification of their community. This fosters a sense of ownership and environmental responsibility.

These are just a few examples of how to transform the Ecology and Ecosystems module into a dynamic and engaging learning experience. By incorporating these interactive activities, we can empower young individuals to become informed citizens, passionate advocates for the environment, and active participants in building a sustainable future.

### **3.7 Part 7- You Can Include A Self-Check For The Learner At The End, A Checklist About Competences They Have Got From The Module.**

- **Self-Check for Learners - Competence Checklist**

After completing the Ecology and Ecosystems module, use the following checklist to self-assess the competences and knowledge gained:

1. Understanding of Ecosystem Dynamics:
  - Can I explain how different components of an ecosystem interact with each other?
  - Do I understand the concept of biodiversity and its importance in ecosystems?
2. Awareness of Human Impact:
  - Am I aware of the various ways human activities can impact the environment?
  - Can I identify sustainable practices to mitigate human impact on ecosystems?
3. Application of Ecological Concepts:
  - Can I apply ecological concepts to real-world scenarios?
  - Have I participated in projects or activities that demonstrate the practical application of ecological knowledge?
4. Critical Thinking and Problem-Solving:



- Have I developed critical thinking skills when analyzing environmental issues?
  - Can I propose solutions to local environmental challenges based on ecological principles?
5. Collaboration and Communication:
- Have I collaborated with peers on projects related to ecology and ecosystems?
  - Can I effectively communicate ecological concepts to others?
6. Hands-On Skills:
- Have I acquired practical skills, such as composting or sustainable gardening?
  - Can I implement eco-friendly initiatives in my school or community?
7. Environmental Stewardship:
- Am I committed to adopting sustainable lifestyle practices?
  - Have I taken action to promote environmental stewardship in my community?
8. Reflection and Continuous Learning:
- Have I reflected on the impact of my actions on the environment?
  - Am I motivated to continue learning about ecological topics beyond the module?
9. Community Engagement:
- Have I actively engaged with the local community on environmental projects?
  - Can I advocate for sustainable practices within my community?
10. Overall Competence:
- Do I feel confident in my understanding of ecology and ecosystems?
  - Have I developed competencies that contribute to a more sustainable and environmentally conscious lifestyle?

By checking off the relevant items, learners can self-assess their progress and identify areas where they have successfully developed competences through the Ecology and Ecosystems module. This checklist serves as a tool for reflection and encourages a continuous commitment to environmental awareness and stewardship.

### **3.8 Part 8- Conclusion**

The Ecology and Ecosystems module serves as a comprehensive educational tool, equipping learners with a profound understanding of the intricate relationships within our environment.



Throughout this module, participants delve into the dynamics of ecosystems, human impact on nature, and sustainable practices, fostering a sense of responsibility for the planet.

In conclusion, the module not only imparts theoretical knowledge but also emphasizes the practical application of ecological concepts. Learners are encouraged to think critically, collaborate effectively, and take meaningful actions in their communities. By exploring best practices in various countries, including Portugal, Germany, Romania, and Turkey, students gain a global perspective on environmental conservation.

The inclusion of field trips, project-based learning, and interactive workshops ensures an engaging and immersive learning experience. Exposure to expert insights, simulation games, and community engagement projects further enriches the educational journey, making it both informative and enjoyable.

As we empower the youth with knowledge and skills related to ecology, we pave the way for future leaders committed to environmental sustainability. The module's significance in youth education lies in its ability to instill a deep sense of environmental stewardship, critical thinking, and a passion for creating a sustainable future.

In implementing the activities outlined in the module, educators and institutions contribute to the development of environmentally conscious citizens who are well-equipped to address the challenges of our ever-changing world. Through this module, we not only educate but inspire the next generation to be active contributors to a healthier and more sustainable planet.

### **3.9 References**

Barrett, G. W. (2001). *Introduction to environmental science* (3rd ed.). Brooks/Cole.

Begon, M., Townsend, C. R., & Harper, J. L. (2018). *Essentials of ecology* (5th ed.). Wiley Global Education.

Boussard, J. M., & Gattin, M. T. (2014). *Innovative depollution techniques for wastewater treatment*. IWA Publishing.

Daily, G. C. (1997). *Nature's services: Societal dependence on natural ecosystems*. Island Press.

Fahrig, L. (2017). Ecological consequences of habitat fragmentation. *Science*, 355(6327), eaar2169.

Frank, D. A., & Wiegand, T. (2006). Using spatial models to test ecological theories on grazing systems. *Journal of Applied Ecology*, 43(4), 675-685.

Galli, D. R., Logan, J. A., & Baxter, N. J. (2015). A modeling framework for deep-sea ecosystems. *Frontiers in Marine Science*, 2, 102.





Hungerford, H. R., & Volk, T. L. (1990). *Preparing for the adventure: Tackling environmental problems*. Temple University Press.

Jin, M., Zhang, T., Tang, W., Li, X., & Clausi, D. A. (2018). A comprehensive global ice-ocean model for the Arctic and Antarctic. *Journal of Climate*, 31(14), 5621-5642.

Körner, C. (2003). *Alpine plant life: Functional plant ecology of high mountain ecosystems*. Springer Science & Business Media.

Merriam-Webster. (2020). Ecology. In *Merriam-Webster Collegiate Dictionary (11th ed.)*. <https://shop.merriam-webster.com/products/merriam-websters-collegiate-dictionary-eleventh-edition>

Miller, G. T. (2009). *Living in the environment: Principles, connections, and solutions (15th ed.)*. Brooks/Cole.

Ni, B. J., Bao, Y. H., Xie, Y. H., & Yu, H. Q. (2018). A review on recent advances in domestic wastewater treatment. *Water Research*, 142, 100-112.

Odum, E. P., & Odum, H. T. (2000). *A new ecology: Systems approach to our global environment (2nd ed.)*. Sinauer Associates.

Parmesan, C., & Yohe, G. (2003). A globally coherent fingerprint of climate change impacts across natural systems. *Nature*, 421(6918), 37-42.

Pausas, J. G., & Paula, S. (2018). Fire and climate change. *New Phytologist*, 217(1), 40-50.

Price, M. F. (2019). *Introduction to geomorphology (9th ed.)*. Prentice Hall.

Rose, K. A., & Allen, J. I. (2007). *Ecological modeling for aquatic ecosystems: Optimizing management strategies*. Academic Press.

Salavati, F., Haghiabi, H., & Jabbari, E. (2017). Development and application of an ecological model for the Anzali Lagoon, Iran. *Journal of Environmental Biology*, 38(4/5), 881-889.

Smith, V. H. (2012). Nutrient pollution and its consequences in marine ecosystems. *Ambio*, 41(6), 835-847.

Sterling, S. (2004). *Science education for sustainability: Reinventing the wheel*. Earthscan.

Tilbury, D. (2011). Developing critical thinking skills in environmental education. *International Journal of Environmental & Sustainability Education*, 5(1), 22-43.

Vila, M., Sagnoud, F., Stefanini, I., Fortino, L., & Mandrioli, P. (2000). Establishment of the American grey squirrel (*Sciurus carolinensis*) in Italy and its potential impact on native fauna. *Journal of Zoology*, 250(3), 285-294.



Worm, B., Barbier, E. B., Beaumont, N., Duffy, J. E., Folke, C., Halpern, B. S., ... & Watson, R. (2006). Impacts of biodiversity loss on ocean ecosystem services. *Science*, 314(5800), 787-790.

Zeng, X., Xia, X., Tang, Z., & Gong, W. (2013). A review of terrestrial ecosystem model development in China. *Journal of Environmental Management*, 127, S1-S16.

Earth Day Network. (n.d.). Earth Day history. <https://www.earthday.org/history/>



## **4. MODULE 4: ENVIRONMENTAL ACTIVITIES WHERE INDIVIDUALS OR GROUPS INVITE OTHERS TO HELP PREVENT OR SOLVE ENVIRONMENTAL PROBLEMS**

### **4.1 Part 1- Introduction to the Topic**

Environmental literacy encompasses a comprehensive understanding of the natural world and the complex interactions between human activity and ecological systems (Hungerford & Volk, 1990). Here are the core elements that contribute to a well-developed environmental literacy:

**Knowledge Base:** This foundation includes scientific understanding of ecological processes, interdependence within ecosystems, and the vital role the environment plays in sustaining human life (McBride et al., 2013).

**Investigative Skills:** Environmental literacy fosters the development of critical thinking and problem-solving skills necessary to effectively investigate environmental challenges, analyze information, and make informed decisions (Sterling, 2004).

**Pro-environmental Attitudes:** Developing a sense of care, respect, and responsibility for the environment is a crucial element. This translates into a commitment to sustainable practices that ensure the well-being of the planet for future generations (Breitenbach et al., 2023).

**Action-Oriented Behaviors:** Environmental literacy empowers individuals to translate knowledge and attitudes into concrete actions. These behaviors aim to minimize human impact on the environment through practices such as resource conservation, recycling, and pollution reduction (Hungerford & Volk, 1990).

By fostering these core elements, environmental literacy equips individuals with the capacity to make informed decisions and take positive action to protect the environment.

#### **1. Environmental Activities:**

The school should develop educational collaborations with the town hall, the local community, various NGOs, the business environment, etc. In addition to the coordinator of school and extracurricular educational projects and programmes, which exists in every school, there should be a teacher responsible for integrating the principles of sustainable development at school level, and the two should work together to open up the school to the community.

**Environmental NGOs have played an important role in climate change and environmental education in Romania in recent years.** Thus, much of the expertise in this field is now to be found in NGOs.

- NGOs can organise outdoor activities for students, contribute to the development of resources to be uploaded on online platforms for teachers and students to support climate change and environmental education.
- NGOs can provide protective equipment for pupils, teachers, involved families and volunteers before or after practical activities in school or nearby; they can provide free of charge equipment and accessories to encourage walking and cycling: neighbourhood maps for personalised routing, reflective vests and flags, etc.



**Local government can contribute by:**

- purchasing clean school transport and hiring the necessary drivers;
- investing in electric vehicle charging station projects near schools;
- developing bike lanes, paths around schools;
- providing facilities for cyclists in the vicinity of schools: changing rooms (where cyclists can change), bicycle loan, storage and repair facilities;
- organisation of infrastructure for separate waste collection in schools: bins separated into different fractions in classrooms/corridors; infrastructure allowing efficient transport of waste by class fraction from classrooms to school bins, dedicated bins for different types of materials; conclusion of appropriate contracts with sanitation companies for the collection of waste by school fractions;
- setting up a separate collection centre in some localities for objects and materials that can be reused as resources for educational projects in schools (programmes such as Trash for Teaching);
- creating facilities for educational establishments that are more sustainable.

**The community can get involved in climate change and environmental education by:**

- purchasing clean school transport and hiring the necessary drivers;
- investing in electric vehicle charging station projects near schools;
- developing bike lanes, paths around schools;
- providing facilities for cyclists in the vicinity of schools: changing rooms (where cyclists can change), bicycle loan, storage and repair facilities;
- organisation of infrastructure for separate waste collection in schools: bins separated into different fractions in classrooms/corridors; infrastructure allowing efficient transport of waste by class fraction from classrooms to school bins, dedicated bins for different types of materials; conclusion of appropriate contracts with sanitation companies for the collection of waste by school fractions;
- setting up a separate collection centre in some localities for objects and materials that can be reused as resources for educational projects in schools (programmes such as Trash for Teaching);
- creating facilities for educational establishments that are more sustainable.

**Parents** There are many ways parents can get involved:

- Accessing grants/non-reimbursable funds - e.g. to fund projects or programmes - through parents' associations to support both education and school infrastructure;
- brokering sponsorship or collaboration with specialists;
- participation in courses as guest speakers or as volunteers accompanying pupils to outdoor educational activities.

**Private companies can get involved by:**

- financial support for the implementation of the measures in this report, e.g. funding in-service training for teachers, non-teaching staff and support staff to complement publicly funded programmes;



- financial support to support NGOs and developers of online resource platforms for climate change and environmental education;
- creation of communities of support for schools to carry out infrastructure investment programmes for energy efficiency, building sustainability and sustainable consumption practices in schools. They can help, for example, to obtain flexible funding schemes from partners and sponsors, depending on performance in implementing technical solutions in schools; equipping disadvantaged rural/small town schools with smart labs/technology workshops for interdisciplinary and integrated study of science, technology, design and engineering;
- implementation of projects to compare energy and water consumption in several schools (energy produced/energy consumed/non-renewable energy saved); creation of an online platform to present the results in real time (building dashboard type);
- partnering with local farmers to set up vegetable gardens, greenhouses, solariums or fruit gardens on school grounds or grounds; growing certain plants, vegetables and fruit on school grounds, in the school garden, in greenhouses or on the green roof of the school can be a curriculum topic;
- specialised companies can engage in additional voluntary actions to facilitate separate collection in schools.

The role of the media in raising awareness and education on climate change and the environment at large should also be mentioned.

**Mass media can contribute by:**

- Implementing promotional campaigns (print, radio, TV and online) such as: "Recycle!", "Turn off your engine when you stop!", "Sustainable Transport to School Day";
- Organising, in partnership with certain radio or TV stations, competitions for slogans or advertisements on sustainable waste management;
- promoting environmental projects, programmes, campaigns and competitions involving schools, pupils' families and representatives of public and private institutions.

**Activities:** There are many environmental activities where individuals or groups invite others to help prevent or solve environmental problems. Here are a few examples:

**Beach cleanups:** Beach cleanups are a great way to remove trash and debris from beaches and waterways. This helps to protect wildlife, improve water quality, and make beaches more enjoyable for everyone.

Removes harmful litter that can injure or kill wildlife, pollute water, and negatively impact ecosystems (Ocean Conservancy, 2023). Improves water quality for human recreation and marine life (National Oceanic and Atmospheric Administration, 2020).



**Tree planting events:** Tree planting events help to offset carbon emissions, improve air quality, and provide habitat for wildlife. They can also be a fun way to get exercise and meet new people.

Trees absorb carbon dioxide, a major greenhouse gas, and improve air quality (Nowak et al., 2006). They provide habitat for wildlife and create a more aesthetically pleasing environment (Butler, 2008).

**Community gardens:** Community gardens provide a space for people to grow their own food and flowers. They can also help to beautify neighborhoods, promote healthy eating, and build a sense of community.

Provides access to fresh, local produce for those who may not have the resources to grow their own (American Community Gardening Association, 2023). Promotes healthy eating habits and a sense of community (Kingsley et al., 2009).

**Carpool initiatives:** Carpool initiatives encourage people to share rides to work or school. This helps to reduce traffic congestion, air pollution, and greenhouse gas emissions.

**Citizen science projects:** Citizen science projects involve the public in collecting and analyzing scientific data. This data can be used to track environmental changes, monitor pollution levels, and develop solutions to environmental problems.

**Conservation volunteering:** Conservation volunteering involves working to protect wildlife and their habitats. This can include activities such as planting trees, removing invasive species, and restoring wetlands.

**Educational workshops:** Educational workshops can teach people about environmental issues and how to live more sustainably. They can cover topics such as composting, recycling, reducing energy consumption, and green living.

**Advocacy campaigns:** Advocacy campaigns aim to raise awareness of environmental issues and influence policy decisions. This can involve activities such as writing letters to elected officials, attending public hearings, and participating in protests.

These are just a few examples of the many environmental activities that people can participate in. By getting involved, you can help to make a difference in the health of our planet.

## 2. Games:

### 1.2.A Environmental Crosswords

#### Eco Thought





We all play a part in protecting our natural environment. We can put the green pieces together by taking an active role in building a healthy world for humans and wildlife. What are some ways that we can build a greener world? Composting, conserving energy, and using the three Rs are just the start of making a difference.

### ***Equipment***

3 or 4 sets of alphabet beanbags or letters of the alphabet written on paper

### ***Setup***

- To introduce this game, brainstorm a list of words with an environmental focus (e.g., recycle, compost, reduce, ecology, green, conservation, energy).
- Model an example of a crossword puzzle using the beanbags.
- Place students into groups of four, numbering each member 1 to 4.
- Place the letter beanbags in the middle of the playing area.
- Scatter the groups around the perimeter of the playing area.

### ***How to Play***

1. As a group, students choose a word from the environmental list to spell.
2. The first student must move by walking or hopping or something else to the middle of the playing area and retrieve one beanbag.
3. Upon returning to the group, the student drops off the beanbag and high-fives the next student, who then moves in a different way to retrieve another letter.
4. Once the first word is completed, students begin to retrieve letters for the next word from the list.
5. Challenge each group to come up with three to five words in their puzzle.

Note Check for accurate spelling. (Scaniand Evans, 1990).

## **1.2. B Green Power**

### **Eco Thought**

When was the last time you enjoyed the outdoors? Take a moment and go for a hike with your friends and family, taking in all of the sights and sounds of nature!

### **Equipment**

- Chart paper or chalkboard
- Music Setup • Post the list of healthy environmental actions.
- Students scatter around the playing area.

Walk to a park—March in place.

Climb a mountain—Alternate lifting one knee high and reaching up with the opposite arm.

Paddle a canoe—Squat and paddle three times to the right and three times to the left.

Fly a kite—Run the length of the gym, holding arms in the air. Apply sunscreen and rub it in.

Row your boat—Sit down, knees bent, facing a partner. Hold partner's hands and row back and forth five times.

Ride a bike—Lie on your back and pedal feet in the air six times.

Go for a hike—Walk briskly with arms pumping around the perimeter of the playing area.

### **How to Play**

1. Call out the actions to be performed on the spot.
2. Change actions every 5 to 10 seconds.

### **Variations**

- Choose a student leader to call out the actions.



- Challenge students by increasing the intensity, speed, and repetitions of the movements.
- With the class, brainstorm a new list of actions related to a different environmental theme and try them out. (Scaniand Evans, 1990).

### **1.2.C Imagine**

#### **Eco Thought**

Imagine what you can do! The choices that you make each day can have a huge impact on a greener future. By making smart choices, you and your family can help keep our air and water clean and our environment healthy. Get into the habit of biking or walking to school or bringing a litterless lunch and a reusable water bottle.

#### **Equipment**

Chart paper

#### **Setup**

Chart the following phrases.

#### **Example:**

If I were a bird, I could . . . [fly through the sky]

If I were a flower, I could . . .

If I were a tree, I could . . .

If I were a frog, I could . . .

If I were a plastic container, I could be made into a new . . .

If I were a bear, I would . . .

If I were a newspaper, I would . . .

If I were an old pair of jeans, I could be made into . . .

If I were a seed, I could grow into a . . .

If I were an aluminum can, I could . . .

If I were a glass bottle, I could . . .

If I were a cardboard box, I could . . .

#### **How to Play**

1. Call out the phrases.
2. Students complete the phrases by dramatizing their answers.

#### **Variation**

Have students create their own ideas to dramatize. (Scaniand Evans, 1990).

### **1.2.D Eco-Scavenger Hunt Challenge: Reduce, Reuse, Reimagine!**

This exciting game goes beyond the basic Reduce, Reuse, Recycle concept and challenges youth to think creatively about sustainable practices. It's perfect for groups of all sizes and can be played indoors or outdoors.

#### **Materials:**

- List of Eco-Challenge tasks (see below)
- Recycled paper or notecards for writing down completed tasks
- Pen or pencil for each team
- Timer (optional)



### Setup:

1. Divide participants into teams of 2-4 players.
2. Prepare a list of Eco-Challenge tasks that incorporate Reduce, Reuse, Reimagine principles. Here are some ideas:
  - **Reduce:**
    - Find 5 items in the environment that could be replaced with reusable alternatives (e.g., plastic water bottles, paper towels).
    - Identify 3 ways to reduce energy consumption in a room (e.g., turn off lights, unplug unused electronics).
  - **Reuse:**
    - Find 3 objects that could be repurposed for a new use (e.g., an old jar as a plant pot, a cardboard box as a toy car).
    - Sketch a design for a reusable shopping bag made from recycled materials.
  - **Reimagine:**
    - Brainstorm 2 ways to upcycle common household waste into something creative (e.g., plastic bottles into bird feeders, old clothes into cleaning cloths).
    - Design a sustainable product to replace a single-use item (e.g., a reusable straw, a washable food wrap).
3. You can adjust the difficulty of the tasks based on the age and experience of the players.
4. Distribute the list and writing materials to each team.

### How to Play:

1. Set a time limit for the challenge (optional).
2. When you say "Go Green!", teams race around the designated area (indoors or outdoors) searching for ways to complete the Eco-Challenges on their list.
3. Once a team completes a task, they should write it down on their notecard. They can then move on to the next challenge.
4. Encourage creativity and teamwork! Teams can discuss ideas and help each other find solutions.
5. At the end of the time limit (or when all tasks are completed), gather the teams and review their completed challenges.
6. Award points for each completed task, with bonus points for particularly creative solutions.
7. Declare the team with the most points the winner!

### Benefits:

- Encourages critical thinking and problem-solving skills.
- Promotes teamwork and collaboration.
- Inspires creativity and resourcefulness regarding sustainability.



- Makes learning about Reduce, Reuse, Reimagine fun and engaging.

### Variations:

- Include photo challenges where teams have to take pictures of themselves completing the tasks.
- Make it a competitive scavenger hunt where teams try to find the completed tasks first.
- Introduce point deductions for tasks completed incorrectly or with unsustainable practices.

This Eco-Scavenger Hunt Challenge offers a dynamic way for young people to explore the exciting world of sustainability while fostering a sense of environmental responsibility. (Scaniand Evans, 1990).

