



**JOINT OPERATIONAL PROGRAMME
BLACK SEA BASIN 2014-2020**

**Project:
Leave your Environmentalist Spirit Online for the Black Sea Basin
“SpiritBSBonline”**

Output O.T2.2 “New Environmentalist Education Model”

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European Union Definition

The European Union is a unique economic and political partnership between 27 European countries. In 1957, the signature of the Treaties of Rome marked the will of the six founding countries to create a common economic space. Since then, first the Community and then the European Union has continued to enlarge and welcome new countries as members. The Union has developed into a huge single market with the euro as its common currency. What began as a purely economic union has evolved into an organisation spanning all areas, from development aid to environmental policy. Thanks to the abolition of border controls between EU countries, it is now possible for people to travel freely within most of the EU. It has also become much easier to live and work in another EU country. The five main institutions of the European Union are the European Parliament, the Council of Ministers, the European Commission, the Court of Justice and the Court of Auditors. The European Union is a major player in international cooperation and development aid. It is also the world's largest humanitarian aid donor. The primary aim of the EU's own development policy, agreed in November 2000, is the eradication of poverty.



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1. INTRODUCTION

The present paper aims to propose a “New Environmentalist Education Model”, created within the ambitious and innovative “Spirit BSB online” project, financed by European Commission within the CBC Black Sea Basin 2014-2020 program.

In the contemporary world the concept of environment and the formation of ecological culture among the young people is one of the most important issues in the education system of the world.

Environmental education teaches about how the planet’s physical and biological system works, and how we can create more sustainable future. Therefore, the young Environmentalist educational model believes that Environmental Education is a process aimed at creating awareness in the youth rather than preaching to the population. Our main goal is the formation of environmental consciousness and culture in young people.

It is also the duty of every human being to know the value of natural resources. It is clear from many years of experience that educating students in the spirit of love for the motherland and the environment from an early age is an important task for each of us.

Undoubtedly, the basis of the culture of environmental safety among young people is environmental education, which covers all levels of the education system, from preschool to higher education. This is due to the fact that environmental education, aimed at specific goals, can increase the environmental awareness of young people, develop in them the skills of conscious attitude to nature, cultivate the qualities of a sincere attitude to work.

Young activists, people such as Xiye Bastida, Isra Hirsi, Alexandria Villaseñor and Greta Thunberg, have acted out and spoken up courageously about the environmental issues that face our generation, present and future. These young people are a voice for a generation that, up until a few years ago, was excluded from the climate conversation. Without these activists who inspire and motivate, young people wouldn’t have a seat at the table. It feels only right to join the fight.

Our belief is that if given the information and opportunities, all young people would become environmentalists.



2. GENERAL PRESENTATION OF THE CONTEXT IN WHICH THE NEW ENVIRONMENTALIST EDUCATION MODEL IS PROPOSED

2.1 Environmental Education - Short Description, goals



Owing its growing population, pollution and fast depletion of the sources, human society is challenged by the need to change the developmental paradigm towards sustainability, e.g., [1-3]. In the process of raising awareness among and the competence of citizens and societies in managing our planet in a sustainable and environmentally friendly manner, schools must play their part and accept responsibility for building “environmental literacy” [4, 5] by means of environmental education [6]. The concept of environmental literacy is not understood monolithically by different authors [7]; however it can be briefly summarized as having competency in recognizing environmental problems, as well as correct attitude, motivation and skills to take an active role in solving them.

It is important that we not only take direct action now, such as expanding initiatives to reduce emissions and increase renewable energy output, in order to make our way towards a more sustainable planet, but also that we give future generations a clear understanding of our environmental problems and challenges, because eventually they will be the ones that inherit them.



Learning about important environmental concepts, such as the value of conserving our natural resources and the impacts of emissions and waste, will help shape the future of both individual decisions as well as national and global sustainability strategies, but all too often these subjects are skipped over in lieu of other, more traditional, educational priorities.