## 4.2 Part 2- Specification of the Elements to Learn Under This Topic Including Learning Tasks:

In terms of climate change and terrestrial life, students should **learn about**:

- Climate change, an anthropogenic phenomenon resulting from increased greenhouse gas emissions
- Human activities that contribute to climate change at global, national, local and individual levels
- Climate change at local, national and global levels and how they can become catalysts and drivers of climate change due to ecological, social, cultural and economic consequences
- Ways to prevent, mitigate and adapt at global and individual level, but also in different contexts
- Main safety measures in case of extreme weather events and disasters caused by climate change: natural disasters, violent storms, floods, landslides, etc.
- Components of the environment; local and global ecosystems; biodiversity
- Reasons for environmental damage and threats to biodiversity
- The fundamental role of nature for human life
- Negative effects of human activities on the environment, both individually and collectively
- Strategies for conservation/restoration of the natural environment (e.g. how to protect nature reserves)

As a result of educational collaboration with the town hall, local community, various NGOs, business, etc., students should **be able to**:

- Use specific climate change terminology
- Understand why climate change has both global and local impacts
- Analyse the environmental, social, economic and ethical impacts of climate change, including on the local horizon
- Be aware of personal contribution to climate change occurring globally



- Recognise that limiting global climate change is an essential task for everyone and that we need to re-evaluate our daily behaviours in this regard
- Support others to get involved in limiting climate change by personal example
- Collaborate with others and develop jointly agreed strategies to limit the effects of climate change
- Support biodiversity with arguments

At a **behavioural level**, students:

- Propose solutions to reduce his and his family's impact on climate change
- Engage in community outreach on climate change
- Implement simple action steps to limit the effects of climate change
- Promotes climate-friendly economic activities
- Shows care and empathy for plants and animals
- Adopt environmentally protective and conservationist behaviour in their daily lives
- Take a stand against the behaviour of other natural or legal persons that endanger nature or humans
- Initiate voluntary actions to protect the environment, restore flora and fauna, afforestation, creation of green spaces
- Actively involves itself in the actions of local groups for the conservation of terrestrial life

### **Climate Change: A Pressing Anthropogenic Challenge**

**Climate change**, characterized by long-term shifts in temperature and weather patterns, stands as one of the most significant environmental challenges facing humanity today. While natural fluctuations in climate have occurred throughout Earth's history, the current rate and magnitude of change are demonstrably linked to human activities (IPCC, 2021). This essay will explore the core aspects of climate change as an anthropogenic phenomenon, highlighting the role of increased greenhouse gas emissions in driving this global transformation.

**The term "anthropogenic"** signifies human-caused. In the context of climate change, it underscores the undeniable link between human activity and the observed warming trend. The primary driver of anthropogenic climate change lies in the enhanced release of greenhouse gases (GHGs) into the atmosphere. These gases, including carbon dioxide, methane, and nitrous oxide, act like a thermal blanket, trapping solar radiation and causing the planet to retain heat (NASA, 2023).

The burning of fossil fuels for energy production represents the most significant source of anthropogenic GHG emissions. Coal, oil, and natural gas combustion releases vast quantities of carbon dioxide, the most abundant anthropogenic GHG. Land-use changes, particularly deforestation, further contribute to atmospheric CO<sub>2</sub> levels by reducing the planet's natural carbon sinks (Friedlingstein et al., 2020). Agricultural practices, including the use of nitrogen fertilizers, generate significant nitrous oxide emissions, while industrial processes and livestock management contribute to methane release.



The scientific consensus on anthropogenic climate change is overwhelming. Multiple lines of evidence, including global temperature records, atmospheric GHG concentration data, and climate model simulations, all point towards human activity as the primary driver of observed climate change (IPCC, 2021). The fingerprint of human influence on climate is further corroborated by the isotopic composition of atmospheric CO<sub>2</sub>, which aligns with the signature of fossil fuel emissions (US EPA, 2023).

The consequences of anthropogenic climate change are far-reaching and pose significant threats to ecological and societal well-being. Rising global temperatures lead to a cascade of effects, including melting glaciers and polar ice caps, rising sea levels, more extreme weather events, and disruptions to ocean currents. These changes can have devastating impacts on ecosystems, agriculture, food security, water resources, and human health (WMO, 2023).

In conclusion, climate change is a well-established phenomenon driven primarily by anthropogenic factors. The exponential increase in greenhouse gas emissions, particularly from fossil fuel combustion and land-use changes, has disrupted the Earth's natural energy balance, leading to a warming trend with potentially catastrophic consequences. Acknowledging the anthropogenic nature of climate change is crucial for developing effective mitigation and adaptation strategies to ensure a sustainable future for our planet.

## **Global Warming**

The term "global warming" describes a potential rise in Earth's average surface temperature (Houghton et al., 1996). Estimates range from 1.5°C to 4°C, with significant alterations to climate patterns expected, including changes in rainfall distribution and increased frequency of severe weather events (Houghton et al., 1996). Most scientists attribute this warming to rising greenhouse gas concentrations, particularly carbon dioxide (CO<sub>2</sub>), in the atmosphere (Houghton et al., 1996). These gases trap outgoing heat, causing a warming effect.

## **Human Activity and Carbon Dioxide Emissions**

The primary source of increasing CO<sub>2</sub> is the burning of fossil fuels for various purposes, including heating, transportation, and industrial processes (Weyant & Yanigisawa, 1998). Since the discovery of fire, humans have contributed to atmospheric CO<sub>2</sub> levels. However, the industrial revolution significantly accelerated fossil fuel use, leading to a dramatic rise in CO<sub>2</sub> emissions (Weyant & Yanigisawa, 1998). Current estimates suggest annual carbon emissions from CO<sub>2</sub> reach approximately 7 gigatonnes (Gt) (Houghton et al., 1996). This highlights the increasing human impact on the environment through technological advancements.

## **Global Efforts to Address Climate Change**

The scientific community recognized the potential consequences of global warming by 1988. A global consensus emerged, calling for action to curb greenhouse gas emissions (Howes et





al., 1997). The 1988 Toronto Conference led to the establishment of the Intergovernmental Panel on Climate Change (IPCC) by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) (Howes et al., 1997). The IPCC's role was to assess the scientific evidence and report to world leaders.

A series of high-profile meetings followed, culminating in the 1992 Rio Earth Summit. Here, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted. Signatories committed to stabilizing greenhouse gas concentrations at a level that wouldn't endanger the climate system (Howes et al., 1997). This was interpreted as returning emissions to 1990 levels by 2000 (Howes et al., 1997). Unfortunately, most developed nations failed to meet this target.

Subsequent meetings, such as the First Conference of the Parties (CoP-1) in 1995, focused on setting emission targets beyond 2000 (Howes et al., 1997). The second CoP in 1996 saw a more positive development with the USA, a major greenhouse gas emitter, endorsing action (Howes et al., 1997). The Kyoto Protocol, agreed upon at the third CoP in 1997, established emission reduction targets for a group of six greenhouse gases (ENDS, 1997). Developed countries aimed for a 5.2% reduction by 2008-2012, with the USA agreeing to a 7% reduction and the European Union (EU) to 8% (ENDS, 1997).

The 1998 CoP in Buenos Aires aimed to solidify implementation strategies for the Kyoto Protocol; however, most decisions were deferred (Pearce, 1998). Doubts emerged regarding whether enough was being done to stabilize the climate (Pearce, 1998). As of 1999, the USA's refusal to cut emissions without developing country participation threatened to stall progress (Pearce, 1999).

## Challenges and Roadblocks

Despite growing public environmental awareness and calls for businesses to adopt sustainable practices, limited progress has been made on addressing climate change. This can be attributed to several factors.

- **Complexity of the Problem:** Global warming lacks a simple solution; every aspect of modern life in developed nations seems reliant on fossil fuels (Pearce, 1999).
- **Economic Concerns:** A prevailing belief exists that economic growth necessitates ever-increasing energy consumption and greenhouse gas emissions (Nordhaus & Yang, 1996). This perception discourages policies that might curb emissions for fear of hindering economic growth (Nordhaus & Yang, 1996). Powerful lobbying groups have effectively communicated this message to policymakers and the public (Pearce, 1999).
- **Scientific Uncertainty:** Highlighting scientific uncertainties surrounding climate change has been another strategy to impede action. Special interests have used these uncertainties to justify inaction, presenting a confusing picture to the public (Pearce, 1998).



## **The Importance of Understanding Science**

Understanding the science behind global warming and climate change is crucial to appreciate the problem's nature

### **4.3 Part 3- Best Practices We Have In Our Institution, In Our City or Country Even In the Partners' Countries**

The best way to find out more about **Lunca Mureşului Nature Park** is to visit the **Ceala Visitor Centre**, where you will be greeted with a "Welcome!" friendly welcome and a wealth of information about the protected area. This is the headquarters of the Lunca Mures Natural Park Administration.

The **Ceala Visitor Centre** is located in the eastern end of the protected area, about 5 km from the centre of Arad. The **Ceala Visitor Centre** is one of the first buildings of its kind in Romania and aims to provide information about the **Lunca Mures Natural Park**, thus highlighting the uniqueness and beauty of nature in this area. The Visitor Centre, named **Ceala** after the forest in which it is built, was completed in 2007 and since 2013 it offers an interactive exhibition. It also hosts several outdoor events and activities, guides tourists to the park's attractions and is the perfect place to carry out educational activities about nature with pupils and students.

The **Ceala Visitor Centre** is involved in a series of educational programmes for pupils and students, which aim to raise awareness that limiting global climate change is a key task for everyone and that we need to re-evaluate our daily behaviour in this regard. These programmes also motivate young people to get involved in limiting climate change through personal example.

Among the projects of this institution, we give as an example:

### **Protecting and promoting the Mures Valley**

*Objectives:*

- To protect biodiversity in the Romania-Hungary border region
- Scientific monitoring of different ecosystems;
- Protection of the Mures River Plain;



- Implementation of educational and informational programmes on nature protection for the local community.

*Argument:* The aim of this project is to ensure a sustainable development of the area and the conservation of biological diversity. Accidental pollution situations will be more effectively prevented and controlled by permanent water quality monitoring. An inventory of plant and animal species in the area will be carried out and existing problems will be highlighted. At the same time eco-tourism will be promoted for the area. These objectives correspond to the strategic development principles as outlined in the Regional Development Strategy for the Western Border Area.

### **Improving the infrastructure needed to raise awareness and sensitize the population of the Lunca Mures Natural Park**

The *overall objective* of the project is to invest in the infrastructure of the Lunca Mureşului Nature Park for better management of habitats and species and to increase awareness of the local population and visitors. This general objective will be achieved through a series of *specific objectives*:

- reducing the impact of visitors on the habitats and species of the Lunca Mureşului Natural Park by concentrating them at the Ceala Visitor Centre and limiting access to one of the integral protection areas

-increase by 20% the awareness of local people, local public authorities and other stakeholders by

Environmental education **workshops** promoted by the **Ceala Visitor Centre**:

#### **1. Ink production**

*Programme description:* Using the abnormal growths of oak trees, called galls, together with water and one more (secret!) ingredient, quality ink is produced right before the children's eyes. Participants will write their names on their own bookmark using feathers, just like in the old days. (Indoor activity).

*Duration:* 50-60 min;

*Recommended age group:* 7 - 18 years;

*The activity is suitable for:* 25 - 30 pupils.

#### **2. Recycling paper**



*Programme description:* After a short introduction to recycling, participants are involved in a paper recycling process using old newspapers. At the end of the activity, the group receives as a souvenir a piece of recycled paper on which they can write. (Indoor activity).

*Duration:* 50-60 min;

*Recommended age group:* 7 - 18 years;

*The activity is suitable for:* 25 - 30 pupils.

### **3. Themed trail excursion**

*Programme description:* The theme trail is 2.5 km long and runs through a rich meadow forest. Along the way you can admire climbing plants, ancient trees, hopefully even wild animals. Several stops are made to provide interesting information (Outdoor activity).

*Duration:* 80 - 90 minutes;

*Recommended age group:* 10 - 18 years;

*The activity is suitable for:* 25 - 30 pupils.

### **4. Bicycle tour**

*Description of the programme:* The thematic route is about 12 km long, of low difficulty and can also be covered on bicycles (personal, or provided by the park administration at the Ceala Visitor Centre) by children, parents and grandparents. The park administration provides accompaniment and information, as with all other activities, but the trail can also be easily covered on your own, as it is well marked and, along its entire length, the trail has 6 interesting outdoor panels containing essential information about the habitats of the nature park, the species of plants and animals that live here, as well as advice on how to behave in nature. (Outdoor activity)

*Duration:* 100 - 120 min;

*Recommended age group:* 12 - 99 years;

*The activity is suitable for:* 10 - 15 people.

*The activity is suitable for:* 25 - 30 pupils.

One association, at national level this time, is **Nature Talks**, which does environmental education in Romania. How? It explains topics such as air pollution, food waste and recycling to children using models, experiments and games. Through the little ones, they also reach parents with the information.

The projects include:

**4.1. Environmental School** - a free environmental education project, carried out with schools and other educational institutions in Romania. This project organised interactive workshops where students learned how to take care of the environment.



#### **4.2. Eco Friendly Hour** - a free environmental education project with 3 activities:

- Air Pollution, which aims to learn about the sources of air pollution, raise awareness of the effects on life on earth and offer solutions.
- Food waste, in which young people learn which foods end up in the bin most often, how to store different types of food correctly and what they should do before going shopping.
- Separate collection is a programme that teaches young people how to prepare different types of waste for recycling, as well as how to reuse certain materials.

**4.3. School in the forest** - free environmental education project in the Cozieni Forest Nursery, Ilfov County. Thousands of students benefited from outdoor workshops, the most appreciated being the tree-planting activity, together with the employees of the Forestry Office.

#### **4.4 Part 4- Links to Videos and Further Reading Sources for the Content of Module**

##### **Learning Objectives:**

- Define environmental literacy and its importance in addressing climate change.
- Explore the core elements of environmental literacy.
- Understand the anthropogenic nature of climate change and its consequences.
- Identify best practices for promoting environmental literacy and climate action.

##### **Video Resources:**

1. "Climate Change: The Evidence" by NASA Climate Change (4:23 minutes) W5bh1JFo43U: <https://www.youtube.com/watch?v=W5bh1JFo43U>: This video provides a concise overview of the scientific evidence for human-caused climate change.
2. "The Sixth Extinction" by PBS NOVA (52:44 minutes) 8b2vC-ecUuU: <https://www.youtube.com/watch?v=8b2vC-ecUuU>: This documentary explores the current mass extinction event and its connection to human activities. (Consider using excerpts relevant to climate change impacts)
3. "Project Drawdown: 100 Solutions to Reverse Global Warming" by Project Drawdown (19:42 minutes) fuDYMOSzVSU: <https://www.youtube.com/watch?v=fuDYMOSzVSU>: This video introduces solutions for mitigating climate change, highlighting various strategies for reducing greenhouse gas emissions.
4. "A Youth Movement for Climate Change" by TED (13:24 minutes) t4GQzmq9rA: <https://www.youtube.com/watch?v=t4GQzmq9rA>: This TED Talk showcases the power of youth activism in addressing climate change. (This could be used to inspire participants)

##### **Further Reading:**



## Websites:

- **"20 Global Nonprofits Working to Protect the Environment"** by Donorbox (<https://donorbox.org/>): This website provides a starting point for exploring the work of environmental organizations around the world.
- **"Environmental Activities for Students: Sustainability in the Classroom"** by Teach Starter (<https://www.teachforamerica.org/stories/lesson-plans-for-teaching-sustainability>): This website offers ideas for incorporating environmental education into the classroom.
- **"Best Environmental Conservation Programs"** by VolunteerMatch (<https://www.volunteerhq.org/>): This website promotes volunteer opportunities with environmental organizations.
- **"Earth Day: Healthy Oceans, Healthy Climate"** by National Oceanic and Atmospheric Administration (<https://www.noaa.gov/earth-day>): This website offers resources on the importance of healthy oceans in a changing climate.

## 4.5 Part 5- The Importance of the Module in Youth Education

### Environmental Activities and Games for Fostering Environmental Literacy in Youth

Environmental literacy is a critical component of education for young people. It equips them with the knowledge, skills, and attitudes necessary to understand environmental issues, make informed decisions, and take action to protect the planet (Hungerford & Volk, 1990). This paper explores how engaging activities and games can be utilized to cultivate environmental literacy in youth.

### Building Environmental Literacy through Activities and Games

Environmental literacy encompasses four core elements: knowledge base, investigative skills, pro-environmental attitudes, and action-oriented behaviors (McBride et al., 2013). Well-designed environmental activities and games can address each of these elements:

- **Knowledge Base:** Activities like tree planting events or citizen science projects can provide youth with firsthand experiences of ecosystems, habitats, and environmental challenges (National Oceanic and Atmospheric Administration, 2020; Nowak et al., 2006).
- **Investigative Skills:** Beach cleanups or participation in environmental workshops can encourage critical thinking and problem-solving as students analyze environmental problems and potential solutions (Sterling, 2004).
- **Pro-environmental Attitudes:** Games like "Imagine..." or "Eco-Scavenger Hunt" can foster a sense of care and responsibility for the environment by prompting creative solutions and sustainable practices (Scaniand Evans, 1990).
- **Action-Oriented Behaviors:** All the activities mentioned involve taking concrete actions to improve the environment, such as planting trees, cleaning beaches, or participating in conservation efforts (American Community Gardening Association, 2023; Ocean Conservancy, 2023).

### Engaging Activities and Games for Interactive Learning





The provided passage offers a variety of engaging activities and games that can make environmental education fun and interactive for young people (Scaniand Evans, 1990). These activities cater to different learning styles and age groups:

- **Physical Activities:** Games like "Green Power" encourage movement and keep students engaged through physical activity (Scaniand Evans, 1990).
- **Creative Activities:** "Imagine..." and "Eco-Scavenger Hunt" spark creativity and challenge students to develop new ideas for a sustainable future (Scaniand Evans, 1990).
- **Collaborative Activities:** Many activities, like crossword puzzles or Eco-Scavenger Hunts, are designed for teamwork and collaboration (Scaniand Evans, 1990).

### **Importance of Environmental Literacy in Youth Education**

Environmental literacy is crucial for young people who will inherit the planet and face the challenges of climate change and resource depletion. By fostering environmental literacy, we can:

- **Empower Youth:** These activities equip young people with the knowledge, skills, and attitudes to make informed decisions and take action to protect the environment (Hungerford & Volk, 1990).
- **Inspire Stewardship:** By participating in environmental activities, young people develop a sense of connection to nature and a responsibility to protect it (Breitenbach et al., 2023).
- **Build a Sustainable Future:** By educating young people about environmental issues and solutions, we can create a generation of environmentally conscious citizens who will work towards a sustainable future (Sterling, 2004).

In conclusion, incorporating engaging environmental activities and games into youth education is a powerful strategy for fostering environmental literacy. These activities can equip young people with the knowledge, skills, and attitudes necessary to become responsible stewards of the environment and create a more sustainable future.

## **4.6 Part 6- Implementation Activities for the Content of Module**

### **Climate Change and Environmental Education: Understanding the Issues and Taking Action**

This outline provides a framework for understanding climate change, its impact on the environment, and potential solutions. It also explores strategies for environmental education and activism.

#### **Climate Change: Causes and Consequences**

- **Understanding Climate Change:** Define climate change as an anthropogenic phenomenon caused by increased greenhouse gas emissions (mainly carbon dioxide) from human activities.



- **Human Activities as Drivers:** Discuss human activities at global, national, local, and individual levels that contribute to climate change, such as burning fossil fuels, deforestation, and industrial processes.
- **Climate Change Impacts:** Explore the consequences of climate change at local, national, and global scales, including rising sea levels, extreme weather events (floods, droughts, heatwaves), and disruptions to ecosystems. Analyze how these consequences can become catalysts and drivers of further climate change through ecological, social, cultural, and economic impacts.

### Solutions and Adaptation

- **Prevention, Mitigation, and Adaptation:** Discuss strategies for preventing climate change through reduced greenhouse gas emissions, mitigating its effects by carbon capture and storage, and adapting to its consequences through infrastructure improvements and disaster preparedness. Explore solutions applicable at global and individual levels, considering different societal contexts.
- **Extreme Weather Events:** Provide information on the main safety measures to take during extreme weather events and disasters caused by climate change, such as natural disasters, violent storms, floods, and landslides.

### The Environment: Understanding the Interconnectedness

- **Components of the Environment:** Define the key components of the environment, including the atmosphere, hydrosphere, geosphere, and biosphere. Explore the interconnectedness of these systems.
- **Ecosystems:** Discuss local and global ecosystems, emphasizing their importance for biodiversity and the health of the planet.
- **Biodiversity:** Define biodiversity and explain its importance for ecosystem function and human well-being.

### Environmental Damage and the Human Impact

- **Threats to Biodiversity:** Analyze the reasons for environmental damage and threats to biodiversity, including habitat loss, pollution, invasive species, and overexploitation of resources.
- **Human Reliance on Nature:** Discuss the fundamental role of nature for human life, including providing food, clean water, air, and resources, as well as regulating climate and providing essential ecosystem services.
- **Human Activities and Environmental Impact:** Explore the negative effects of human activities on the environment, both individually (e.g., littering, excessive consumption) and collectively (e.g., deforestation, industrial pollution).

### Strategies for Conservation and Restoration

- **Conservation Strategies:** Discuss different strategies for conservation of the natural environment, including protected areas like nature reserves, sustainable resource management practices, and biodiversity protection programs.
- **Activities for Environmental Education and Action:** Propose activities that can be arranged to achieve the objectives mentioned above. Here are some examples:



- **Citizen Science Projects:** Engage students in collecting and analyzing scientific data on environmental issues.
- **Environmental Debates and Discussions:** Facilitate discussions about climate change and environmental challenges, encouraging critical thinking and problem-solving.
- **Environmental Restoration Projects:** Organize activities like tree planting, beach cleanups, or community gardening to promote environmental stewardship.
- **Educational Field Trips:** Organize visits to nature reserves, local parks, or environmental education centers to provide firsthand experiences of the natural world.
- **Creative Activities:** Encourage students to express themselves through art, writing, or music to raise awareness about environmental issues.
- **Reduce-Reuse-Recycle Initiatives:** Promote sustainable practices through waste reduction, recycling, and responsible consumption campaigns.

By implementing these educational strategies and engaging in environmental action, we can empower individuals and communities to become responsible stewards of the planet.

**4.7 Part 7- You Can Include A Self-Check For The Learner At The End, A Checklist About Competences They Have Got From The Module.**

The educational project is a series of activities aimed at achieving formative objectives and actively involving people: teachers, pupils, parents, representatives of institutions with a major impact on the education of the young generation. They are put in the position of taking responsibility, deciding and organising. Produce a "Let's be green!" project with the following structure:

**PROPOSER:** .....

**TIMEFRAME:** .....

**NAME:** .....

**OBJECTIVES:**

- .....
- .....
- .....

**TARGET GROUP:** .....

**PARTNERS/SPONSORS:** .....

**PROPOSED ACTIVITIES:**

- .....
- .....
- .....

**EXPECTED RESULTS/REALIZATION INDICATORS (numerical or percentage) :**



- .....
- .....
- .....

**MEANS REQUIRED:**

- .....
- .....
- .....

**EVALUATION TOOLS:**

- .....
- .....
- .....

**4.8 Part 8- Conclusion**

Could we imagine a world without forests, parks, birdsong or buzzing bees? Biodiversity (the totality of living organisms on Earth) provides food and shelter for all living things, has always inspired humans and provided them with essential resources for life. In short - nature makes our lives possible and beautiful.

Although many of us probably agree with these points, we sometimes tend to forget how important the environment is, and due to increasing anthropogenic pressure, a lot of areas or species of plants and animals are at risk, a phenomenon called biodiversity loss.

Increasing access to environmental and climate change education requires the involvement of more than just central government or teaching staff. Involvement and harmonious collaboration between NGOs, local government, communities, parents, private companies and the media are essential for the success of climate change and environmental education.

**4.9 References**

American Community Gardening Association. (2023, April 12). Benefits of community gardens. <https://www.greenleafcommunities.org/the-many-benefits-of-community-gardens/>



Breitenbach, A. M., Bahadoorsingh, K., & Randerson, K. M. (2023). Fostering environmental literacy from a social-ecological perspective: A systematic review. *Journal of Environmental Education*, 54(2), 81-102. doi: 10.1080/00958964.2022.2139422

Butler, T. (2008). The economic benefits of trees in communities. University of Florida IFAS Extension. <https://edis.ifas.ufl.edu/publication/EP604>

ENDS. (1997, December 12). Kyoto breakthrough - climate change pact agreed. *ENDS Daily*, 322, 3-4.

Friedlingstein, P., O'Sullivan, M., Liu, Y.-W., & et al. (2020). Global carbon budget 2020. *Earth System Science Data*, 12(4), 3269-3344. doi: 10.5194/essd-12-3269-2020

Hungerford, H. R., & Volk, T. L. (1990). The development of environmental literacy. *Journal of Environmental Education*, 21(3), 38-44. doi: 10.1080/00958964.1990.10753676

Houghton, J. T., Filho, L. G. M., Callander, B. A., Harris, N., Kattenberg, A., & Maskell, K. (1996). *Climate Change 1995: The IPCC Second Assessment Report: Scientific, Technical and Economic Aspects (Vol. 1)*. Cambridge University Press.

Howes, M., Skea, J., & Schroeder, H. (1997). *Shared air: A guide to the climate change convention*. Earthscan Publications Ltd.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.K. Allen, M. R. (eds.)]*. Cambridge University Press. Retrieved from <https://www.ipcc.ch/report/ar6/wg1/>

Kingsley, J. D., Moreland, M. M., Zahner, S. A., & Buchman, R. E. (2009). Neighborhood greenspace and physical activity in a geographically diverse sample of the US population. *Preventive Medicine*, 48(3), 388-394. <https://www.sciencedirect.com/science/article/pii/S1618866721001540>

McBride, B., Brody, M., Knipping, B., & Murphy, T. (2013). Environmental literacy: Exploring the role of school gardens in supporting learning objectives. *Applied Environmental Education and Communication*, 12(1), 60-70. doi: 10.1080/1533015X.2013.787093

NASA. (2023, April 19). *Climate Change Evidence: How Do We Know?* NASA Climate Change. Retrieved from <https://science.nasa.gov/climate-change/>



National Oceanic and Atmospheric Administration. (2020, December 11). Marine debris program. <https://marinedebris.noaa.gov/>

Nowak, D. J., Crane, D. E., Stevens, J. C., & Walton, J. T. (2006). Urban trees and air quality – A benefit-cost analysis. *Journal of Arboriculture and Urban Forestry*, 32(4), 112-120. [https://groundworksdenver.org/devs/Trees\\_airquality.pdf](https://groundworksdenver.org/devs/Trees_airquality.pdf)

Nordhaus, W. D., & Yang, D. (1996). A regional dynamic general equilibrium model of the Asian economies. *Economic Journal*, 106(433), 841-863.

Ocean Conservancy. (2023, February 22). International coastal cleanup. <https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/>

US EPA. (2023, January 18). Causes of Climate Change. United States Environmental

Pearce, D. (1998, December 11). Climate change: The Buenos Aires tango. *New Scientist*, 160(2148), 10-12.

Pearce, D. (1999, July 10). Climate change: The US holds the world to ransom. *New Scientist*, 163(2184), 10. Protection Agency. Retrieved from <https://www.epa.gov/climate-change>

Revelle, R., & Suess, H. E. (1957). On the rate of exchange of CO<sub>2</sub> between the atmosphere and the ocean. *Tellus*, 9(1), 18-27.

Scaini, S. and Evans, C. (1990). 50 Games for Going Green Physical Activities That Teach Healthy Environmental Concepts, *Human Kinetics Library of Congress Cataloging-in-Publication Data Scaini,*

Sterling, S. (2004). Higher education, sustainability and the public good: An introduction to the special issue. *International Journal of Sustainability in Higher Education*, 5(1), 3-8. doi: 10.1108/1467636041049000

Weyant, J. P., & Yanigisawa, T. (1998). Relaxing emissions controls: Cost and policy implications. *Energy Policy*, 26(12), 1071-1081.

WMO. (2023, April 18). State of the Climate in 2022. World Meteorological Organization. Retrieved from <https://wmo.int/about-wmo/overview>

### **Videos:**





- National Aeronautics and Space Administration (NASA) Climate Change. (2023, April 19). Climate Change: The Evidence [Video]. YouTube. <https://www.youtube.com/watch?v=W5bh1JFo43U>
- NOVA [PBS]. (2014, June 17). The Sixth Extinction [Video]. YouTube. <https://www.youtube.com/watch?v=8b2vC-ecUuU>
- Project Drawdown. (2019, September 24). Project Drawdown: 100 Solutions to Reverse Global Warming [Video]. YouTube. <https://www.youtube.com/watch?v=fuDYMqSszVSU>
- TED. (2019, September 23). A Youth Movement for Climate Change [Video]. YouTube. <https://www.youtube.com/watch?v=t4GQqzmq9rA>

### Websites:

- DonorBox. (2023, January 11). 20 Global Nonprofits Working to Protect the Environment. Retrieved from <https://donorbox.org/nonprofit-blog/20-global-nonprofits-environment>
- Teach Starter. (n.d.). Environmental Activities for Students: Sustainability in the Classroom. Retrieved from <https://www.teachstarter.com/gb/blog/environmental-activities-for-students-sustainability-classroom/>
- VolunteerMatch. (n.d.). Best Environmental Conservation Programs. Retrieved from <https://www.volunteerhq.org/blog/best-environmental-conservation-programs/>
- National Oceanic and Atmospheric Administration. (2023, April 20). Earth Day: Healthy Oceans, Healthy Climate. Retrieved from <https://oceanservice.noaa.gov>



## **5. MODULE 5: THE IMPACT OF GLOBAL CHANGE ON HUMAN HEALTH, INFECTIOUS, AND EPIDEMIC DISEASES**

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### **5.1 Part 1: Introduction to the Topic**

The twenty-first century has seen a surge in severe infectious disease outbreaks, notably the COVID-19 pandemic, causing significant harm to lives and livelihoods worldwide. Previous outbreaks like the 2003 SARS coronavirus, 2009 swine flu, 2012 MERS coronavirus, 2013–2016 Ebola epidemic, and 2015 Zika epidemic have also inflicted substantial suffering and spread across borders. Concurrently, recent decades have brought unparalleled technological, demographic, and climatic shifts: air travel has doubled since 2000, urban populations have surpassed rural ones since 2007, global population continues to rise, and climate change poses an increasing threat (e.g. Baker et. al. 2022, p. 193). In earlier historical periods, colonization, slavery, and warfare facilitated the worldwide dissemination of infectious diseases, resulting in catastrophic consequences. Common human illnesses such as tuberculosis, polio, smallpox, and diphtheria were widespread, causing significant sickness and death before the introduction of vaccines. Similarly, animal diseases like rinderpest travelled through trade routes and military movements, devastating livestock and the communities dependent on them. However, over the past couple of decades, advancements in medicine, increased access to healthcare, and better sanitation practices have lowered the overall morbidity and mortality rates associated with infectious diseases, particularly for ailments like lower respiratory tract infections and diarrheal diseases. The rapid development of vaccines, exemplified by the response to the SARS-CoV-2 virus, demonstrates the effectiveness of modern scientific methods in promptly addressing emerging threats. Despite these advancements, the burden of infectious diseases remains considerable in countries with lower incomes, with ongoing high mortality and morbidity rates related to neglected tropical diseases, HIV/AIDS, tuberculosis, and malaria. Additionally, deaths resulting from emerging and re-emerging infections have persisted throughout the twenty-first century, indicating the potential onset of a new era of infectious diseases characterized by the rapid spread of emerging, re-emerging, and endemic pathogens, facilitated by global connectivity (e.g. Baker et. al. 2022, p. 193).

### **Overview of global change and its effects on human health**

Global change and especially climate change poses various threats to the well-being of people, no matter what part of the world they live in. “Climate change affects the food we eat, the air we breathe, the water we drink, and the places that provide us with shelter. Climate change can also impact people’s health and well-being by altering the frequency or intensity of extreme weather events and spread of certain pests and diseases” (EPA, 2024). It moreover affects people in the seriousness and frequency in which health problems occur as well as creating new or unanticipated health problems also in those areas where these problems did not occur before (e.g EPA, 2024). The main diseases that occur are connected to “respiratory and heart diseases, pest-related diseases like Lyme disease and West Nile Virus, water- and

food-related illnesses, and injuries and deaths” but it also increases violent crime and overall mental health (EPA, 2024).

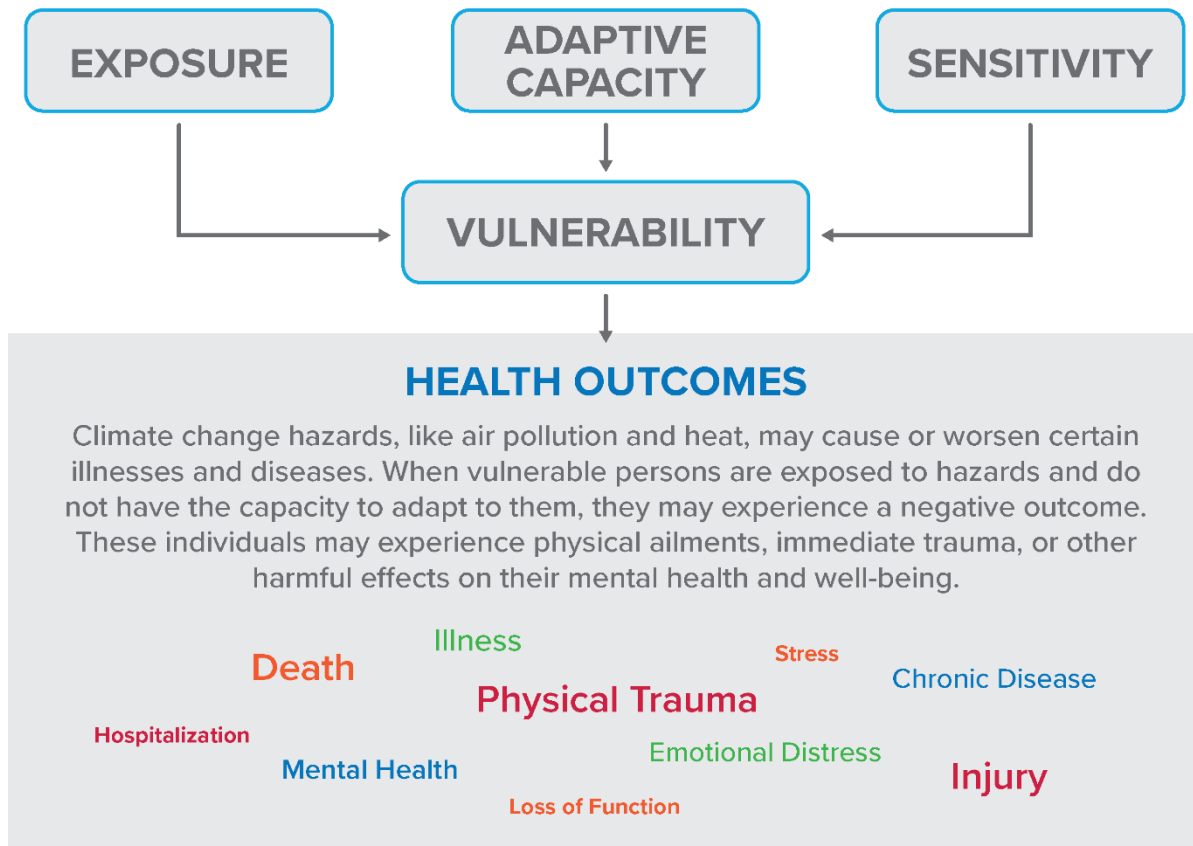


Figure 1: The Connections between Climate Change and Health (EPA, 2024).

According to the United States Environmental Protection Agency (EPA, 2024)) individuals may encounter various climate change impacts simultaneously or at different life stages. Their susceptibility to these impacts hinges on three primary factors:

- **Exposure:** The extent to which individuals come into contact with climate-related risks is influenced by factors such as their location, duration of exposure, and activities. For instance, individuals spending considerable time outdoors might face heightened exposure to extreme heat.
- **Sensitivity:** Variances in sensitivity to climate hazards exist among individuals, often influenced by factors like age and health status. For instance, children and individuals with conditions like asthma tend to be more susceptible to air pollutants and smoke from wildfires.
- **Adaptive capacity:** The ability to cope with, exploit opportunities arising from, or respond to climate change hazards varies among individuals. Factors such as income,



age, living conditions, access to healthcare, and others influence one's adaptive capacity.

To put it in a nutshell, global change, particularly climate change, presents myriad threats to human well-being worldwide. It affects essentials like food, air, water, and shelter, while also impacting health through extreme weather events and the spread of diseases. These effects vary in severity and frequency, sometimes creating entirely new health issues. The susceptibility of individuals to these impacts depends on their exposure, sensitivity, and adaptive capacity, influenced by factors like location, age, health status, and socio-economic conditions.

### **The impact in regard to infectious and epidemic diseases**

Since the mid-19th century, human activities have led to elevated levels of greenhouse gases such as carbon dioxide, methane, and nitrous oxide in the Earth's atmosphere, resulting in a rise in average global temperature. The consequences of this warming trend are extensive and include soil degradation, reduced agricultural productivity, desertification, biodiversity loss, ecosystem degradation, diminished freshwater resources, ocean acidification, and stratospheric ozone depletion. These changes have significant implications for human health, contributing to non-communicable diseases like injuries from natural disasters, malnutrition during famines, and increased mortality during heat waves, particularly among chronically ill individuals. Direct exposure to natural disasters also impacts mental health, with emerging connections between climate change and civil unrest, though these are challenging to quantify (e.g. Rossati 2017, p. 7).

Over time, climate change threatens agricultural resources by diminishing water availability, altering and shrinking arable land, increasing pollution, accumulating toxins in the food chain, and creating habitats conducive to the spread of human and animal pathogens. Vulnerabilities are especially pronounced in low-income countries. Climate change scenarios predict shifts in the distribution of infectious diseases with warming temperatures and changes in outbreak patterns associated with extreme weather events. Floods, for instance, have been linked to spikes in leptospirosis, campylobacter infections, and cryptosporidiosis (e.g. Rossati 2017, p. 7). Global warming also impacts water temperatures, intensifying the transmission of waterborne pathogens. Vector-borne diseases, transmitted by organisms such as mosquitoes and ticks, are particularly sensitive to climate change. Warmer temperatures enhance survival rates and accelerate reproductive cycles, leading to increased densities and expanded geographic ranges of these vectors. Diseases like malaria and various viral infections,



transmitted by mosquitoes, have become more prevalent worldwide. Tick-borne diseases have similarly surged in colder regions as rising temperatures accelerate tick development cycles and expand their habitats (e.g. Rossati 2017, p. 7). Looking ahead, the health sector must prioritize the development of prevention and adaptation programs to mitigate the costs and burdens imposed by climate change in the coming years (e.g. Rossati 2017, p. 7).

There is a notable rise in psychological disorders and injuries resulting from natural disasters, yet this burden remains largely overlooked, underestimated, and inadequately monitored. Post-traumatic stress disorder (PTSD) is a significant concern, affecting not only direct victims but also rescue workers. The mental health impacts of disasters can persist over time, with psychological morbidity affecting a substantial portion of the population in the aftermath. Climate change exacerbates these challenges, potentially leading to conflicts over resources like water due to desertification. Statistical studies suggest a link between climate variables and civil violence, with warmer temperatures being associated with increased conflict incidence. Furthermore, agricultural disruptions caused by climate events can have global repercussions, as seen with the 2010 heatwave in Russia leading to increased wheat prices worldwide and impacting vulnerable populations in low-income countries (e.g. Rossati 2017, pp. 11-12).

According to Rossati (2017, pp. 13-16) global change significantly impacts the spread and intensity of infectious diseases, with climate affecting the range of diseases and weather influencing the timing and severity of outbreaks. Climate change scenarios project shifts in disease distribution and outbreaks associated with extreme weather events. Statistical models predict a 10% increase in diarrheal diseases by 2030, primarily affecting young children, while a 2–3°C rise in global temperature could raise the population at risk of malaria by 3–5%. Floods not only directly impact populations but also elevate the risk of microbiological water pollution, leading to excess cases of diseases like leptospirosis and campylobacter enteritis. Global change also impacts water temperatures, enhancing the transmission of waterborne pathogens and contributing to rising cases of infectious and toxin-related illnesses such as cholera. Vector-borne diseases, particularly those transmitted by mosquitoes and ticks, are highly sensitive to climate change due to their dependence on temperature. Warmer climates accelerate the life cycles of vectors, leading to increased disease transmission. Diseases like malaria, dengue fever, and Lyme disease have seen expanded geographic ranges and increased incidence due to rising temperatures. The proliferation of ticks and the diseases they transmit have also surged, with milder winters extending the period of tick activity and



facilitating disease transmission. In addition to global change, other factors such as land use changes contribute to the spread of tick-borne diseases. Abandonment of agricultural lands and the establishment of ecological niches suitable for ticks in urban areas further exacerbate disease transmission. Overall, climate change poses significant challenges to public health, necessitating comprehensive strategies to mitigate the impact of infectious diseases on vulnerable populations.

### **Importance of understanding the issues in the context of global change**

Understanding the relationship between climate change and infectious diseases, particularly vector-borne illnesses transmitted by organisms like mosquitoes and ticks, is important in the context of global change. As temperatures rise and weather patterns become increasingly erratic, the distribution and prevalence of these diseases undergo significant shifts. By comprehending these dynamics, policymakers, public health officials, and researchers can better anticipate and prepare for the health impacts of climate change. Furthermore, recognising the different factors contributing to the spread of infectious diseases, including ecological changes, human behaviour, and socio-economic conditions, is essential for developing effective prevention and control strategies. This understanding enables the identification of vulnerable populations and regions, facilitating targeted interventions to reduce the health risks associated with climate change. Moreover, addressing the correlation between climate change and infectious diseases requires interdisciplinary collaboration and a holistic approach. By integrating knowledge from fields such as environmental science, epidemiology, and public health, stakeholders can develop comprehensive strategies to combat emerging health threats.

To put it in a nutshell, understanding the complex interactions between climate change and infectious diseases is important for safeguarding public health in the face of global environmental challenges. It underscores the need for proactive measures to reduce the impact of climate change on human health and build resilient communities capable of adapting to a changing world.





## 5.2 Part 2: Specification of the Elements to Learn

### Understanding the mechanisms of global change affecting health

Understanding the mechanisms by which climate change affects health is important for addressing the significant consequences it poses for our well-being and safety. Climate change, largely driven by human activity, leads to increased air and sea temperatures, alterations in rainfall patterns, more frequent extreme weather events, and rising sea levels. These changes directly impact health through extreme events, deteriorating air quality, shifts in the spread of infectious diseases, threats to food and water security, and effects on mental health (e.g. Better Health, 2024). Certain groups are particularly vulnerable to the health impacts of climate change, including children, pregnant women, the elderly, individuals with pre-existing medical conditions, and those living in rural or remote areas. Vulnerabilities are exacerbated by inequalities in access to healthcare and other services, as well as by socioeconomic disparities (e.g. Better Health, 2024). To reduce the effects of climate change on health, proactive measures are essential. By adopting strategies to build resilience and reduce greenhouse gas emissions, we can help slow the pace of climate change and protect our health and well-being. Collaboration at the global, national, community, and individual levels is necessary to address this urgent issue and safeguard the health of current and future generations (e.g. Better Health, 2024).