The Treaty on Environmental Education for Sustainable Societies and Global Responsibility is an outcome of the First International Conference on Environmental Education, an event which took place in 1992 in Rio de Janeiro, parallel to the Second United Nations Conference on Environment and Development, which was held during that year's Global Forum. The Treaty was drafted over the course of a year in a cooperative effort among adult, youth, and childhood educators from eight regions of the world (Latin America, North America, the Caribbean, Europe, Asia, the Arab States, Africa, and the South Pacific). It was initially published in five languages: Portuguese, French, Spanish, English, and Arabic.

Besides serving as a guideline for educational activities, the Treaty stimulated the creation of civil society organizations and networks within the framework of environmental education.

The following principles, as outlined in the Treaty, continue to inspire the work of countless Adult Education initiatives throughout the world today:

1. Education is the right of all; we are all learners and educators.
2. Environmental education, whether formal, non-formal or informal, should be grounded in critical and innovative thinking in any time or place, promoting the transformation and reconstruction of society.
3. Environmental education is both individual and collective. It aims to develop local and global citizenship with respect to the self-determination and the sovereignty of nations.
4. Environmental education is not neutral but is value-based. It is an act for social transformation.
5. Environmental education must involve a holistic approach and thus an interdisciplinary focus in the relations between human beings, nature and the universe.
6. Environmental education must stimulate solidarity, equality, and respect for human rights involving democratic strategies and an open climate of cultural interchange.
7. Environmental education should treat critical global issues, their causes and interrelationships with a systemic approach and within their social and historical contexts. Fundamental issues in relation to development and the environment such as population, health, peace, human rights, democracy, hunger, degradation of flora and fauna, should be perceived in this manner.
8. Environmental education must facilitate equal partnerships in the processes of decision-making at all levels and stages.
9. Environmental education must recover, recognize, respect, reflect, and utilize indigenous history and local cultures, as well as promoting cultural, linguistic, and ecological diversity. This implies acknowledging the historical perspective of native peoples as a way to change ethnocentric approaches, as well as the encouragement of bilingual education.



10. Environmental education should empower all peoples and promote opportunities for grassroots democratic change and participation. This means that communities must regain control of their own destiny.
11. Environmental education values all different forms of knowledge. Knowledge is diverse, cumulative, and socially produced, and should not be patented or monopolized.
12. Environmental education must be designed to enable people to manage conflicts in just and humane ways.
13. Environmental education must stimulate dialogue and cooperation among individuals and institutions in order to create new lifestyles which are based on meeting everyone's basic need, regardless of ethnic group, gender, age, religious, class, physical, or mental differences.
14. Environmental education requires a democratization of the mass media and its commitment to the interests of all sectors of society. Communication is an inalienable right and the mass media must be transformed into one of the main channels of education, not only by disseminating information on an egalitarian basis, but also through the exchange of means, values and experiences.
15. Environmental education must integrate knowledge, skills, values, attitudes, and actions. It should convert every opportunity into an educational experience for sustainable societies.
16. Education must help develop an ethical awareness of all forms of life with which humans share this planet, respect all life cycles, and impose limits on human exploitation of other forms of life.²

The Treaty was reviewed and updated in 2006, at the Fifth Ibero-American Congress on Environmental Education, which was convened in the Brazilian city of Joinville (State of Santa Catarina). It was also the subject of a workshop held by the International Council for Adult Education (ICAE) in 2007, in Nairobi, Kenya, and was presented in Ahmadabad, India at the international conference which marked the completion of 30 years of the first international Environmental Education conference in Tbilisi, Georgia. These international events confirmed the continuing validity of the Treaty, paving the way for the Second International Conference on Environmental Education.

The quest for human and social change and the incentive to create equitable and ecologically balanced communities in compliance with the goals set out in the Treaty require us, from a global and structural perspective, to address the causes of human and social deterioration, while at the same time taking into account local realities. It demands that we foster cultural diversity, that we accept and value different ways of knowledge, and that we establish alternatives for life based on self-determination in matters relating to labor, capital and knowledge, and sustainable modes of production and consumption, to achieve the kind of world envisaged in the Treaty.