Environmental degradation, such as deforestation, pollution, and habitat destruction, also poses significant health risks. Pollution from industrial activities, transportation, and waste disposal contributes to respiratory diseases, cardiovascular problems, and cancer. Loss of biodiversity can disrupt ecosystems, leading to the emergence of zoonotic diseases and reducing the availability of natural resources essential for human well-being. Population growth and urbanisation exacerbate health challenges by increasing pressure on resources, straining infrastructure, and amplifying socio-economic disparities. Rapid urbanization often leads to overcrowded living conditions, inadequate sanitation, and limited access to healthcare, fostering the spread of infectious diseases and exacerbating chronic health conditions (e.g. Chu & Karr, 2016). Socio-economic inequalities play a critical role in determining health outcomes, with marginalized communities disproportionately affected by the adverse impacts of global change. Limited access to healthcare, education, and economic opportunities exacerbates vulnerabilities and reduces resilience to environmental and health threats. To address these challenges, interdisciplinary approaches that integrate knowledge from environmental science, public health, social sciences, and policy are essential. By

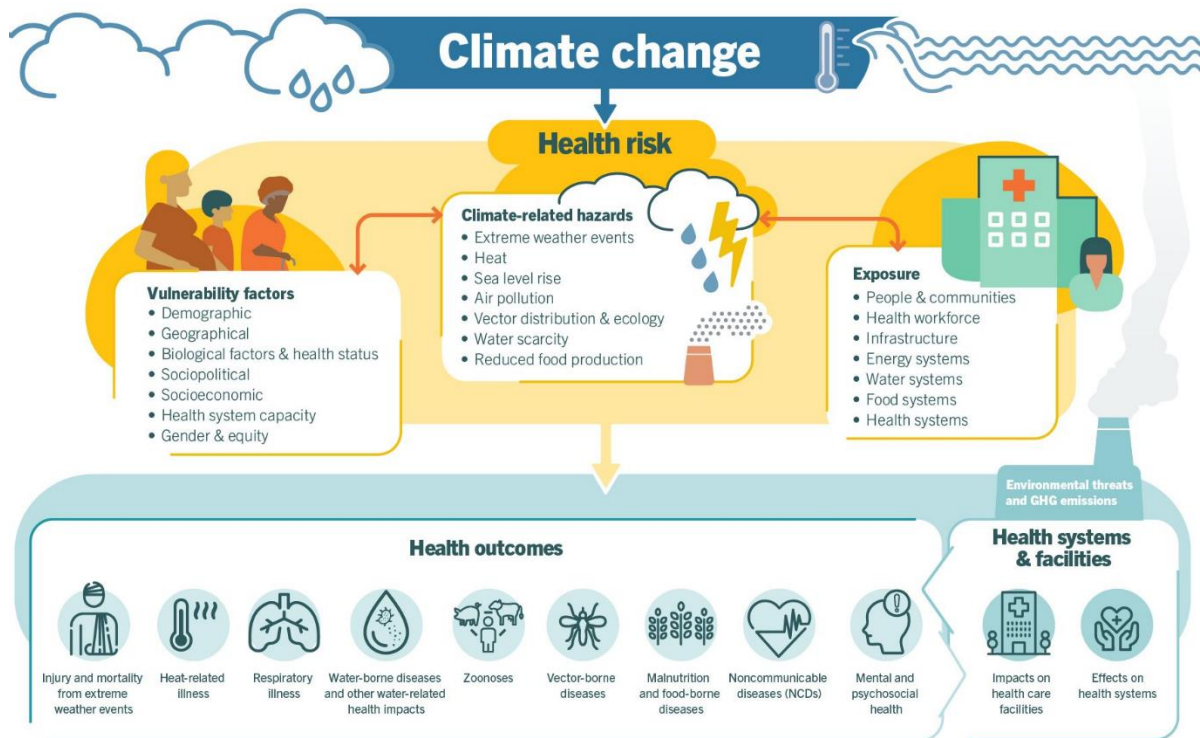


understanding the complex interactions between global change and health, stakeholders can develop and implement evidence-based interventions to promote health equity, environmental sustainability, and resilience in the face of evolving global challenges (e.g. Chu & Karr, 2016).

### **Identification and analysis of various infectious and epidemic diseases**

According to the World Health Organization (WHO, 2023), climate change is a significant contributor to humanitarian crises arising from heatwaves, wildfires, floods, tropical storms, and hurricanes, with these events becoming more frequent, intense, and widespread. Research indicates that approximately 3.6 billion individuals reside in areas highly vulnerable to climate change. Predictions suggest that between 2030 and 2050, climate-related factors could lead to around 250,000 additional deaths annually, primarily due to undernutrition, malaria, diarrhoea, and heat stress. The direct financial toll on health, excluding impacts on sectors like agriculture and water, is estimated to reach between US\$2–4 billion per year by 2030. Regions with limited health infrastructure, mainly in developing nations, will struggle the most to cope with these challenges without external support for preparedness and response efforts. Mitigating greenhouse gas emissions through improved transportation, dietary, and energy consumption choices could yield substantial health benefits, particularly by reducing air pollution (e.g. WHO, 2023). Climate change poses a profound threat to human health, affecting not only the physical environment but also social, economic, and health systems. It acts as a force multiplier, exacerbating existing health challenges and potentially undoing decades of progress. Climate-related weather events, including storms, heatwaves, floods, droughts, and wildfires, directly endanger lives and contribute to the emergence of noncommunicable and infectious diseases. The impact of climate change extends beyond immediate health threats, affecting the health workforce, infrastructure, and capacity to deliver universal health coverage. Moreover, shifts in temperature and precipitation patterns, along with rising sea levels and other environmental changes, undermine the fundamental determinants of health, including clean air, water, food systems, and livelihoods (e.g. WHO, 2023). Urgent action is needed to address climate-related health risks, as highlighted by the Intergovernmental Panel on Climate Change's recent report. Vulnerable populations, including low-income countries and small island states, bear the brunt of these impacts despite contributing minimally to global emissions. Climate change

exacerbates health disparities, disproportionately affecting marginalized groups such as women, children, ethnic minorities, and the elderly (e.g. WHO, 2023).



*Figure 2: Figure: An overview of climate-sensitive health risks (WHO, 2023).*

While it is widely acknowledged that climate change impacts human health, accurately assessing the extent and consequences of these health risks remains challenging. Despite this challenge, advancements in scientific research have enabled us to attribute increased morbidity and mortality to global warming, providing greater insight into the magnitude and nature of these health threats (e.g. WHO, 2023). According to WHO data, a significant portion of the global population lacks access to safe drinking water, leading to a high prevalence of foodborne illnesses, particularly affecting children under five. Climate stressors exacerbate risks related to water and foodborne diseases, as evidenced by increasing instances of hunger, especially in regions like Africa and Asia where food availability, quality, and diversity are affected by climate change (e.g. WHO, 2023). Changes in temperature and precipitation patterns facilitate the spread of vector-borne diseases, contributing to over 700,000 deaths annually. Additionally, climate change induces immediate mental health issues such as anxiety and post-traumatic stress, alongside long-term disorders resulting from factors like displacement and disrupted social cohesion (e.g. WHO, 2023). Recent studies attribute a significant proportion of heat-related deaths to human-induced climate change, with heat-related deaths among the elderly increasing by 70% over two decades. Furthermore,



projections indicate a substantial rise in deaths attributable to climate change-related impacts on diseases like malaria and coastal flooding by the 2030s (e.g. WHO, 2023). The adverse effects of climate change on health pose a severe threat to global development, health, and poverty reduction efforts, exacerbating existing health inequalities within and between populations. Urgent action is needed to limit global temperature rise to 1.5°C to prevent catastrophic health impacts and mitigate millions of climate change-related deaths (e.g. WHO, 2023). WHO's response to these challenges revolves around promoting actions that reduce carbon emissions while improving health, building climate-resilient and sustainable health systems, protecting health from climate change impacts, and providing leadership, raising awareness, evidence, monitoring, capacity building, and country support. Through collaborative efforts and strategic interventions, WHO aims to address the health implications of climate change and advance global health equity and sustainability (e.g. WHO, 2023).

All in all, understanding the mechanisms through which global change affects health is important for addressing the consequences it imposes on our well-being and safety. Global change, largely driven by human activity, leads to escalating risks such as extreme weather events, deteriorating air quality, shifts in disease spread, threats to food and water security, and mental health impacts. Vulnerable groups, including children, pregnant women, the elderly, and marginalised communities, are disproportionately affected by these health risks due to existing inequalities in access to healthcare and socio-economic disparities. Urgent proactive measures are needed to reduce the effects of climate change on health, requiring collaborative efforts across all levels of society. Additionally, environmental degradation exacerbates health risks, further threatening human health and well-being. To address these challenges, interdisciplinary approaches integrating environmental science, public health, social sciences, and policy are essential. By advancing our understanding of the complex interactions between global change and health and implementing evidence-based interventions, we can strive towards promoting health equity, environmental sustainability, and resilience in the face of evolving global challenges.



### 5.3 Part 3: Best Practices

In an era marked by unprecedented environmental changes and global health threats, understanding effective responses to the health challenges posed by global change is important. Climate change, biodiversity loss, and other environmental transformations are increasingly recognised as significant drivers of emerging health risks, necessitating innovative strategies and interventions to safeguard public health.

The following chart presents a curated selection of case studies and best practices, showing successful responses to health challenges associated with global change. Each case study provides insights into practical interventions, policies, or initiatives that have demonstrated efficacy in mitigating or adapting to the impacts of environmental transformations on public health. By using the link provided, the full study and initiative can be accessed.

Title	URL
It's here! Are we ready? Five case studies of health promotion practices that address climate change from within Victorian health care settings.	<a href="https://onlinelibrary.wiley.com/doi/abs/10.1071/HE11461">https://onlinelibrary.wiley.com/doi/abs/10.1071/HE11461</a>
Climate-ADAPT 10 case studies How Europe is adapting to climate change	<a href="https://climate-adapt.eea.europa.eu/en/about/outreach-and-dissemination/dissemination-materials">https://climate-adapt.eea.europa.eu/en/about/outreach-and-dissemination/dissemination-materials</a>
Quantifying the Impact of Climate Change on Human Health	<a href="https://www.weforum.org/publications/quantifying-the-impact-of-climate-change-on-human-health/">https://www.weforum.org/publications/quantifying-the-impact-of-climate-change-on-human-health/</a>
Climate Impacts on Human Health	<a href="https://climatechange.chicago.gov/climate-impacts/climate-impacts-human-health">https://climatechange.chicago.gov/climate-impacts/climate-impacts-human-health</a>
Projects, Case studies and Tools	<a href="https://unfccc.int/topics/capacity-building/resources/capacity-building-portal/history-of-the-portal/projects-case-studies-and-tools">https://unfccc.int/topics/capacity-building/resources/capacity-building-portal/history-of-the-portal/projects-case-studies-and-tools</a>
Health and climate change: complex problems with co-benefits	<a href="https://www.health.org.uk/publications/long-reads/health-and-climate-change-complex-problems-with-co-benefits">https://www.health.org.uk/publications/long-reads/health-and-climate-change-complex-problems-with-co-benefits</a>



A review of the global climate change impacts, adaptation, and sustainable mitigation measures	<a href="https://link.springer.com/article/10.1007/s11356-022-19718-6">https://link.springer.com/article/10.1007/s11356-022-19718-6</a>
Consequences of climate change	<a href="https://climate.ec.europa.eu/climate-change/consequences-climate-change_en">https://climate.ec.europa.eu/climate-change/consequences-climate-change_en</a>
Climate and health: applying All Our Health	<a href="https://www.gov.uk/government/publications/climate-change-applying-all-our-health/climate-and-health-applying-all-our-health">https://www.gov.uk/government/publications/climate-change-applying-all-our-health/climate-and-health-applying-all-our-health</a>
Climate change and mental health: risks, impacts and priority actions	<a href="https://ijmhs.biomedcentral.com/articles/10.1186/s13033-018-0210-6">https://ijmhs.biomedcentral.com/articles/10.1186/s13033-018-0210-6</a>

The above mentioned examples serve as resources for policymakers, public health practitioners, and researchers seeking evidence-based approaches to address the complex health challenges posed by global change. By examining successful interventions and lessons learned from real-world experiences, stakeholders can gain insights into effective strategies for promoting resilience and protecting public health in a rapidly changing environment.





## 5.4 Part 4: Importance in Youth Education

### **Discussion on why educating youth about the intersection of global change and health is crucial**

Educating youth about the intersection of global change and health is important in shaping a generation of informed and engaged individuals ready to address the pressing challenges of our time. As highlighted in the case study of the intensive summer course on global health and social justice for high school students at the University of Southern California (USC), such educational initiatives play an important role in nurturing the next generation of global health professionals and advocates (e.g. Wipfli & Withers, 2022). The course, designed to provide a comprehensive overview of global health issues, including disease epidemiology, social determinants of health, and health equity, received high praise from students, even when transitioned to a virtual format during the COVID-19 pandemic. The incorporation of interactive, game-based activities and guest speakers proved particularly effective in engaging students and fostering their interest in global health and related fields (e.g. Wipfli & Withers, 2022, pp.1-2).

By offering educational programs like the one at USC, universities can meet the growing demand for global health education among young learners. These programs not only expose students to the multidisciplinary nature of global health but also install a sense of social responsibility and inspire them to pursue careers that contribute to health equity and sustainability. Moreover, integrating topics such as social justice and racial inequities in health into the curriculum addresses broader structural issues and prepares students to critically analyse and address health disparities in their future endeavours. In designing such courses, it is essential to adopt innovative learning theories and approaches that promote active engagement, critical thinking, and real-world problem-solving. By employing constructivism and connectivism learning theories, educators can empower students to create their own understanding of global health issues, make meaningful connections between theory and practice, and cultivate a lifelong passion for learning and advocacy (e.g. Mattar, 2017). Moving forward, more universities should consider offering summer programs or extension programs targeting high school students to expand access to global health education. By prioritising interdisciplinary learning, providing scholarships for underprivileged students, and incorporating active learning strategies, institutions can ensure that young learners are equipped with the knowledge, skills, and motivation to address the complex challenges at the intersection of global change and health.



Especially by considering the adverse effects of climate change on mental health it gets more clearer why the discussion of the education of young people in the context of global change and health is important. Climate change-induced eco-anxiety, characterised by chronic fear of environmental doom, has emerged as a significant concern, particularly among young people (e.g. Thomas et al., 2022, p. 2). However, despite its prevalence, eco-anxiety is not recognised as a psychiatric diagnosis in the DSM-5, and standardised criteria or scales for assessing it in youths are lacking [3]. A survey of young people aged 16–25 worldwide highlighted feelings of betrayal and abandonment by governments regarding climate action (e.g. Thomas et al., 2022, p. 2). Narratives surrounding young people and climate change in media often depict them in various roles, from innocent victims to powerful activists (e.g. Benoit, Thomas, & Martin, 2022). However, there's a notable absence of qualitative studies exploring young people's emotions and experiences regarding climate change. Given the increased exposure to climate change discourse in educational and media platforms, understanding youths' perspectives is crucial. Thus, the study of Thomas et. al. aimed to provide a platform for children and adolescents to express their thoughts and feelings about climate change, considering developmental contexts and cultural influences (e.g. Thomas et al., 2022).

Participants displayed a range of emotions related to climate change, including anger, frustration, sadness, hopelessness, guilt, and anxiety. The anger and frustration stemmed from perceived inaction and apathy among adults, while guilt arose from feelings of personal inadequacy in addressing the issue. Anxiety about climate change varied among participants, with some experiencing manageable levels while others reported significant distress, leading to sleep disturbances and low mood. Interestingly, some participants, particularly those engaged in activism, described using their anxiety as a catalyst for action. Others expressed ambivalence or scepticism, questioning the accuracy of media portrayals and expressing cautious optimism about the future (e.g. Thomas et. al., 2022, pp 3-4). Exposure to information about climate change was often first encountered by older participants during their schooling years, typically in elementary or middle school settings. However, few reported learning about climate change from their families, as one participant noted, "The culture I grew up in was not unaware, but it wasn't a part of our discussions" (15 M.US) (Thomas et. al., 2022, p. 4). Some participants expressed dissatisfaction with the level of coverage of climate change in school curricula, likening it to topics like sex education that they felt should receive more attention. One participant from France remarked, "It seems to me that it's like sex education, there should be a number of hours of awareness, and that's not done. [Both] are borderline taboo" (16 M.Fr) (Thomas et. al., 2022, p. 4). Consequently,



several participants took it upon themselves to seek out information due to their own interest and curiosity, demonstrating discernment in evaluating the reliability of their sources. For instance, one participant mentioned, "I think I did pretty well, to sort out the reliable sources [from YouTube], the not so reliable sources" (15 M.Fr ) (Thomas et. al., 2022, p. 4). Interestingly, an older participant admitted to having minimal exposure to climate change information prior to the focus group discussion, stating, "I didn't really have a good grasp of what climate change is before this" (17 M.US) (Thomas et. al., 2022, p. 4).

In contrast, younger participants more frequently reported encountering information about climate change through online content, which sometimes heightened their fears and other times alleviated them. Parents also played a role in shaping their children's understanding of climate change, with some exercising caution in discussing the severity of the issue. One parent mentioned, "We haven't ever discussed with them the severity of climate change. We don't want to freak them out too bad" (PF.US) (Thomas et. al., 2022, p. 4). However, other parents actively used online media as a tool to educate their children about climate change, as illustrated by one parent who said, "[My daughter] was wondering what causes global warming. So, I showed her a couple videos, and she was interested in that" (PF.US) (Thomas et. al., 2022, p. 4). Another parent observed her child's proactive engagement with climate change information online, noting, "[My daughter] watched a few videos, and her level of expertise on the exact mechanism increased considerably. She felt like her role as an expert was explaining the environment to you seriously" (PF.US) (Thomas et. al., 2022, p. 4). While this increased interest may partly stem from participation in the research study, it also underscores how younger participants are adept at seeking out information when they are curious about a topic.

Younger children typically perceive climate change in more tangible terms, associating it with observable phenomena such as melting ice caps, rising sea levels, wildfires, and the loss of animal species like polar bears (Thomas et al., 2022, p. 5). For instance, one participant expressed emotional distress over images of polar bears affected by climate change, stating, "One time I cried about it because I was actually really upset. Because of all the photos I saw. Of the polar bears" (11 F.US). Their understanding of how human activities impact the environment varied, with some recognizing the role of burning fossil fuels like coal and oil, while others questioned the environmental impact of everyday actions like taking a boat or using public transportation (Thomas et al., 2022, p. 5). Moreover, younger participants



displayed moral clarity and identified perceived hypocrisy among adults, particularly those in positions of power or responsibility (Thomas et al., 2022, p. 5).

When it comes to climate action, younger participants often associated it with tangible activities such as planting trees, participating in trash cleanups, recycling, and conserving resources like water and electricity (Thomas et al., 2022, p. 5). However, they did not always make the direct connection between these actions and climate change, often viewing them through the lens of being less wasteful, as influenced by parental guidance (Thomas et al., 2022, p. 5). For example, one participant mentioned, "At home, we are more focused on food, that it has an impact on the climate and on the environment in general. It's funny because it didn't come up at all in the [focus group] discussions" (PF.Fr) (Thomas et. al. 2022, p.5). Many participants expressed frustration with previous generations for their contributions to climate change and perceived lack of action to address it (Thomas et al., 2022, p. 5). Some attributed this inaction to denial and a reluctance to change established lifestyles, while others offered a more sympathetic view, recognizing the complexity of addressing environmental issues (Thomas et al., 2022, p. 5). Moreover, there was a sense among some participants of being abandoned by adults and left to deal with the consequences of climate change (Thomas et al., 2022, p. 5). However, amidst this frustration, some participants expressed hope in the younger generation's ability to take meaningful action to address climate change (Thomas et al., 2022, p. 5).

Educating youth about the intersection of global change and health is crucial because it empowers them to understand the complex dynamics at play, such as climate change's adverse effects on mental health. The findings of the study of Thomas et. al. indicates that many young people are not primarily anxious but rather angry and frustrated about the climate crisis and the burden they perceive of rectifying the mistakes of previous generations. Despite this frustration, they recognize the need for assistance from older generations and do not feel they can tackle these challenges alone. They exhibit a mature approach to climate action, seeking thoughtful and measured responses rather than adopting an activist stance. However, they still face pressures from family and peers, highlighting the importance of supportive environments in both homes and schools (e.g. Thomas et al., 2022, pp. 11-13). While their study found commonalities across their binational sample, cultural differences between France and the United States influenced young people's perceptions of their agency, government roles, social and climate justice intersections, and support for grassroots climate action. Contrary to adult concerns about inducing anxiety in children by educating them about climate change, our



study suggests that the greater threat to young people's mental health may be an awareness of the severity of the climate crisis without avenues for processing and addressing these concerns (e.g. Thomas et al., 2022, pp. 11-13).

In response to young people's anxieties, parents, researchers, and providers should identify opportunities for meaningful engagement in climate activism. Discussing climate change and actions taken by adults to address it with young children can provide reassurance, model prosocial behaviours, and inspire their own commitment to climate action. By nurturing this engagement, we can empower the younger generation to contribute positively to addressing global challenges while supporting their mental well-being.

### **Exploration of how this knowledge empowers youth to contribute to addressing health challenges**

Empowering youth to contribute to addressing health challenges through knowledge about climate change and health intersections is essential for several reasons. At first, educating young people about these connections provides them with the necessary awareness and understanding to recognise the significance of environmental factors on health outcomes. This knowledge equips them to make informed decisions and take meaningful action to reduce health risks associated with climate change (e.g. Sanson & Bellemo, 2021, p. 207). Furthermore, discussions and engagements with youth involved in climate activism reveal how such involvement can serve as a potent tool for managing anxiety and despair about the future. By actively participating in initiatives to combat climate change, young individuals often channel their concerns into determination, courage, and optimism. As noted by Alice Hardinge, taking action fosters a sense of solidarity, cooperation, and productivity amidst despair, ultimately serving as a remedy for climate-related anxieties (e.g. Sanson & Bellemo, 2021, p. 207). Moreover, involvement in climate activism provides young people with invaluable opportunities to develop essential skills and attributes. Organising strikes, participating in advocacy efforts, and engaging in community organizing enhance their abilities in areas such as leadership, communication, teamwork, and conflict resolution. These skills not only contribute to their personal development but also equip them to be effective agents of change in addressing health challenges stemming from climate change (e.g. Sanson & Bellemo, 2021, p. 207). However, it is crucial to acknowledge the potential mental health impacts of climate activism on young individuals. While involvement in such initiatives can be rewarding and fulfilling, it also exposes them to immense pressure and feelings of



responsibility to address the climate crisis. Consequently, there is a risk of burnout and mental strain among youth activists. Therefore, fostering strong support networks and providing mental health resources are essential for sustaining their engagement and well-being (e.g. Sanson & Bellemo, 2021, p. 207).

To put it in a nutshell, educating youth about the intersection of global change and health empowers them to become proactive advocates for addressing health challenges associated with climate change. By leveraging their knowledge, skills, and activism, young people can contribute meaningfully to efforts aimed at building resilient communities and securing a sustainable future for generations to come.





## 5.5 Part 5: Conclusion

### Summary of key takeaways from the module

At the conclusion of this discourse lies a comprehensive summary of discussions encompassing various facets of climate change and its intricate intersection with human health. Throughout the dialogue, we experienced multifaceted dimensions, beginning with an exploration of the adverse mental health effects induced by climate change, particularly among youths. Eco-anxiety, an emergent psychological phenomenon, was elucidated as a chronic fear engendered by environmental apprehensions, underscoring the urgency to address the mental health impacts of climate crisis among younger generations. Despite the absence of standardised diagnostic criteria, empirical evidence elucidated the profound influence of climate-related distress on mental well-being, underscoring the imperative for qualitative studies to comprehend youths' experiences comprehensively. Further inquiry led to an examination of young people's perceptions and emotions regarding climate change, revealing nuanced insights into their understanding, concerns, and aspirations. Distinct archetypal roles emerged, portraying youths as both vulnerable victims and empowered activists within societal narratives. The dearth of platforms for young voices to articulate their perspectives underscored a critical gap warranting scholarly attention. Methodological approaches, including focus groups stratified by age and grounded theory analysis, were advocated to elucidate youths' evolving perceptions within developmental contexts. In addition to amplifying youths' voices, the discourse emphasised the importance of empowering them with knowledge and agency to address health challenges posed by climate change. Practical exercises and projects were proposed as instrumental mechanisms for translating theoretical knowledge into tangible action. From community resilience projects to policy advocacy initiatives, diverse strategies were delineated to foster climate-resilient health systems and communities. Educational campaigns, research endeavours, and collaborative partnerships were posited as catalysts for instigating transformative change, necessitating interdisciplinary collaboration and continuous evaluation. Furthermore, notable resources and studies were cited, spanning academic publications, reports, and dissemination materials, augmenting the dialogue with empirical evidence and scholarly rigor. These scholarly contributions, ranging from academic reviews to case studies and insight reports, provide invaluable insights into the multifaceted dimensions of climate change and health.

To put it in a nutshell, this discourse underscores the imperative for holistic approaches to address the complex nexus of climate change and health, with a concerted focus on



empowering youths, fostering interdisciplinary collaboration, and catalysing transformative action. Amidst the discourse surrounding global change and its implications for human health, it becomes evident that fostering resilience is paramount. Beyond the identification of risks and vulnerabilities lies the imperative to cultivate adaptive capacity, enabling individuals, communities, and systems to thrive amidst environmental perturbations. This necessitates a paradigm shift towards proactive, anticipatory approaches that not only mitigate adverse health outcomes but also nurture resilience and well-being in the face of uncertainty.

Central to this approach is the recognition of the interconnectedness between ecological integrity, social justice, and human health. By addressing systemic inequities and disparities exacerbated by climate change, stakeholders can foster more equitable and resilient societies. Moreover, integrating traditional ecological knowledge and indigenous perspectives offers invaluable insights into sustainable adaptation strategies rooted in local contexts, thereby enhancing community resilience and fostering culturally responsive approaches to climate change mitigation and adaptation. Furthermore, the discourse underscores the transformative potential of leveraging technology and innovation to address climate-related health challenges. From telemedicine and remote health monitoring to predictive analytics and early warning systems, digital solutions offer promising avenues for enhancing preparedness and response capacities in the face of climate-induced health threats. Additionally, citizen science initiatives and community-driven monitoring efforts empower individuals to actively engage in climate research and decision-making processes, democratising knowledge production and fostering collective action. So, the discourse extends beyond mere recognition of climate-health linkages to advocate for transformative action grounded in principles of equity, justice, and resilience. By embracing holistic, interdisciplinary approaches that centre community voices and values, stakeholders can chart a course towards a more sustainable and health-promoting future for all. As we navigate the complexities of the climate-health nexus, the lessons gleaned from this discourse serve as catalysts for collective action and solidarity, inspire for change at local, national, and global scales.



## 5.6 References

- Abbass, K., Qasim, M. Z., Song, H., et al. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. *Environmental Science and Pollution Research*, 29, 42539–42559. <https://doi.org/10.1007/s11356-022-19718-6>
- Baker, R. E., Mahmud, A. S., Miller, I. F., Rajeev, M., Rasambainarivo, F., Rice, B. L., Takahashi, S., Tatem, A. J., Wagner, C. E., Wang, L.-F., Wesolowski, A., & Metcalf, C. J. E. (2022). Infectious disease in an era of global change. *Nature Reviews Microbiology*, 20, 193-205.
- Benoit, L., Thomas, I., & Martin, A. (2022). Review: Ecological awareness, anxiety, and actions among youth and their parents – a qualitative study of newspaper narratives. *Child and Adolescent Mental Health*, 27, 47-58. <https://doi.org/10.1111/camh.12514>
- Better Health. (2024). Climate change and health. Accessed at 20<sup>th</sup> of March 2024 via: <https://www.betterhealth.vic.gov.au/health/healthyliving/climate-change-and-health>
- Chu, E. W., & Karr, J. R. (2017). Environmental Impact: Concept, Consequences, Measurement. In *Reference Module in Life Sciences* (pp. B978-0-12-809633-8.02380-3). doi:10.1016/B978-0-12-809633-8.02380-3. Epub 2016 Oct 31. PMID: PMC7157458.
- European Environment Agency. (2018). Climate-ADAPT—Sharing adaptation information across Europe. Luxembourg: Publications Office of the European Union. Retrieved from <https://climate-adapt.eea.europa.eu/en/about/outreach-and-dissemination/dissemination-materials>
- Hayes, K., Blashki, G., Wiseman, J., et al. (2018). Climate change and mental health: Risks, impacts and priority actions. *International Journal of Mental Health Systems*, 12(1), 28. <https://doi.org/10.1186/s13033-018-0210-6>
- Mattar, J. (2017). Constructivism and connectivism in education technology: Active, situated, authentic, experiential, and anchored learning. *Estudios e Investigaciones*. <https://doi.org/http://dx.doi.org/10.5944/ried.21.2.20055>
- Patrick, R., & Capetola, T. (2018). It's here! Are we ready? Five case studies of health promotion practices that address climate change from within Victorian health care settings. *Health Promotion Journal of Australia*, 29(3), 225-231. <https://doi.org/10.1071/HE11461>



- Rossati, A. (2017). Global Warming and Its Health Impact. *International Journal of Occupational and Environmental Medicine*, 8, 7-20. [10.15171/ijocem.2017.963](https://doi.org/10.15171/ijocem.2017.963).
- Sanson, A., & Bellemo, M. (2021). Children and youth in the climate crisis. *BJPsych Bulletin*, 45(4), 205-209. <https://doi.org/10.1192/bjb.2021.16>
- Thomas, I., Martin, A., Wicker, A., & Benoit, L. (2022). Understanding youths' concerns about climate change: A binational qualitative study of ecological burden and resilience. *Child Adolesc Psychiatry Ment Health*, 16(1), 110. <https://doi.org/10.1186/s13034-022-00551-1>.
- United States Environmental Protection Agency (EPA). (2024). Climate Change Impacts. *Climate Change and Human Health*. Accessed at 20<sup>th</sup> of March 2024 via: <https://www.epa.gov/climateimpacts/climate-change-and-human-health#:~:text=Climate%20change%20affects%20the%20food,of%20certain%20pests%20and%20diseases>.
- Wipfli, H., & Withers, M. (2022). Engaging youth in global health and social justice: a decade of experience teaching a high school summer course. *Global Health Action*, 15(1987045). <https://doi.org/10.1080/16549716.2021.1987045>
- World Economic Forum. (2024, January 16). Quantifying the impact of climate change on human health. *Insight Report*. Retrieved from <https://www.weforum.org/publications/quantifying-the-impact-of-climate-change-on-human-health/>
- World Health Organization (WHO). (2023). Climate change. Accessed at 20<sup>th</sup> of March 2024 via: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>



## **6. MODULE-6 ENVIRONMENTAL ACTIVITIES THAT PEOPLE USE TO SUPPORT OR STRENGTHEN LAWS DESIGNED TO HELP PREVENT OR SOLVE ENVIRONMENTAL PROBLEMS**

Our planet faces a complex web of environmental challenges, from air pollution choking our cities to overflowing landfills and polluted waterways. While these issues might seem daunting, there's a growing movement of individuals and organizations taking action. This module equips you to join this movement and become a champion for sustainable future. The foundation of any effective environmental effort lies in understanding the principles, legal framework, and historical development of environmental policy. This opening section delves into these core aspects, providing a solid grasp of the guiding forces behind environmental regulations. You'll explore how these regulations have evolved over time and the role of international institutions in shaping global environmental standards.

Equipped with this foundational knowledge, we shift our focus to three critical environmental issues: air pollution, water pollution, and waste management. Here, you'll gain insights into the sources and consequences of these problems, alongside practical strategies for addressing them. Whether it's advocating for stricter air quality regulations, supporting sustainable water practices like rainwater harvesting or greywater reuse, or promoting responsible waste disposal through initiatives like composting or recycling, this section empowers you to make a real difference in specific areas.

But knowledge is only half the battle. The fight for a healthy planet requires inspiration, and this section provides just that. We'll showcase inspiring examples of organizations around the world, actively working on solutions. From organizations advocating for a global shift towards renewable energy like 350.org, to those mimicking nature's ingenious solutions like the Institute of Biomimicry, or the international environmental activism of Greenpeace, you'll discover diverse approaches to environmental challenges. By learning about their work, you can identify causes that resonate with you and find ways to contribute, be it volunteering, fundraising, or simply spreading awareness.

Knowledge and inspiration are powerful, but to truly drive change, we need action. This section focuses on practical activities that translate your newfound knowledge into tangible results. You'll explore ways to develop your ability to critically analyze your surroundings and identify environmental challenges within your community. Whether it's excessive car emissions in your city or local water waste due to inefficient irrigation practices, this critical



thinking will be key. By fostering a sense of responsibility for the environment, we can collectively create a more sustainable future.

Finally, the module provides a self-assessment tool to gauge your learning and identify areas for further exploration. This allows you to track your progress and celebrate your achievements while recognizing opportunities for continued growth.

This module empowers you to become a responsible citizen and an advocate for a healthy environment. By understanding environmental policy, exploring key issues, learning from effective solutions, and taking action in your community, you can contribute to a cleaner, greener future for all. Let's join forces and ensure a thriving planet for generations to come.

## **6.1 Part 1- Introduction to the Topic**

Environmental law is a collective term that encompasses aspects of law that focus on protecting the natural environment, human health and natural resources. It is a complex web of regulations, policies and statutes designed to address issues such as air and water quality, waste management and pollution control.

The aim of environmental law is to protect human health, preserve the environment for present and future generations and ensure sustainable development. Environmental laws are implemented and enforced by various government agencies. These agencies are responsible for monitoring and regulating activities that may have an impact on the environment, including industrial operations, environmental impact assessment and conservation.

Environmental law focuses on a wide range of topics, such as air quality laws, water quality, waste management, chemical safety and the protection of endangered species. These laws are designed to minimise the impact of human activities on the environment and prevent environmental contamination.

At the international level, environmental law encompasses global environmental agreements that address global issues such as climate change, ozone depletion and biodiversity protection. These agreements are often negotiated and implemented through cooperation between national governments and international organisations.

Environmental law covers a wide range of issues, with air quality, water quality and waste management being some of its main areas of interest. These aspects of environmental





law are key to maintaining a healthy environment and ensuring that we protect the environment and the well-being of present and future generations.

Regulations, through laws such as the Clean Air Act, aim to reduce air pollution by setting standards for emissions from various sources, including vehicles, power plants and factories. These regulations help combat smog, acid rain and other problems, ultimately protecting health and the environment. Laws such as the Clean Water Act and the Safe Drinking Water Act protect water sources from pollution, ensuring they are safe for drinking, recreation and other uses. These laws regulate discharges of pollutants into waters and set standards for drinking water, protecting aquatic ecosystems and health.

Waste management is a key aspect of environmental legislation, covering solid waste, hazardous waste and nuclear waste. Regulations such as the Resource Conservation and Recovery Act (RCRA) set guidelines for the generation, transport, treatment, storage and disposal of waste, ensuring that waste is managed responsibly and does not pose a threat to the environment or health.

### **Environment policy: general principles and basic framework**

The European Union (EU) occupies a prominent position in global environmental governance (Jordan & Lensch, 2010). Environmental policy within the EU is guided by a robust framework that integrates legislative measures, strategic planning, and international cooperation (Euractiv, 2023). This paper explores the core principles, legal basis, and key instruments that constitute the EU's approach to environmental protection.

### **Core Principles**

EU environmental policy rests upon a foundation of core principles (European Parliament, 2023). These principles include:

- **Precautionary Principle:** This principle mandates caution when scientific uncertainty exists regarding potential environmental risks associated with specific actions or policies (Schmidt & Peterson, 2014). For instance, if doubts arise about the safety of a product, the precautionary principle may necessitate its removal from the market until further scientific evaluation can be conducted.
- **Preventive Principle:** This principle emphasizes the importance of preventing environmental damage at its source, rather than solely focusing on remediation efforts (Farmer et al., 2017).



- **Polluter Pays Principle:** This principle holds polluters financially responsible for the environmental damage they cause (Jänicke, 2010). The Environmental Liability Directive exemplifies this principle, requiring polluters to take preventive measures and bear the costs associated with environmental damage remediation (European Commission, n.d.-a).
- **Integration:** Environmental considerations are increasingly incorporated into other EU policy areas, such as energy and agriculture (Euractiv, 2023). This holistic approach aims to ensure policy coherence and promote sustainable development.

### **Legal Basis**

The legal foundation for EU environmental policy is established within the Treaty on the Functioning of the European Union (TFEU) (Articles 11 and 191-193) (EUR-Lex, n.d.). The EU holds competence across a broad spectrum of environmental issues, encompassing air and water pollution, waste management, and climate change (European Parliament, 2023). However, the principle of subsidiarity and the requirement for unanimity in specific areas, such as fiscal matters and land use, can limit the EU's scope for action (Jordan & Lensch, 2010).

### **Origins and Development**

The origins of EU environmental policy can be traced back to the 1972 European Council held in Paris (Euractiv, 2023). Following the first UN Conference on the Environment, the Council emphasized the need for an environmental policy to complement economic policies and called for an action program (Euractiv, 2023). Subsequent treaty revisions have progressively strengthened the EU's commitment to environmental protection and the role of the European Parliament in its development (European Parliament, 2023). Key milestones include:

**1987: Single European Act:** Introduced a new 'Environment Title' establishing the legal basis for a common environmental policy (European Parliament, 2023).

**1993: Maastricht Treaty:** Elevated environmental protection to an official EU policy area, introduced the co-decision procedure, and established qualified majority voting in the Council as the general rule (European Parliament, 2023).



**1999: Amsterdam Treaty:** Established the requirement to integrate environmental protection into all EU sectoral policies, promoting sustainable development (European Parliament, 2023).

**2009: Lisbon Treaty:** Recognized ‘combating climate change’ as a specific EU objective and granted the EU legal personality, enabling it to conclude international agreements (European Parliament, 2023).

These advancements have solidified the EU's position as a global leader on environmental issues, exemplified by initiatives like the European Green Deal and the EU Climate Law (European Commission, n.d.-b; European Parliament, 2021).

### **Basic Framework**

The EU's environmental policy framework encompasses several key instruments:

- **Environment Action Programmes (EAPs):** Since 1973, the European Commission has issued multiannual EAPs outlining forthcoming legislative proposals and environmental policy goals (European Commission, n.d.-c). The 8th EAP, which entered into force in 2022, sets the environmental policy agenda for the EU until 2030 (European Commission, n.d.-c).
- **Horizontal Strategies:** The EU employs horizontal strategies to integrate environmental considerations into other policy domains (Euractiv, 2023). Examples include the EU Sustainable Development Strategy and the Biodiversity Strategy (European Commission, n.d.-d; European Commission, 2020).
- **International Environmental Cooperation:** The EU actively participates in international environmental negotiations and is a party to numerous multilateral environmental agreements (European Parliament, 202

Following the previous section on core principles, legal basis, and origins, here's a continuation exploring the remaining key instruments of the EU's environmental policy framework:

- **Environmental Impact Assessment (EIA) and Public Participation:** EU regulations mandate EIAs for certain public and private projects with potentially significant environmental impacts (e.g., construction of motorways) (European



Commission, n.d.-e). Additionally, public participation is a central aspect of EIA, ensuring transparency and public input in environmental decision-making (European Parliament, 2023). The Aarhus Convention further guarantees public rights to information, participation, and access to justice in environmental matters (UNECE, n.d.).

- **Implementation, Enforcement, and Monitoring:** Effective environmental policy hinges on robust implementation, enforcement, and monitoring mechanisms (Euractiv, 2023). While hundreds of EU environmental directives, regulations, and decisions exist, achieving environmental goals relies heavily on national, regional, and local implementation efforts (European Parliament, 2023). The EU employs various tools to address implementation gaps, including minimum standards for environmental inspections and the Environmental Implementation Review (Euractiv, 2023; European Commission, n.d.-f). Monitoring of environmental health and compliance with EU environmental law is also crucial. The European Environment Agency (EEA) and the European Pollutant Release and Transfer Register (E-PRTR) play vital roles in environmental data collection and reporting (European Environment Agency, 2020; European Commission, n.d.-g).

### **The Role of the European Parliament**

The European Parliament plays a critical role in shaping EU environmental legislation (European Parliament, 2023). Key functions include:

- **Legislative Scrutiny and Approval:** The Parliament participates in the legislative process for EU environmental law, having the power to amend or reject Commission proposals.
- **Oversight and Implementation Monitoring:** The Parliament holds the Commission and member states accountable for environmental policy implementation.
- **Setting Ambitious Goals and Priorities:** The Parliament has consistently advocated for more ambitious environmental targets and stricter enforcement mechanisms. For example, it declared a climate and environmental emergency in 2019 and passed the EU Climate Law in 2021 (European Parliament, 2019; 2021).

### **Conclusion**



The EU's environmental policy framework is a comprehensive and evolving system. Guided by core principles and a robust legal foundation, the framework employs various instruments to achieve environmental protection goals. The active role of the European Parliament in shaping legislation and holding institutions accountable is a significant strength of the EU's approach. However, challenges remain in ensuring effective implementation and enforcement across member states. As the EU strives towards a more sustainable future, continuous improvement and adaptation of its environmental policy framework will be essential.

## **EU STUDIES AND THE EXPANDING LEGAL BASIS OF ENVIRONMENTAL POLICY**

### **Theoretical Frameworks**

- **Intergovernmentalism:** Powerful member states, their national interests, and leaders play a key role in shaping environmental agendas and decision-making (Moravcsik, 1993; Scharpf, 1988).
- **Neofunctionalism:** Cooperation between EU institutions, states, and other actors on practical environmental issues can lead to addressing more sensitive areas (Haas, 1964; Lindberg, 1963).
- **New Institutionalism:** Institutions like social structures, principles, and norms influence the behavior and decision-making of actors within the EU regarding environmental policy (March & Olsen, 1989; Scott, 2008).
- **Constructivism:** Social interaction and communication shape the identities and interests of EU actors, impacting environmental policy discourse and decision-making (Adler & Bernstein, 2001; Kratochwil, 1986).
- **Multilevel Governance:** Actors operate across regional, national, and local levels in environmental governance. This analysis examines the shifting of authority and its impact on outcomes (Hooghe & Marks, 2010; Marks & Hooghe, 2013).
- **Europeanization:** This theory explores how EU integration influences member states' interactions with EU institutions and non-state actors, affecting policy convergence in environmental protection (Börzel & Risse, 2003; Radaelli, 2008).

### **EU Treaty Law as the Foundation**



While all theories contribute to understanding EU environmental policy, all acknowledge EU treaty law as the bedrock (Jordan & Lensch, 2010). The Treaty of Rome establishing the European Economic Community (EEC) lacked specific environmental provisions (see Table 2 in the original text). However, it contained language allowing for environmental initiatives based on improving living and working conditions and reducing trade barriers for a single market (Articles 2, 3(c) of the Treaty Establishing the European Economic Community, 1957; Roderick & Wurzel, 2005). These provisions, along with subsequent treaties, have facilitated a significant transfer of legal authority from national to EU levels for environmental policymaking (Fudge & Jordan, 2007).