It will not be possible for us to adapt to the expected global socio-environmental changes already taking place without environmental education. Without youth education, the Millennium



Goals and the goals of the Decade of Education for Sustainable Growth, goals and goals which our world's nations have also found to be of high priority in several other conventions and programs, would not be possible.

We still cannot make the clear argument that we are all "environmentally informed" considering all the initiatives.

Education is a tool. It must, as such, be permanent and continuing. It must be a life-long process that all the organizations and individuals who are interested in every facet of our existence understand in an articulated way. It is a process that in every space of existence must always strive to involve every individual.

Many parts of the Curriculum for Environmental Education as Education for Sustainable Development have already become part of the teaching and learning experience in secondary schools.

More significantly, environmental issues are mostly conveyed through formal instruction while teaching in the environment and using the environment for active inquiry- and problem-based learning are uncommon. Most of the time is used for teaching about the environment while teaching within the environment and using environment for situated learning occurs only rarely.

Every society needs to have a good curriculum for environmental education to protect its environment. Environmental education is now a part of many curriculums across the globe and each country has its own mechanisms depending on the educational system and other variables such as social and political values and other educational priorities (Thomson-Hoffman, 2004). EE in Europe developed from the 1980s, especially after Intergovernmental Conference on Environmental Education in Moscow in 1987 (Filho, 1996). According to Yueh (2007), an interesting point in Europe is that EE outside the formal education system has achieved a greater impact than that taught in schools, in particular, the informal organizations such as nature clubs, nature centers and national parks and non-governmental organizations (NGOs). Countries in Europe determined that environmental problems are specific to each country and each region and so countries should produce their own EE programs to solve their own problems (Yueh, 2007).

2.2 The project which proposed the new model - short presentation

The "Spirit BSB online" project takes the unique opportunity offered by CBC Black Sea Basin 2014-2020 program, a program which overall objectives is to improve the welfare of the people in the Black Sea basin regions through sustainable growth and joint environmental protection. The overall objectives of the project is to increase awareness and knowledge of environmental issues of Black Sea Basin by promoting joint sensibilization action, by creating a positive model



and positive behaviors of young, and by wide spreading of this model, for contribute to joint environmental protection.

The “Spirit BSB online” project is built on four groups of activities. First group of Research Program will be represented by activities of information and search of dates and facts. There will be conducted two research: one about current status of pollution in BSB. All area of the program will be subject of the research, to have the whole imagine of the BSB. The team will focus too on defining an external area of BSB with a pollution impact on BS, and the potential pollution risks from these areas. The second research is about current status of environmental education. The project will identify and define the educational model in the schools of the three partner countries.

In the second group, of Development Program, the project will work on the development of innovative tools in the field of environmental education, with the main subject of Black Sea protection, but also with subjects on general aspects of pollution. On the basis of the research group we set out to develop a “Pollution and solutions in BSB - Handbook for everyone” and a New Environmentalist Education Model. The project will develop ecological education tools that use IT and the Internet. We propose to develop a video game, especially for ecological education, but also an online platform, in which to create an on-line spirit for the Black Sea.

Through the third group Develop the integrated training program “Young environmentalist” the project created a training designed to take place on three plans: classic education through lessons in classes, education through the game, using the digital phase of the game, and then it will go to the level of ecological education in real context, in nature.

The four group of Environmental Campaign Program will be developing on several levels at once. An one year online campaign “10.000 online for Black Sea” will be organized through the platform. Four environmental events will be organized in the territory to celebrate The International Black Sea Day. A Joint Online Petition Action “Not just eight are using the Black Sea” will be developed. Finally, an international environmental conference will be held.

Target group of the model are young people aged from 11 till 16 years old. During the development of the project idea, it was envisioned that model should have been concentrated on pollution of Black Sea Basin. The main subject of environmental education is of course the Black Sea, but also general aspects of environment and pollution issues are taken into account, like the principle of “the polluter pays” or the “3 Rs” or “pollution has no border”. The goal of developing these new environmental education tools is to raise awareness of the target audience.