### **Historical Development**

Official EU environmental policy dates back to the 1972 Paris Summit, following the landmark United Nations Conference on the Human Environment (EEAS, 2023; UN Environment Programme, 1972). This summit established Environmental Action Programmes (EAPs) to set EU environmental agendas (Jordan & Lensch, 2010). Early environmental legislation (1970s-1980s) often addressed specific issues without a clear, long-term strategy (Knill & Lecocq, 2007). However, EU efforts have since led to the harmonization of numerous environmental and public health standards across member states (Fudge & Jordan, 2007).

### **The Single European Act and Deepening Integration**

While pursuing environmental goals, the EU pursued economic integration, completing the Single Market in 1993 (European Commission, n.d.). This process required coordinated national policies and reduced barriers to the free movement of goods, including environmental regulations (Euractiv, 2023). The 1986 Single European Act (SEA) played a crucial role:

- **Treaty Articles for Environmental Law-Making:** Building on Court of Justice rulings establishing a legal basis for environmental action (e.g., Case 43/75, *Defrenne v. Sabena* [1976]), the SEA introduced dedicated treaty articles (Fudge & Jordan, 2007).
- **Qualified Majority Voting:** The SEA introduced qualified majority voting in the Council of the European Union for approving new environmental laws. Previously, consensus rule gave each country veto power (Fudge & Jordan, 2007). This shift





allowed for more ambitious policies, particularly by "green leader" states (Radaelli, 2008).

- **Increased Role of the European Parliament:** The SEA granted the European Parliament greater influence through the cooperation procedure for policy-making with the Council (Fudge & Jordan, 2007). The Parliament's role continued to expand with subsequent treaties, allowing it to raise many environmental standards (Jordan & Lensch, 2010).

## **Conclusion**

The EU's environmental policy framework is a complex product of various theoretical perspectives and legal developments. From early issue-specific approaches to a more comprehensive strategy, the EU has made significant strides in environmental protection. The interplay of member state interests, institutional structures,

## **ENVIRONMENTAL POLICY ACTORS**

EU environmental scholarship often adopts a specific theoretical lens and focuses on the evolving roles of various actors within the governance process (Radaelli, 2008). This actor-centric approach reflects broader social science trends, but also acknowledges the dispersed nature of EU decision-making (Jordan & Lensch, 2010). The EU lacks a single, central authority, with multiple actors contributing to regional environmental goal-setting and implementation. While five key EU institutions – the European Council, the Commission, the Council, the Parliament, and the Court of Justice – play a leading role (Jordan & Lensch, 2010), member states, advocacy groups, and civil society also hold significant influence. This analysis explores this complex multi-actor landscape, examining how various actors interact and shape EU environmental policy.

### **EU Bodies and Member States**

The European Union (EU) boasts a complex environmental governance architecture, characterized by a multitude of actors with overlapping and sometimes conflicting interests (Radaelli, 2008). This analysis delves into the roles and interactions of five key EU institutions – the European Council, the European Commission (hereafter, the Commission), the Council of the European Union (hereafter, the Council), the European Parliament



(hereafter, the Parliament), and the Court of Justice of the European Union (hereafter, the Court) – in shaping EU environmental policy (Jordan & Lensch, 2010).

### **The European Council: Setting the Agenda**

The European Council, composed of heads of state or government from member states, serves as the EU's highest-level political authority (Jordan & Lensch, 2010). While not directly involved in legislative processes, the Council sets broad environmental goals and steers the direction of policy development. Through summits held twice a year, the Council seeks to balance regional and national interests in environmental matters (**reference**). Each member state holds the rotating Presidency of the European Council for six months, shaping the agenda and prioritizing specific environmental issues during its term. Notably, the Council plays a crucial role in establishing collective targets for greenhouse gas emissions reduction and renewable energy expansion. Additionally, the Council plays a part in selecting the Commission President, who sets the overall direction for the Commission's work program.

### **The Engine of Integration: The Commission**

The Commission acts as the EU's executive arm and the driving force behind deeper integration, including environmental policy (**reference**). Its responsibilities encompass proposing new EU legislation, monitoring member state compliance with existing laws, initiating enforcement actions, managing the EU budget, and representing the EU in international environmental forums. This central role positions the Commission as a strong advocate for ambitious environmental goals and increased EU authority in tackling environmental challenges. The Commission is led by a President, who oversees a College of Commissioners, each with a specific portfolio. Commissioners in charge of environment, maritime affairs and fisheries, climate action and energy, agriculture and rural development, and health and food safety play a vital role in shaping environmental policy proposals.

### **The Council: Negotiating National Interests**

The Council, composed of ministerial representatives from member states, serves as another key player in EU environmental governance (**reference**). It acts as a forum for member states to negotiate environmental legislation under the ordinary legislative procedure, alongside the Parliament. The Council's work is structured around nine topical areas, with the Environment Council specifically addressing environmental issues and climate change.



Decisions within the Council, governed by the Lisbon Treaty's "double majority" voting system, require a qualified majority (55% of member states, representing at least 65% of the EU's population) to pass legislation.

### **The Parliament: Gaining Influence**

The Parliament, composed of directly elected Members of the European Parliament (MEPs), has witnessed a significant increase in its influence on EU environmental policy through successive treaty revisions (**reference**). While originally a consultative body, the Parliament now possesses greater powers, including involvement in selecting the Commission President and approving the full Commission. Importantly, the Parliament's Committee on Environment, Public Health and Food Safety actively participates in shaping environmental legislation, often advocating for more stringent environmental standards. Decisions within the Parliament are made by simple majority or absolute majority, depending on the specific issue.

### **The Court: Upholding the Law**

The Court plays a critical role in ensuring the consistent application and interpretation of EU environmental law across member states (**reference**). It handles both contentious and non-contentious proceedings. Contentious proceedings address legal disputes between member states, EU institutions, the Commission and member states, or individuals and EU institutions. Non-contentious proceedings involve national courts seeking preliminary rulings from the Court on how to interpret and apply EU environmental law within domestic legal cases. Through its rulings, the Court has clarified the legal basis for environmental policy action, fostered a more robust role for environmental protection within the single market, and provided guidance on balancing environmental concerns with economic and trade considerations.

### **Conclusion**

The intricate interplay between these five key actors – the European Council, the Commission, the Council, the Parliament, and the Court – shapes EU environmental policy. The European Council sets the high-level agenda, the Commission drives policy proposals, the Council negotiates legislation, the Parliament exercises democratic influence, and the Court upholds the law. This multi-actor landscape creates a complex yet dynamic system for addressing environmental challenges at the regional level. As the EU continues to evolve, so



too will the interactions between these institutions, ensuring a multifaceted and evolving approach to environmental governance.

### **Private and Civil Society Actors**

The rise of the EU's influence has coincided with a surge in lobbying activities targeting EU institutions, particularly surrounding environmental policy (Radaelli, 2008). While stakeholder engagement fosters opportunities for non-state actors to influence policy, concerns regarding undue influence from well-resourced private sector groups remain. To counterbalance this, the Commission actively seeks participation from environmental NGOs in policy consultations (Jordan & Lensch, 2010). Business groups, often wary of increased regulations, navigate the system alongside environmental organizations seeking stricter regulations and stronger alliances with supportive EU bodies..

Stakeholder engagement often occurs through umbrella organizations representing large swathes of interests. Green 10, for instance, coordinates efforts of major environmental organizations, while Business Europe lobbies on behalf of national business federations. Additionally, short-term issue-specific coalitions may form, mirroring trends observed in network and coalition theory (45-47). Beyond European actors, foreign entities like the American Chamber of Commerce also participate in Brussels.

Furthermore, the 2011 European citizens' initiative empowers citizens to petition for EU policy proposals in environmental and other relevant areas. This, alongside the Charter of Fundamental Rights allowing petitions to the Parliament, represents a push towards greater transparency and democratic engagement in response to concerns about the EU's perceived "democratic deficit" (48). These developments highlight the evolving nature of EU environmental governance, where formal institutions interact with a diverse array of stakeholders to shape policy outcomes.

### **MAKING AND IMPLEMENTING ENVIRONMENTAL POLICY**

EU scholarship delves not only into the history and actors within the Union, but also into the intricate mechanisms of EU governance, particularly the processes of lawmaking and implementation (Jordan & Lensch, 2010). This focus stems from the EU's constantly evolving policy apparatus and its expansive reach across member states. Studies often explore the formulation, revision, and expansion of specific environmental policies through the ordinary



legislative procedure and the increasingly influential comitology system (49, 50). EU policymaking is often characterized as technocratic, striving for consensus while fostering complex negotiations to accommodate diverse interests. Additionally, research examines member state implementation of environmental laws, including monitoring mechanisms and enforcement actions undertaken by EU bodies (51-53). This focus on policy dynamics underscores the interplay between formal legal frameworks and the practical realities of policy implementation within the EU's environmental governance system.

## Making Environmental Policy

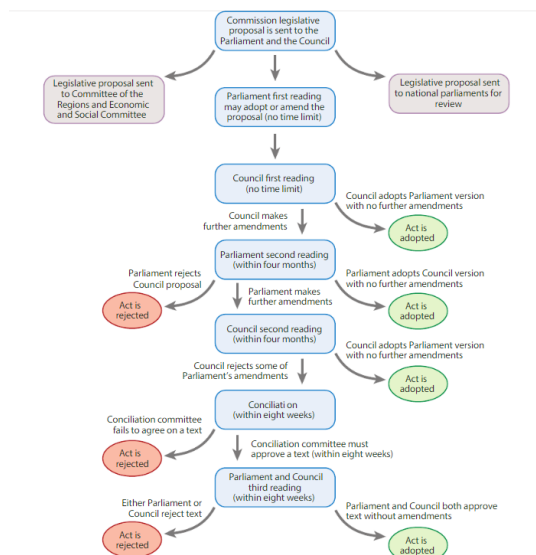
EU environmental policymaking is a complex dance, with numerous actors vying for influence and advocating for diverse interests (Jordan & Lensch, 2010). While the Commission, tasked with proposing new legislation, steers the initial agenda (**reference**), extensive consultation with external groups is a hallmark of the process.

Member states, the Parliament, and even citizens through the European citizens' initiative can formally request the Commission to address specific environmental concerns. Importantly, these requests often aim to either strengthen or weaken environmental standards.

Beyond formal channels, actors actively lobby individual Directorates-General (DGs) within the Commission, which become focal points for engagement by member states, industry, and environmental advocates. Additionally, environmental leader states strategically place national experts within the Commission, leveraging their expertise to shape policy proposals (55).

The Commission conducts extensive consultations across DGs and with other EU bodies during policy development. Working papers and impact assessments, introduced in 2002, inform these processes but their influence on final legislation remains debated (56, 57).

Once finalized, proposals face scrutiny from various bodies, including the Council, the Parliament, specialized agencies, and national parliaments. Within the Parliament, the lead





committee and plenary sessions offer opportunities for amendments, with the Committee on Environment, Public Health and Food Safety often playing a pivotal role (58). Notably, the Parliament has frequently advocated for stricter environmental standards (59).

This intricate web of interactions between the Commission, member states, the Parliament, expert advisors, and advocacy groups highlights the multifaceted nature of EU environmental policymaking, where the final outcome is a product of negotiation and compromise among diverse stakeholders.

Figure 1: Scheme of the ordinary legislative procedure.(Annu. Rev. Environ. Resource. 2015.40:309-335. Downloaded from [www.annualreviews.org](http://www.annualreviews.org) )

## **ENVIRONMENTAL POLITICS AND EU ENLARGEMENT**

The European Union (EU) stands as a unique experiment in supranational governance, pursuing deeper integration despite a burgeoning membership (**reference**). This expansion, from its initial six members to the current 28, has coincided with the development of a robust environmental policy framework. Accession – the process by which countries join the EU – presents an opportunity to "green" candidate countries while simultaneously posing challenges to existing EU environmental standards. Research in EU environmental politics sheds light on these complexities, focusing on membership requirements, member state dynamics, domestic policy adjustments, and the role of EU support for new members.

### **Shaping the Landscape: Membership Criteria and Negotiations**

Since the mid-1990s, EU membership requires adherence to a set of political, economic, and legal criteria, including a functioning market economy, democratic institutions, and the adoption of the entire EU acquis – the body of existing EU legislation (69). This includes an environment chapter alongside others with significant environmental implications, such as agriculture and energy. Negotiations, a demanding process, focus on aligning candidate countries' domestic laws, rules, and institutions with EU standards. Through conditionality, the EU incentivizes progress towards compliance with its principles, with each thematic chapter closed upon successful harmonization.

Environmental considerations were initially absent from the early 1970s enlargements, predating the development of a comprehensive EU environmental policy. However,





subsequent expansions coincided with a growing focus on environmental protection. During negotiations leading to the Single European Act (SEA), which established the legal foundation for environmental lawmaking, northern member states advocated for stringent environmental standards within the single market. Southern member states, however, prioritized economic growth. A compromise was reached, establishing a single market with provisions for adopting environmental legislation and creating structural funds to support development projects in less affluent member states .

### **Leader States and Laggards: The Balance of Power**

The 1995 accession of affluent northern states with high environmental standards (Austria, Finland, and Sweden) shifted the balance of power towards stricter environmental policies (4, 70). These "green leader states" worked within EU institutions to raise standards and enact reforms, driven by domestic political pressures, a desire to reduce transboundary pollution, and the economic advantages of uniform environmental regulations within the single market. Meanwhile, "laggard" member states, often from the south, resisted such efforts, viewing their less stringent regulations as a competitive advantage and fearing the costs of implementation (29, 31).

### **The Challenges and Opportunities of Eastern Enlargement**

The 2004, 2007, and 2013 enlargements, encompassing Central and Eastern European (CEE) countries, presented significant challenges due to the environmental damage inflicted under communist regimes (71, 72). These new members lacked the institutional, financial, and human capacity for effective environmental regulation and civil society engagement. Some feared this expansion would weaken EU environmental policymaking (73). However, these concerns proved largely unfounded. CEE countries did not act as a homogenous bloc, forming diverse coalitions on environmental issues within the Council (72, 74). Similarly, their MEPs displayed varied positions on environmental legislation (59).

### **Supporting Newcomers: Cohesion Policy and Capacity Building**

The EU, through its cohesion policy, provides support to new members to build public and private sector capacity (75). This includes financing for environmental management, rural and agricultural development, and environment-related infrastructure. Additionally, the "Environment for Europe" process promotes improved public and civil society capacities



through ministerial conferences (76). EU membership has demonstrably improved environmental standards in many new member states, although the effectiveness of conditionality remains a topic of debate (77). Targeted governments may prioritize superficial changes without addressing underlying issues, leading to uneven progress across programs and countries (74, 78-80). Corruption within member states further complicates the picture (81).

### **The Role of Civil Society**

The EU recognizes the importance of civil society in promoting transparency and environmental monitoring (51, 82-84). It offers both political and financial support to NGOs, such as the Regional Environment Centres, which facilitate cooperation among public, private, and civil society actors in CEE. Overall, EU enlargement presents a multifaceted challenge – an opportunity to elevate environmental standards in candidate countries while navigating the complexities of integrating diverse economies and political systems.

## **6.2 Part 2- Specification of the Elements to Learn Under This Topic Including Learning Tasks:**

### **A. Air pollution**

Air pollution is one of the forms of pollution with major, disastrous effects on the environment. Technically, any physical, biological or chemical change in the atmosphere can be called air pollution and occurs when any harmful gas, dust or smoke, enters the atmosphere and affects plants, animals as well as human beings.

Implicitly, air pollution involves pollution of the atmosphere and thus any gas or substance entering the atmosphere can create undesirable imbalances in the medium and long term. Therefore, the thinning of the ozone layer in the atmosphere (the one that protects us from the negative effects of ultraviolet radiation) caused by air pollution is a major threat to the existence of ecosystems on the planet and represents the ultimate challenge that mankind must overcome despite the political differences on the international scene.

#### **I. Types of air pollutants**

In order to better understand the causes of air pollution we need to know that pollutants entering the atmosphere can be divided into primary pollutants and secondary pollutants. Primary pollutants are the direct result of an industrial process (such as sulphur dioxide emitted by factories, for example) while secondary pollutants are caused by the reactions of



primary pollutants.

## **II. Causes of air pollution**

The causes of air pollution include a number of activities such as:

Burning fossil fuels - sulphur dioxide emitted from burning fossil fuels (such as coal or oil) is one of the main causes of air pollution; at the same time, cars with internal combustion engines, the ones we use every day, are major sources of pollution with harmful effects on air quality because they release tens of thousands of tonnes of harmful gases into the atmosphere every day;

Agricultural activities - ammonia, for example, is a product often used in specific activities in the agricultural sector, while being one of the most dangerous gases in the atmosphere. Moreover, the widespread use of insecticides and pesticides contributes to environmental pollution, including atmospheric pollution.

Mining - Mining is an area where large equipment is used. During the process, dust and chemicals are released into the air causing massive air pollution. This is one of the reasons why this activity is responsible for the deterioration of the health of workers and residents near mining operations.

Household activities: household cleaning or painting products emit toxic substances into the air causing environmental pollution. Have you noticed that when you paint indoors, even with windows.

## **III. Effects of air pollution**

Among the effects of air pollution, the most serious are:

Respiratory and cardio-respiratory problems - the effects of air pollution on our health are alarming. They cause respiratory and heart problems, which are the most common medical conditions in these cases. Studies have shown that people living in areas with high levels of air pollutants in the air are prone to conditions such as pneumonia and asthma, among many others.

Global warming - rising global temperatures, rising sea levels and melting glaciers are alarming signals that unless urgent action is taken to stop air pollution, the environment will suffer irreversible damage. Unfortunately, the planet's leaders do not seem to understand each other or reach a consensus when it comes to limiting or preventing the irreversible...



Acid rain - gases entering the atmosphere, such as nitrogen oxides and sulphur oxides, mix with water droplets in the atmosphere, resulting in acid rain, with damaging effects on soil and plants.

Water eutrophication - eutrophication occurs when a large amount of nitrogen is deposited on the surface of the sea, favouring the growth of algae that adversely affect the underwater flora and fauna. Green algae that are present on lakes and ponds occur because of the presence of nitrogen in the air above a certain limit.

Effect of pollution on animals

#### **IV. Measures to prevent and reduce air pollution**

We all have an obligation to contribute to the protection of the environment and to ensure better air quality for ourselves and future generations. Here are some of the measures to prevent air pollution:

Use public transport - using public transport considerably reduces air pollution and relieves traffic congestion at the same time; do an exercise in imagination - put 60 occupants of a trolleybus or bus into 60 cars. Already you will have a roadway at least 200 m long (compared to the maximum 7 m of a trolleybus), a traffic jam and unbreathable air in the immediate vicinity of the "motorised caravan". So try to use the trolleybus or metro from time to time - you'll know you've done a bit more to protect the environment that day!

Save energy - turn off lights and any energy-consuming appliances when you leave home or when you are not using them. Electricity seems like a 'green' or clean source when compared to petrol, for example, when it comes to car fuel, but we forget that it is also produced in processes that generate pollution, such as during the process of burning hydrocarbons to produce electricity.

Reusing and recycling materials - reusing objects or recycling

#### **V. Sanctions**

Romanian legislation stipulates precise obligations for economic agents by Law 104/15.06.2011, a law that aims to protect human health and the environment by taking mandatory measures to maintain air quality.

Article 79 of Law 104/2011 establishes sanctions for legal persons in case of non-compliance with the provisions of the law on ambient air quality.



## **B. Water pollution**

Water pollution can be defined as the release of substances into groundwater or into lakes, rivers, estuaries, seas and oceans. These end up interfering with and affecting the beneficial use of water and also the normal functioning of ecosystems. In addition to the release of chemicals or micro-organisms, water pollution can also include the release of energy, in the form of radioactivity or heat.

For example, groundwater is a source considered potable by many people and is used for domestic purposes. Although it may appear clean, it is not excluded that it is still polluted by chemicals, bacteria and viruses.

Although seas and oceans contain large volumes of water, their natural capacity to absorb pollutants is limited. Contamination from sewage pipes, sludge or oil spills can harm marine life, especially microscopic phytoplankton that serve as food for larger aquatic organisms.

### **I. Sources of water pollution by nature of substances**

All water sources can be polluted by a variety of substances such as decaying organic waste, toxic chemicals, oil, oil, pathogenic micro-organisms, plant nutrients, sediments and radioactive substances.

Water pollution has many causes and can be caused by nitrates, detergents, pesticides, heavy metals and many other harmful substances from a variety of sources. Thus, there are several types of water pollution.

### **Physical water pollution**

Physical pollutants are those that include most of the toxic wastes that can end up in water. Radioactive deposits and wastes, water used in atomic plants, water used for cooling plants and thermal waters are just a few examples of pollution.

Also, even oil and petrol from millions of cars end up in the water. Nearly half of the estimated 1 million tonnes of oil entering the marine environment each year comes from land-based sources. At sea, tanker spills account for about 10% of the oil in the world's waters, while regular shipping industry operations through both legal and illegal spills contribute about a third. Oil is also naturally released from beneath the seabed through fractures known as seeps.

### **Chemical pollution of water**



Pollution of water with pesticides, oil spills, carcinogens, detergents or other substances specific to different industries is called chemical pollution. Waste is considered toxic if it is poisonous, radioactive, explosive, mutagenic, causing chromosome damage, teratogenic, causing birth defects, or bioaccumulative.

Sources of toxic chemicals include:

Improperly disposed wastewater from industrial plants and chemical processing facilities (lead, mercury, chromium);

surface runoff and sewage containing pesticides used in agricultural areas and on suburban lawns;

toxic waste from industrial, chemical and biological processes;

batteries for electronic devices, pesticides, mobile phones and computers;

household waste;

Toxic waste leads to huge costs in terms of economic expenditure, human and ecosystem health. They also cause substantial damage to animal and plant populations. Such wastes hinder natural restoration processes, destroy habitats, permanently reduce populations of sensitive species or inhibit their reproductive success.

### **Biological water pollution**

One of the main water pollutants is the city's sewage, as it is the main source of pathogens (disease-causing micro-organisms) and decaying organic substances. All of these pose a direct threat to human health. Decomposing organic matter is another type of threat to water quality. As organic matter is naturally broken down in sewage by bacteria and other micro-organisms, the oxygen content in the water is depleted. This endangers the water quality of lakes and streams, where high levels of oxygen are needed for fish and other aquatic life to survive. Wastewater treatment processes reduce the level of pathogens and organics in wastewater, but do not eliminate them completely.

At the same time, sewage is considered a major source of nutrients for plants. Excess nitrates and phosphates in the water encourage algae growth, sometimes causing unusually rapid growth. However, this is not necessarily a good thing, because when algae die the dissolved oxygen in the water decreases, as micro-organisms use it to digest the algae during the decomposition process. Anaerobic organisms (organisms that do not require oxygen to live) then metabolise the organic waste, releasing gases such as methane and hydrogen





sulphide, which are harmful to aerobic (oxygen-requiring) life forms. So the process by which a lake changes from a clean, clear state to a nutrient-rich, algae-filled state and from there to an oxygen-deficient, waste-filled state is called eutrophication, a natural, inevitable and slow process. However, when accelerated by human activity and water pollution it can lead to premature ageing and death of a water body.

### **Radioactive water pollution**

Radioactive waste is also extremely harmful and includes elements and compounds that produce or absorb ionising radiation and any material that interacts with such elements and compounds.

Medical waste is also a broad category of things harmful to water and aquatic life, and includes equipment and materials, used bandages, needles, fluids capable of harbouring organisms that cause infectious diseases, and other materials from hospitals or biological research facilities. These can very quickly transfer into the water and contaminate it.

### **Thermal water pollution**

Heat is considered to be a water pollutant because it decreases the water's ability to retain oxygen and increases fish mortality. Important fish species, such as trout, cannot survive in waters with very low oxygen levels. A major source of heat is power plants that discharge cooling water directly into rivers. The discharged water can be up to 15 degrees Celsius warmer than natural water.

## **II. Effects and consequences of water pollution**

The effects of water pollution on human health are many and extremely harmful. It is very important for everyone to be aware that polluted water can make any healthy body ill and, moreover, can lead to death. Pathogens in water in the form of disease-causing bacteria and viruses from human and animal waste are a major cause of illness from drinking water.

Even swimming can pose a risk. There can be many chemical pollutants in water, from heavy metals such as arsenic and mercury to pesticides and nitrate fertilisers.

Once ingested, these toxins can cause a range of health problems such as:

- cancer;
- hormonal disorders;
- harmful effects on brain function;
- skin rashes;
- inflamed eyes;



- respiratory infections;
- hepatitis;

It is also important for nature to have a healthy ecosystem if the waters are to benefit from oxygen. Where this is lacking, plants and animals suffocate and die. In some cases, these harmful substances can affect the lives of whales and sea turtles.

Contaminants in the water are toxic not only to aquatic life but also to humans. Thus, fish accumulate large amounts of toxins such as mercury, then they move up the food chain as predators eat their prey. At some point, they end up being consumed by humans.

### **III. Measures to prevent water pollution**

Perhaps the most effective method of reducing the effects of toxic waste on human health and the environment would be to eliminate its production. Toxins can be reduced by replacing some products with their non-polluting alternatives. Efficient production processes and proper maintenance of machinery also reduce toxins. Some wastes, such as heavy metals, can be recycled, which can reduce both the amount of toxins needed in the production process and the manufacturer's costs.

It's also up to each individual to help rebalance this balance. Here's what you can do:

- Don't pour the fat or oil you cook with directly down the sink or toilet. Try having a special storage jar and leave it in the bin when it's full;
- don't use the toilet as a bin. Avoid flushing make-up remover pads or wet wipes down it;
- only use the washing machine when the tub is full;
- make sure you use a minimum amount of detergent when washing clothes and dishes;
- buy only biodegradable containers;
- avoid using plastic as much as possible;
- sort household waste;
- dispose of batteries and light bulbs only in bins specially designed for them;
- if you visit an area where there is a lake, river or ocean nearby, do not throw any rubbish in or near water;

### **C. Waste management**



Proper waste management is a key issue in the fight to protect the environment and ensure a sustainable future for society. Over time, industrial development and population growth have led to an increasing production of waste, and the lack of effective management can have devastating consequences for ecosystems and human health.

The importance of waste management:

### **Protecting the environment:**

One of the most important aspects of waste management is protecting the environment. By properly collecting, treating and disposing of waste, soil, water and air pollution is prevented, thus protecting natural ecosystems and biodiversity. Proper waste management also reduces the risk of fires or toxic spills that can seriously affect natural habitats and wildlife.

### **Reducing greenhouse gas emissions:**

Improper disposal of waste can contribute to emissions of greenhouse gases such as methane, a gas with a global warming potential about 25 times that of carbon dioxide. By managing waste sustainably, through recycling, composting or other treatment methods, we can reduce our impact on climate change and contribute to efforts to combat global warming.

### **Saving natural resources:**

Proper waste management can help save natural resources. Through recycling and reuse, valuable materials can be extracted from waste and reintroduced into the economic cycle, thus reducing the need to exploit new natural resources. This contributes to conserving natural habitats, reducing energy consumption and minimising negative environmental impacts.

### **Protecting human health:**

Improper disposal of waste can pose a direct threat to human health. Toxic and hazardous substances contained in waste can enter soil and water, affecting their quality and potentially contaminating drinking water sources. Uncontrolled waste burning can also release chemicals into the atmosphere, which can cause respiratory and other health problems for local communities.

Proper waste management ensures that waste is collected, transported, treated and disposed of in a safe and responsible way. In this respect, local authorities, government organisations and civil society play an important role in developing and implementing effective waste management policies and strategies. At the same time, education and public awareness are essential to promote responsible waste management behaviour.

**Recycling** is one of the most effective methods of waste management, as it allows recyclable materials to be transformed into valuable resources for industry. Plastics, paper, glass and



metal can be recycled into new products, reducing the need for raw materials and the energy required for production.

Another important waste management practice is **composting**. Organic materials such as food and garden waste can be turned into compost, a natural fertiliser and soil nutrient. Composting reduces the amount of waste going to landfill and at the same time improves soil fertility and reduces the use of chemical fertilisers.

In addition, promoting **the circular economy** is an essential step towards sustainable waste management. This concept involves extending the life of products through repair, reuse and refurbishment, thereby encouraging a reduction in the amount of waste generated.

An important aspect in ensuring effective waste management is the involvement and collaboration of all stakeholders. Government authorities need to create the necessary legislative framework and infrastructure for waste management, and private companies need to adopt responsible waste production and management practices. At the same time, citizens need to be aware of the importance of responsible waste management and actively participate in selective waste collection and recycling.

In conclusion, waste management is of crucial importance in protecting the environment and ensuring a sustainable future for society. By adopting responsible practices such as recycling, composting and promoting the circular economy, we can contribute to reducing pollution, conserving natural resources and protecting human health. Education and public awareness of the importance of proper waste management also play an essential role in the fight to protect the environment.

### **6.3 Part 3- Best Practices We Have In Our Institution, In Our City or Country Even In the Partners' Countries**

According to the National Oceanic and Atmospheric Administration, climate change continues to increase the rate of extreme weather events, disrupt ecosystems and cause sea level rise. Fortunately, there are hundreds of organizations around the world working collaboratively and inclusively to find solutions. Involving community activists, policy makers, artists, families and more, they are helping people take a step forward and hopefully save the planet.

#### **350.ORG, INTERNATIONAL**

Writer and activist Bill McKibben and a group of university friends founded 350.org in 2008 with the goal of keeping global carbon dioxide concentrations below 350 parts per



million. They are using the power of collective individuals internationally to stop the exploitation of oil and gas and switch to 100% renewable energy.

### **INSTITUTE OF BIOMIMICRY, INTERNATIONAL**

Biomimicry is a design technique that solves problems by imitating nature. The mission of the Biomimicry Institute is to promote the transfer of ideas, models and strategies from biology to the design of sustainable human systems. For example, a person who wants to spend less energy on construction might consider using Moist Brick, a naturally cooling building material that can condense water from the night air, similar to the skin of a Texas horned lizard.

### **CLIMATE ACTION NETWORK (CAN), INTERNATIONAL**

CAN is a global network of over 1,300 environmental NGOs. With regional hubs in regions such as West Africa, South Asia, Latin America and Eastern Europe, the network works to promote government and individual action to address the impacts of climate change. CAN's working groups address a variety of issues including agriculture, science policy and technology.

### **GREENPEACE, INTERNATIONAL**

Founded in 1971, Greenpeace is a global organisation that uses peaceful protest and strategic communication to highlight environmental issues and promote solutions. Currently present in over 50 countries, Greenpeace works to stop deforestation, protect ocean health, stop nuclear testing and more. Through solutions rooted in social justice, they hope to help communities disproportionately affected by climate change.

### **HEALTH AND ENVIRONMENT ALLIANCE (HEAL), EUROPE**

HEAL works to develop laws and policies that protect global and human health and to raise awareness of the benefits of climate change mitigation. Their goal is to create a toxic-free, decarbonised and climate-resilient future. With over 90 member organisations, HEAL represents 200 million people in the 53 countries of the European region.

### **WORLD WILDLIFE FUND (WWF), INTERNATIONAL**

WWF is an international nonprofit organization that helps local communities access cutting-edge conservation science to protect natural resources. WWF's local chapters around the world address climate change by preparing for potential future disasters and studying how these changes will affect ecosystems and wildlife.



## **CENTRE FOR ENVIRONMENTAL RESEARCH (CCMESI), ROMANIA**

CCMESI conducts theoretical and field research on topics related to environmental sciences and biodiversity. Their mission is to help practitioners address local, regional and global environmental issues. Research results are shared with the general public, practitioners and the scientific community through research papers, books, technical reports, conferences and participation in debates. They successfully address topics such as rural and urban landscape, environmental quality, water quality, species protection (large carnivores, reptiles, amphibians, birds). The work of the research centre involves academics, PhD students, MSc students and undergraduate students.

The objectives of CCMESI are:

- To develop solutions to local, regional and global environmental problems;
- To promote the concept of sustainable development in Romania;
- Develop partnerships with universities, industry, local and national authorities;
- To train young researchers and trainees in environmental sciences;

## **NATIONAL ENVIRONMENTAL GUARD (GNM), ROMANIA**

The National Environmental Guard (GNM) is a government agency in Romania under the Ministry of Environment. It controls activities that have an impact on the environment, and imposes fines as provided for in environmental legislation.

In the field of environmental protection

- controls activities with an impact on the environment and applies the contraventional sanctions provided for in the environmental protection legislation;
- controls compliance with the provisions of environmental protection legislation, including the measures laid down in the compliance programmes for economic and social activities and compliance with the legal procedures for issuing legislation;
- exercises control over import-export activities of products, goods and other materials with special marketing regime;
- controls activities with major accident hazards and/or significant transboundary environmental impact in order to prevent and limit pollution risks;
- participates in interventions to eliminate or mitigate the major effects of pollution on environmental factors, as well as in determining their causes, and applies the penalties provided for by law;
- controls environmental investments in all phases of execution and has access to all





documentation;

- propose to the issuing body the suspension and/or annulment of regulatory acts issued in breach of legal provisions;
- ascertains the facts which constitute contraventions and applies the contravention sanctions in the field of environmental protection; refers the matter to the criminal investigation bodies and collaborates with them in ascertaining the facts which, according to environmental legislation.

#### **6.4 Part 4- Links to Videos and Further Reading Sources for the Content of Module**

<https://education.nationalgeographic.org/resource/air-pollution-101/>

<https://www.protectiamediului.org/gnm/> <https://www.greenpeace.org/eu-unit/>

<https://www.worldwildlife.org/> <https://www.epa.gov/education/what-environmental-education>

<https://www.facebook.com/joinundesa/videos/strengthening-sustainable-forest-and-ocean-management-to-mitigate-climate-change/315047640070094/>

<https://study.com/academy/lesson/video/the-role-of-individuals-in-protecting-the-environment.html>

#### **6.5 PART 5- The importance of the module in Youth Education**

The role of environmental education and protection of the environment is obvious, it focuses on shaping the future citizen able to form an objective point of view on the surrounding reality, to incite him to participate, thus becoming aware of the future and the fact that the life of tomorrow's generations depends to a large extent on his choices. Environmental education is an education through and for values, which can take concrete forms at different levels of schooling, delivering information content in a transdisciplinary way, in formal or non-formal contexts.

The provided module content on environmental policy holds immense significance for youth education.

#### **Part 1: The Foundation of Environmental Policy**

Understanding the Framework: This section provides a critical foundation. Understanding core principles like sustainability and legal frameworks empowers young people to analyze environmental policies critically and comprehend the rationale behind



environmental regulations (Dobson, 2007). Exploring the historical development of environmental policy allows them to see environmental protection as an evolving process shaped by global trends and concerns.

The Role of Actors: Identifying key players – EU bodies, member states, civil society organizations – illustrates the collaborative nature of environmental policy-making. This fosters a sense of agency in young people, knowing they can contribute to positive change through advocacy and participation (Hungerford & Volk, 2010).

### **Part 2: Environmental Challenges in Focus**

**Air and Water Pollution:** These sections equip young people with vital knowledge about environmental threats like air and water pollution. Examining sources, effects, and mitigation strategies enables them to understand the complex relationship between human activities and environmental health (McKeever & Razzaq, 2019). This knowledge empowers them to make informed choices in their daily lives and advocate for cleaner air and water.

**Waste Management:** Learning about waste generation, its consequences, and waste reduction and recycling strategies fosters responsible consumption patterns and a commitment to the circular economy in young people (Kirchherr et al., 2017).

### **Part 3: Inspiration Through Best Practices**

**Showcasing Success Stories:** Highlighting successful environmental initiatives allows young people to see positive change happening in the world. Including local, national, and international best practices demonstrates the diverse approaches to environmental protection and inspires them to become active participants in similar efforts.

#### **Importance of Clear Titles and Information:**

The module benefits from clear and concise titles that effectively convey the content within each section. This aligns with the principles of learner-centered education, ensuring accessibility and comprehension for young learners (Pashler et al., 2009).

## **6.6 Part 6- Implementation Activities for the Content Of Module**

### **Developing the ability to explore the surrounding reality**

Young people will be able to:	Activities
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- determine the degree of pollution of water, air, soil;	- investigation of the pollutants in the local horizon and the creation of an observation sheet; - carrying out case studies: determining the degree of pollution of water, air and soil;
- graphically represent information acquired through direct and indirect observations;	- individual or group mini-projects; - making posters, leaflets, flyers with messages to raise awareness among community members;
- experiment with their own solutions to ameliorate the negative impacts on an area;	- case study;

### Taking responsibility for the environment

Young people will be able to:	Activities
- to develop responsible behaviours and attitudes by referring to the legal norms in the environmental field;	- evoking own observations and debating them in interest groups; - popularizing models of good practice;
- to make responsible and correct decisions on environmental behaviour;	- making decision schemes about one's attitudes and decisions; - developing a set of rules on environmental protection; - case study;
- demonstrate an understanding of the consequences of inappropriate behaviour in relation to environmental health;	- participation in debates; - producing promotional materials; - participation in partnership activities with institutions and NGOs for the conservation and protection of the environment.



**6.7 Part 7- You Can Include A Self-Check For The Learner At The End, A Checklist About Competences They Have Got From The Module.**

Circle the correct choices:

1. Pollutants entering the atmosphere can be divided into:

- a. primary pollutants
- b. secondary pollutants
- c. tertiary pollutants

2. Types of water pollution:

- a. physical pollution
- b. biological pollution
- c. chemical pollution
- d. thermal pollution
- e. radioactive pollution
- f. conscious pollution

3. List 5 activities, which contribute to air pollution:

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4. Fill in the blanks using the appropriate expressions (**recycling, reuse, reducing, resources**):

Proper waste management can help save natural resources. Through ..... and



....., valuable materials can be extracted from waste and reintroduced into the economic cycle, .....the need to exploit new natural .....

## 6.8 Part 8- Conclusion

Education is the basis of everything in the world today, including the environment. Environmental education provides knowledge about the current state and future prospects of nature. It teaches people to explore all issues related to the environment and to consciously engage in its conservation. To take any step towards protecting the environment, we need awareness, which can only come through studying topics related to our ecosystems. What are the issues facing the world today? What are the components that make up the universe? What are the different species of plants and animals? How can we ensure their long-term survival? What is sustainability and how can it be achieved? The answer to these questions can only be found if we learn about the environment and apply this knowledge in practice.

Ensuring that the needs of future generations are met from the earth's resources would be a sustainable way of consuming these resources today. At the current rate of consumption, natural resources will be depleted too quickly for future generations to survive. Irresponsible use of these resources will leave future generations to bear the consequences of this exploitation. Environmental education helps people understand the repercussions of over-exploitation and act accordingly.

Environmental education connects students to the world around them, learning about natural and built environments, raising awareness of the issues affecting the environment on which we all depend and the actions we can take to improve and sustain it. Whether bringing nature into the classroom, taking students outside to learn, or relaxing on a family walk, contact with nature has many benefits for young people, educators, schools, and the community.

## 6.9 References

Adler, E., & Bernstein, S. (2001). *Constructing security: Culture, institutions, and militaries in the world economy*. Cornell University Press.

Börzel, T., & Risse, T. (2003). *Europeanization: Theory and empirical explanations*. Manchester University Press.



EEAS (European External Action Service). (2023, May 11). The history of the EU [Europa.eu]. europa.eu

Euractiv. (2023, May 11). Environment policy: general principles and basic framework [Fact Sheets on the European Union]. europa.eu

European Commission. (n.d.-a). Environmental liability. ec.europa.eu

European Commission. (n.d.-b). The European Green Deal. ec.europa.eu

European Commission. (n.d.-c). Environment action programmes. ec.europa.eu

European Commission. (n.d.-d). EU sustainable development strategy. ec.europa.eu

European Commission. (2020, May 20). EU biodiversity strategy for 2030. ec.europa.eu

European Commission. (n.d.-e). Environmental impact assessment (EIA). ec.europa.eu

European Commission. (n.d.-f). Environmental implementation review. ec.europa.eu

European Commission. (n.d.-g). European pollutant release and transfer register (E-PRTR). ec.europa.eu

European Environment Agency. (2020). The European environment - state and outlook 2020. eea.europa.eu

European Parliament. (2023, May 4). Environment policy: general principles and basic framework [Fact Sheets on the European Union]. europa.eu

European Parliament. (2019, November 28). Resolution of the European Parliament of 28 November 2019 declaring a climate emergency and calling for the Commission to comprehensively address it [2019/2938(RSP)]. eur-lex.europa.eu

European Parliament. (2021, June 20). Regulation (EU) 2021/1119 of the European Parliament and of the Council of 4 July 2021 establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999

Fudge, C., & Jordan, A. (2007). The European Union and environmental policy. Routledge.





Haas, E. B. (1964). *Beyond the nation-state: Functionalism and international organization*. Stanford University Press.

Hooghe, L., & Marks, G. (2010). *Multi-level governance and the European Union*. Westview Press.

Jordan, A., & Lensch, H. (2010). The European Union as a leader in environmental policy? *Environmental Policy and Governance*, 20(3), 107-123.

Knill, C., & Lecocq, W. (2007). *The Europeanization of environmental policy*. Routledge.

Kratochwil, F. (1986). *Images of anarchy: International relations in the twenty-first century*. Princeton University Press.

Lindberg, L. N. (1963). *The integration of European political communities*. Greenwood Publishing Group.

March, J. G., & Olsen, J. P. (1989). *Rediscovering institutions: The organizational basis of political action*. Cambridge University Press.

Marks, G., & Hooghe, L. (2013). Contradictions and complementarities of multi-level governance. *The Oxford Handbook of Governance*, 441-460.

Moravcsik, A. (1993). Preferences and power in international politics. *International Organization*, 47(4), 607-643.

Radaelli, C. (2008). *The European Union and environmental policy: Actors, institutions, and processes*. Routledge.

Roderick, P., & Wurzel, R. (2005). *European environmental policy and governance*. Routledge.

Selin, H. & Vandever, Stacy. (2015). European Union and environmental governance. *European Union and Environmental Governance*. 1-166. 10.4324/9781315723624.

Scharpf, F. W. (1988). The joint-decision trap: Lessons from experiences with budgetary policy in the European Communities. *Governance*, 1(1), 239-273.



Scott, W. R. (2008). *Institutions and organizations* (3rd ed.). SAGE Publications Ltd.

UN Environment Programme. (1972). *The Stockholm Declaration*. [unep.org]. Retrieved from <https://unep.org/resources/filter/alltags=501>

Court of Justice of the European Union. (1976). Case 43/75, *Defrenne v. Sabena* [1976] ECR 431.



## **MODULE 7: Development of environmental literacy handbook Education Curriculum**

### **7.1 Basic approaches of the Environmental Literacy Handbook Curriculum**

The culmination of this program, Module 7: Development of Environmental Literacy Handbook Education Curriculum, serves as our comprehensive guide to crafting an impactful environmental education program regarding 6 modules shared above. Having journeyed through the intricacies of environmental policy, pollution, best practices, and youth engagement in the previous modules, this handbook empowers you, the educator, to translate this knowledge into a dynamic and engaging curriculum for your learners.