Through the third group, Develop the integrated training program “Young environmentalist” the project created a training designed to take place on three plans: classic education through lessons in classes, education through the game, using the digital phase of the game, and then it



will go to the level of ecological education in real context, in nature. 20 new trainers will be formed for applying the "New environmentalist Education Model". Each partner will train 5 trainers.

The training will be conducted on three levels:

1. Taking the "New Environmentalist Education Model" training course for the young
2. Playing the Computer Game - digital phase
3. Playing the Computer Game - practical phase (implementation in a real frame of game's scenes).

The current document provides detailed modules for the environmental education program.

2.3 The type of personality of young people related to environmental issues

Personality types of young people related to environmental issues

Ecological debates create new polarities and reveal new characters, from the negationist or ignorant to the "green" warrior or the pragmatic ecologist.

The list, compiled by TalkClimateChange.com, is a demonstration of the fact that the attitude towards nature protection and climate change is determined by personal circumstances rather than purely logical arguments.

The young environmentalist

The young ecologist is not afraid to make changes or to be a rebel of the traditional society, so he fully supports the application of sustainable ecological measures. He has a thorough knowledge of Ecology, has a special interest in the Natural Sciences and has an exemplary civic attitude for raising awareness of environmental issues to the general public.

Worried

Concern puts environmental issues on the list of concerns. He is concerned about these issues and shares his concern in discussions with other young people. Concerns are concerned as far as possible about saving resources, carefully use electricity, water, heat. They do not have a clear vision of the complexity of environmental issues and do not apply concrete measures in everyday life.

The alarmist

The ecological apocalypse is near! There are signs everywhere. The world will end. Few alarmists have doubts, and this only to protect their 4X4 cars or huge houses. Unfortunately, despite the measures they use and the economy they make, they fail to improve Nature, because most "green" options are terribly inconvenient and expensive.

The "green" warrior type Greenpeace

Eco-warriors are the very heart of the ecological offensive, those who do not compromise when it comes to radical measures or environmentally friendly lifestyle. "Green" warriors can be found in exactly those places where deniers, worries and alarmists will never go.



Scientist

The scientist is intelligent, educated and enjoys listening to a well-argued argument. Environmental challenges are the perfect tool to demonstrate the superiority of intellect and argument.

Pragmatist

Pragmatists understand the high risks of environmental challenges, but they know how things work in this world and they know that humanity will make a lot of mistakes until it does a good thing.

The pragmatist takes every opportunity to be an ecologist, but not when it costs him a lot.

Negationist

Climate change is not real. It is in fact a liberal conspiracy invented by those who are jealous of the wealth of the deniers. How can humanity have the least impact on the planet as long as the population emits only a few billion tons of greenhouse gases annually?

Even if he admits that climate change caused by humans is real, the denialist assumes only a tiny responsibility and, in any case, "it's not his problem."

Ignorant

Completely ignorant, he never thought seriously about environmental issues, although he accidentally heard the news. However, they have much more important things to worry about that do not affect them personally.

Young Environmentalist should be able to

- interact with the environment
- address serious environmental issues
- develop and explore solutions to the issues
- explore, investigate, research and undertake an environmental sustainability project



3. THE CONCEPT OF THE NEW ENVIRONMENTALIST EDUCATIONAL MODEL

Our aim is to make the Young people be aware of the fact that the nature is a complex unity each part of which needs special consideration. We also intend to make the Youth get to know the basic principles and knowledge of environmental protection. Our main objective is to demonstrate the phenomena that are dangerous for nature to the Students showing them the methods and processes related to the protection or the environment (in case of living and non-living natural resources) and we intend to make them realize the importance of the preservation of cultural-historical values.

3.1 *The target groups*

It is difficult to determine and define the age borderline of youth. Thus, formal definitions of this life period differ between the institutions of the UN, EU and national institutions. Worldwide, there are different definitions of the youth age borderlines and it is considered that no other life period provokes as many discussions on age borderlines as this one. Duration of youth is actually socially and not biologically determined. Schooling is the key factor which shortens or prolongs youth.