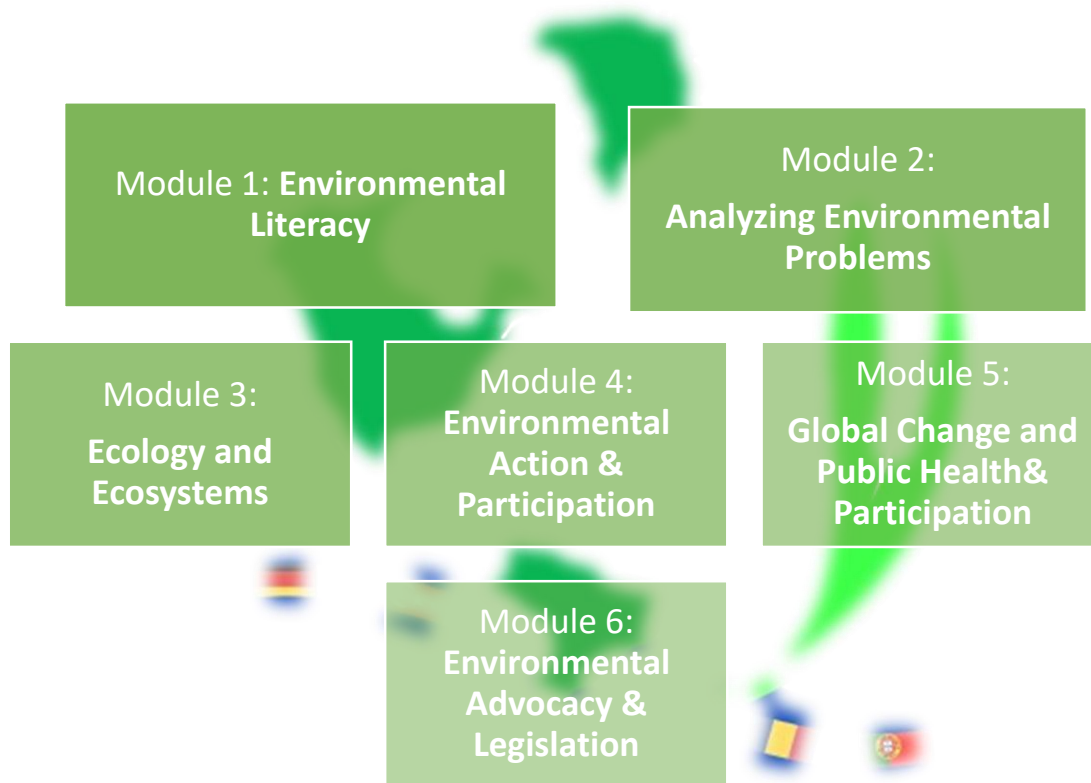
This handbook goes beyond simply outlining environmental concepts. It delves into the "how" of teaching environmental literacy, equipping you with the necessary tools and strategies to facilitate effective learning. Here, you'll discover a framework for structuring a curriculum that fosters a deep understanding of environmental issues and encourages responsible action.

Module 7 guides you through the process of curriculum design, providing practical steps for building engaging lesson plans that cater to diverse learning styles and age groups. It explores various didactic approaches, moving beyond traditional lecture formats and encouraging active learning through discussions, case studies, and simulations. By incorporating these interactive activities, you'll solidify student understanding and inspire a sense of environmental stewardship.

Ultimately, Module 7 serves as a bridge, empowering educators to become catalysts for change. Through interactive learning experiences, you'll ignite a passion for environmental responsibility in your students, inspiring them to take positive action and become active participants in building a sustainable future.

### **7.2 The Learning Journey: How Modules and Outcomes Foster Environmental Literacy**

The curriculum is based on seven modules of which the last module is about the curriculum and the learning outcome matrixes of the project. Therefore, the seventh module is only presenting the curriculum and didactic approaches and does not count into the timeframe. So, in general, the timeframe for the modules 1-6 are having different time frame for every module which makes 26 hours of training:



Build upon the modules and the learning outcome matrixes, the curriculum is developed. The curriculum consists of a scope and sequences, learning outcomes, instructional strategies, assessment methods, resources and materials and how you can differentiate according to learners' needs and capacities, as well as a timeframe for each module. In the following, the curriculum for the modules can be found:



**Module 1: Ethical and aesthetic values in environmental education**

Timeframe: 4 hours of training, either consecutive or two times two hours

**Scope and Sequence:**

The module delves into alternative ethical frameworks. Life-centered ethics, for instance, acknowledges the intrinsic value of all living beings, fostering a more inclusive approach to environmental decision-making. Ecocentric ethics takes this a step further, emphasizing the inherent value of ecosystems and the interconnectedness of all life. This holistic approach encourages a shift towards practices that promote the well-being of the entire planet, not just humans.

**Instructional Strategies:**

Module 1 leverages a variety of resources to cater to diverse learning styles. Text and graphics provide a foundation, while videos on specific topics offer additional insights. The module can be completed independently or collaboratively. Learners can work alone, in pairs, or even in teacher-facilitated groups. In group settings, students could be assigned different sub-topics or videos to explore and present their findings back to the class, fostering deeper engagement and knowledge sharing.

**Assessment Methods:**

All Learners:

- Ethical Debate
- Case Study Analysis
- Creative Sustainability Project

For High-Ability Learners:

- Environmental Ethics Research Project
- Green Leader Q&A

For Moderate-Ability Learners:

- Jigsaw: Ethics in Action
- Stakeholder Role-Playing
- Environmental Ethics Mind



		<p>Map</p> <p>For Low-Ability Learners:</p> <ul style="list-style-type: none"> <li>● Exit Ticket: What Did You Learn?</li> <li>● Photo Discussion: Ethics in Pictures</li> <li>● Environmental Ethics Word Hunt</li> </ul>
<p><b>Main Learning Outcome:</b></p> <p>To develop an informed and ethically responsible perspective on human interaction with the environment.</p>		
<p><b>Other Learning Outcomes:</b></p> <p>When participants finish this module, they will be able to define environmental ethics and its importance in today's world. They will have tools to explain the different approaches to environmental ethics, including anthropocentrism, life-centered ethics, ecocentrism, and other emerging perspectives. Participants will have a chance to identify the core principles of each ethical framework and recognize</p>		





<p>the strengths and weaknesses of different approaches. Finally, they will gain real-world examples of environmental ethics in action.</p>		
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**Differentiation:**

Module 1 includes tools to cater to learners of varying abilities while still addressing the core theme of developing an informed and ethically responsible perspective on human interaction with the environment. Throughout the module, the core content on environmental ethics approaches (anthropocentrism, life-centered ethics, etc.) will remain consistent. However, the depth and complexity will be adjusted. High-ability learners will delve deeper into eco-innovation, sustainability design, and green entrepreneurship within each ethical framework, analyzing real-world examples. Moderate-ability learners will explore these concepts with a focus on their role in fostering sustainable business practices, while low-ability learners will gain a foundational understanding of their impact on environmental sustainability.

Differentiation will extend to other sections as well. Part Three, focusing on best practices, will showcase local examples of eco-innovation and green initiatives. High-ability learners can then research best practices further, while moderate-ability learners analyze case studies, and low-ability learners encounter clear, relatable examples. Resources will also be varied. Research papers and articles on advanced topics will cater to high-ability learners, while clear videos and articles will support moderate-ability learners. Low-ability learners will benefit from infographics and short, straightforward videos. Activities will be similarly adjusted. High-ability learners might develop business plans or analyze case studies for improved sustainability, while moderate-ability learners could debate ethical implications or role-play company board meetings. Low-ability learners can create eco-friendly posters or identify examples of eco-innovation in daily life. Finally, the self-check will adapt its questions. High-ability learners will face open-ended questions requiring analysis and application, moderate-ability learners will answer multiple-choice and short answer questions, and low-ability learners will engage with true/false and matching questions. Through these adaptations, Module 1 ensures all learners, regardless of



ability, can achieve the main learning outcome and gain valuable knowledge and skills in environmental ethics.



**Module 2: Analysis of Perceived Environmental Problems According to Environmental Literacy Level**

**Timeframe:** 6 hours of training, either consecutive or two times two hour

<u>Scope and Sequence:</u>	<u>Instructional Strategies:</u>	<u>Assessment Methods:</u>
<p>Module 2 starts by introducing environmental literacy and its role in understanding environmental problems. It then dives deep into the core components: building a "culture of complexity" to consider diverse perspectives, developing the "capacity for action" to solve problems, and fostering a sense of "co-responsibility" for the environment. Learners explore best practices in environmental education at different age levels and across countries. Finally, resources and further learning opportunities solidify their understanding.</p> <p>Module 2 also emphasises long-term behavioural change alongside immediate practical application. Starting in early childhood, the program instils an "ecological consciousness" through educational activities that build knowledge, problem-solving skills, and responsible attitudes towards the environment. By integrating environmental issues into various school subjects and collaborating with families and communities, the program aims to cultivate future citizens who actively protect nature and promote a harmonious</p>	<p>Module 2 leverages a variety of resources to cater to diverse learning styles. Text and graphics will provide the foundation for core concepts like "culture of complexity," "capacity for action," and "co-responsibility" for the environment. Case studies and videos will then bring these concepts to life by showcasing real-world situations that highlight the importance of considering multiple perspectives, taking action, and sharing responsibility. The module can be completed independently, allowing learners to explore the content at their own pace. However,</p>	<p><b>For All Learners:</b></p> <ul style="list-style-type: none"> <li>● Environmental Issue Analysis</li> <li>● Best Practice Presentations</li> </ul> <p><b>For High-Ability Learners:</b></p> <ul style="list-style-type: none"> <li>● Comparative Environmental Education Research</li> <li>● Expert Interview</li> </ul> <p><b>For Moderate-Ability Learners:</b></p> <ul style="list-style-type: none"> <li>● Environmental Literacy Quiz</li> </ul>



<p>relationship between humans and the environment.</p>	<p>collaborative activities can also be incorporated. Learners can work in pairs or groups to analyze best practices in environmental education and present their findings to the class, fostering deeper engagement and knowledge sharing through the exchange of ideas and perspectives on environmental literacy.</p>	<p><b>For Low-Ability Learners:</b></p> <ul style="list-style-type: none"> <li>● "Before and After" Pictures</li> </ul>
<p><b><u>Main Learning Outcome:</u></b></p> <p>To develop a deeper understanding of environmental literacy and its components (culture of complexity, capacity for action, co-responsibility) and how these elements influence the way people perceive environmental problems.</p>		
<p><b><u>Other Learning Outcomes:</u></b></p> <p>Finishing Module 2 will let participants identify specific best practices in environmental education at different levels (early childhood, primary, secondary, high school) and gain an understanding of the national curriculum offerings related to environmental education in their own context and potentially in partner countries. They will also become familiar with resources for further learning on environmental literacy and related topics (videos, articles). With the help of activities, they will develop critical thinking skills to analyse environmental issues from a holistic perspective (considering complexity, action, and responsibility) and evaluate the effectiveness of different</p>		



environmental education approaches based on their impact on environmental literacy.		
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**Differentiation:**

Module 2, while focusing on core ecological principles and ecosystems, can be enriched by the context of Romania's strong commitment to environmental education. Case studies highlighting successful Romanian "Green Schools" can showcase real-world applications of ecological concepts. Project-based learning activities focused on improving their own schools' environmental practices can connect these concepts to students' lives. Additionally, incorporating local Romanian ecosystems and environmental challenges can make the learning experience more relevant and engaging. This approach bridges the gap between the broader theme of environmental education and the specific ecological foundations explored in Module 2.



### Module 3: Ecology And Ecosystem

**Timeframe:** 4 hours of training, either consecutive or two times two hour

#### Scope and Sequence:

This ecology module introduces learners to the essential role ecosystems play in our world. Part 1 lays the groundwork by defining ecology, highlighting its importance in understanding our dependence on nature, and exploring historical trends in environmental awareness. Part 2 delves deeper, outlining key elements like ecological basics, ecosystem components, and interactions within them. The human impact on ecosystems and case studies with best practices will be covered in future updates (Parts 2.4 & 2.5). Parts 3 and 4 will showcase best practices from partner countries and provide additional learning resources. Part 5 emphasizes the significance of this module for youth education, aiming to cultivate awareness, critical thinking, responsible action, future leadership skills, and collaborative problem-solving for environmental challenges. Finally, Part 6 will detail engaging activities like field trips and project-based learning to solidify understanding. This comprehensive structure empowers learners to grasp the intricate web of life within ecosystems and the impact

#### Instructional Strategies:

Module 3 delves into sustainable practices to counter human impact on ecosystems. To keep learners engaged and solidify understanding, the module utilizes a diverse toolbox. From captivating multimedia presentations to interactive activities like simulations and quizzes, learners actively explore concepts. Group discussions and role-playing exercises spark critical thinking as they analyze real-world case studies and debate solutions. This multifaceted approach caters to various learning styles and empowers individuals to become active participants in building a more

#### Assessment Methods:

- Debates
- Short quizzes/polls
- Exit tickets
- Individual presentations
- Project-based learning
- Essays/reports
- Reflection journals
- Self-evaluation checklists





<p>humans have on this delicate balance.</p>	<p>sustainable future.</p>	
<p><b><u>Main Learning Outcome:</u></b></p>		
<p>Module 3 empowers learners to understand and apply sustainable practices in response to human impact on ecosystems.</p>		
<p><b><u>Other Learning Outcomes:</u></b></p>		
<p>Learners will gain a strong foundation in ecological principles, including the study of interactions between organisms and their environment and identify and explain the different components of ecosystems, such as biotic (living) and abiotic (non-living) factors. After finishing the module 3, they will be able to understand the interconnectedness of living organisms and their environment within ecosystems and analyse the delicate balance maintained in ecosystems and the potential consequences of disrupting it.</p>		
<p><b><u>Differentiation:</u></b></p>		
<p>Module 3 tackles sustainable practices in response to human impact on ecosystems. Recognizing diverse learning styles, the module caters to all learners. High-ability students will lead discussions and analyse complex case studies, while moderate-ability learners actively participate in group activities and strategize adaptation plans. Low-ability learners receive additional support and engage in simplified discussions and</p>		



activities, ensuring everyone grasps key concepts and feels empowered to contribute to a sustainable future.

**Module 4: Environmental activities where individuals or groups invite others to help prevent or solve environmental problems**

**Timeframe:** 4 hours of training, either consecutive or two times two hour

**Scope and Sequence:**

Module 4 dives into climate change, its human causes, and its effects on land-based life. Students will explore the science behind global warming and the greenhouse effect, then analyse how human activities like burning fossil fuels contribute. The module examines how climate change impacts ecosystems, biodiversity, and food security. It then delves into solutions, exploring renewable energy sources, sustainable practices, and strategies for adapting to a changing climate. Finally, students will develop action plans to reduce their own impact and explore ways to get involved in addressing this global challenge.

**Main Learning Outcome:**

The main learning outcome is to empower students to become informed and responsible global citizens who can address

**Instructional Strategies:**

Module 4 tackles climate change through a mix of resources to suit different learning styles. Text and visuals will establish the science of global warming and human influences. Then, case studies and videos will bring these concepts to life. We'll explore real-world examples of climate change's impact on land and its inhabitants. Following this, the module will delve into solutions, examining renewable energy, sustainable practices, and adaptation strategies. Just like

**Assessment Methods:**

- Quizzes & Short Answer prompts
- Exit Tickets
- Class Discussions & Participation
- Essays or Reports
- Projects or Presentations
- Simulations or Role-Playing Activities
- Reflection Journals
- Pre- & Post-Module Surveys



<p>environmental challenges.</p>	<p>Module 2, Module 4 can be completed independently for self-paced learning. But, collaborative activities can also be integrated. Students can work together to analyze solutions and present findings, fostering knowledge sharing and deeper engagement through discussions on climate change and its solutions.</p>	
<p><b><u>Other Learning Outcomes:</u></b></p>		
<p>Beyond environmental literacy, this program can cultivate a range of valuable skills. Students will hone their critical thinking and problem-solving abilities by analysing environmental challenges and proposing solutions. Effective communication will be crucial for conveying their knowledge and inspiring others. The program can also foster responsible decision-making in daily life, leadership qualities, and a sense of civic engagement that encourages participation in environmental advocacy. Collaboration and teamwork will be essential for tackling complex issues, while interdisciplinary learning will connect environmental concerns with broader contexts. Ultimately, this program strives to develop well-rounded global citizens who understand the interconnectedness of our planet and take responsibility for its future.</p>		
<p><b><u>Differentiation:</u></b></p>		
<p>Module 4 adapts its approach to cater to varied learning styles. High-ability students will analyze real-world climate data and lead discussions on solutions like renewable energy policies. They can also delve into case studies. Moderate-ability learners will participate in group activities, strategizing adaptation plans or role-playing climate negotiations. Low-ability learners will engage in accessible activities like calculating their</p>		



carbon footprint or researching ways to conserve energy at home. They will participate in discussions on the importance of individual action, using clear language. Resources will be tailored to each group, with high-ability learners exploring scientific articles, while others benefit from visuals and simpler texts. Scaffolding and support will be available, along with choices in activities to ensure all students can grasp key concepts and feel empowered to contribute to solving climate change.



**Module 5: The Impact of Global Change on Human Health, Infectious, and Epidemic Diseases**

**Timeframe:** 4 hours of training, either consecutive or two times two hours

**Scope and Sequence:**

In the introductory segment, participants delve into the intricate relationship between global change and human health. They define global change and its ramifications on various health aspects, including the emergence and spread of infectious diseases and epidemic outbreaks. The session explores how factors such as climate change, urbanization, and globalization intersect to shape health vulnerabilities and pose challenges to healthcare systems worldwide.

**Main Learning Outcome:**

Upon completing the module, participants will have developed a comprehensive understanding of the impact of global change on human health, including the dynamics of infectious diseases, adaptation strategies, and the promotion of resilience and equity in healthcare systems.

**Other Learning Outcomes:**

In addition to the main learning outcome, participants will define

**Instructional Strategies:**

The module employs a diverse range of instructional strategies to facilitate learning and engagement. These include multimedia presentations, interactive activities, and group discussions aimed at fostering critical thinking and knowledge application. Learners are encouraged to explore real-world scenarios, analyse case studies, and participate in role-playing exercises to deepen their understanding of module concepts.

**Assessment Methods:**

Assessment methods include group presentations on case studies, completion of interactive tasks using platforms such as H5P, essay assignments, self-reflection exercises, multiple-choice quizzes, and gap text exercises. These assessments evaluate learners' comprehension, critical thinking skills, and ability to apply module content to practical scenarios.



key concepts related to infectious diseases, analyse case studies, evaluate adaptation strategies, explore technological solutions, and recognize the importance of promoting health equity and resilience in vulnerable populations.		
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**Differentiation:**

The module accommodates learners of varying abilities through tailored instructional approaches. High-ability learners lead discussions and analyse complex case studies, while moderate-ability learners actively participate in group activities and collaborate on adaptation strategies. Low-ability learners receive additional support to grasp key concepts and engage in simplified discussions and activities aligned with their learning needs.





**Module 6: Environmental activities that people use to support or strengthen laws designed to help prevent or solve environmental problems**

**Timeframe:** 4 hours of training, either consecutive or two times two hours

**Scope and Sequence:**

Module 6 explores the EU's environmental policy, unpacking its guiding principles and legal framework. We'll then examine its historical development and delve into key theoretical perspectives. Finally, the module dives into the tools used to implement and enforce these policies, equipping you to understand the EU's approach to environmental protection.

**Main Learning Outcome:**

The main learning outcome for module 6 is to understand the development and implementation of environmental policy within the European Union.

**Other Learning Outcomes:**

Module 6 goes beyond just understanding the development and implementation of EU environmental policy. By the end of the

**Instructional Strategies:**

Module 6 utilizes a variety of teaching methods to cater to diverse learning styles. Lectures with visuals will establish the foundation, while real-world case studies and guest speakers from environmental organizations or the EU will bring the policy to life. Students will actively engage through discussions, simulations where they role-play key actors, and policy analysis projects. Technology will also play a role, with online platforms for exploring policy options, virtual field trips to environmental projects, and collaborative tools for group work.

**Assessment Methods:**

- Quizzes & Short Answer prompts
- Participation in Discussions & Simulations
- Peer Reviews
- Policy Briefs
- Presentations
- Policy Analysis Projects
- Self-Reflection Essay



<p>module, you'll also be able to analyze the various theoretical frameworks that inform this policy, such as intergovernmentalism and multilevel governance. You'll gain insights into the historical development of EU environmental efforts, from early action programs to the current focus on ambitious goals. Additionally, the module will equip you to critically evaluate the role of different actors, including member states, the European Parliament, and the European Commission, in shaping and enforcing environmental regulations. Ultimately, Module 6 aims to empower you to become a more informed and engaged citizen, capable of understanding the complexities of environmental policy within the European Union.</p>	<p>We'll differentiate instruction with tiered activities and visual aids, while offering scaffolding and support for all learners. Assessment will be a mix of quizzes, policy brief writing, presentations, and self-reflection to ensure a well-rounded understanding of the EU's approach to environmental policy.</p>	
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**Differentiation:**

Module 6 mirrors Module 1's approach to diverse learners. The core content on EU environmental policy instruments, principles, and actors remains constant. High-ability learners delve into complex policy documents, research innovative solutions, and explore emerging technologies. Moderate-ability learners analyze scenarios, participate in policy simulations, and research local best practices. Low-ability learners gain basic understanding through visuals, identify real-world policy examples, and discuss the importance of environmental policy. Resources and activities



are tailored accordingly, with high-ability learners accessing research papers and conducting mock simulations, while moderate-ability learners utilize clear articles and participate in debates. Low-ability learners benefit from short videos and create awareness posters. Self-assessment adapts as well, with high-ability learners tackling open-ended analytical questions, moderate-ability learners answering a mix of question formats, and low-ability learners engaging in basic knowledge checks. This ensures all students grasp the core theme of environmental policy and its role in achieving a sustainable future.