Active involvement of young people in solving problems of their local community and all other problems universal for all people and climates, like environmental issues, is significant not only for their healthy growing up, but also for more successful and high grade functioning of every society.

Young people have special worries and special responsibilities towards the environment. The number environmental risks and dangers disproportionally affect young people who have to live longer despite the deterioration of the environment caused by previous generations. These are the reasons why young people will be forced to get involved in the new manner and in the new forms of activism, which will generate efficient answers to newly arisen environmental challenges.

Environmental education is one of the best ways to prepare young people for facing growing environmental problems of the planet Earth. This environmental education pressingly implies not only giving information and knowledge on how burdened and disturbed global ecosystems are on the verge of collapse, but also the guidelines, knowledge and skills for overcoming the environmental consequences caused by action of the human civilization. Besides the fact that they have greater part in distant future, young people are very well situated to promote environmental awareness, simply because they often have better access to information than elder people. Partly, this is the point which should be more exposed through environmental education in schools, at least in developed countries, or even sporadically somewhere else. Apart from exposure in formal education, young people live their lives in the era in which environmental protection has great influence. The foundation against the ecological way of



thinking and behaviour is not rooted within young people and thus they can introduce new ideas and views of the problems.

Target group of the model are young people aged from 11 till 20 years old. We have identified the need to educate young people(a population segment aged between 11 and 20) through unconventional means and tools, update the IT technologies that young people today are more interested in communicate . We also identified the need of real information of young minds about environment , which we combined this need with their need for play game, thus identifying an education strategy: to create an educational new video game. As a educational strategy, we identified also the need of young for a model, so we propose to create New Enviromentalism Education Model.

3.2 The methods of forming/teaching - the training (description of the concept of the training proposed: days; training in classes, playing the game, practical phase)

The main methods of forming a model of young environmentalist are:

- take a youth centred approach and promote learning for, about and in the environment
- develop leadership skills, confidence, self-belief and self-esteem
- include young people's views - they decide, they plan, they act
- enhance their capacity for independent thinking and effective, responsible action.

Through the third group, Develop the integrated training program "Young environmentalist" the project created a training designed to take place on three plans: classic education through lessons in classes, education through the game, using the digital phase of the game, and then it will go to the level of ecological education in real context, in nature. 20 new trainers will be formed for applying the "New environmentalist Education Model". Each partner will train 5 trainers.

The training will be conduct on three level, each of one day training time:

1. Taking the "New Environmentalist Education Model" training course for the young
2. Playing the Computer Game - digital phase
3. Playing the Computer Game - practical phase (implementation in a real frame of game's scenes).

3.3 The requirements, traits and criteria of the Young Environmentalist Model

Quality environmental education programs help develop an environmentally literate Youth that can compete in our global economy; has the skills, knowledge, and inclinations to make well-informed choices; and exercises the rights and responsibilities of members of a community.

An Environmentally Literate Person is someone who, both individually and together with others, makes informed decisions concerning the environment; is willing to act on these decisions to improve the well-being of other individuals, societies, and the global environment; and participates in civic life. Those who are environmentally literate possess, to varying



degrees, the knowledge and understanding of a wide range of environmental concepts, problems, and issues; a set of cognitive and affective dispositions; a set of cognitive skills and abilities; and the appropriate behavioral strategies to apply such knowledge and understanding in order to make sound and effective decisions in a range of environmental contexts.

The New Environmentalist Education Model Programme is designed to enable students to:

1. Acquire basic understanding of the interrelationships of components and business: its control will factors of the environment and the processes that occur in it.
2. Develop desirable values and attitudes, especially concern and responsibility mobilization of public, toward the conservation and enhancement of the environment.
3. Acquire and refine skills in identifying, assessing, and solving environmental scientific concern problems.
4. Develop a sense of urgency in responding to environmental issues and problems and taking action toward their solution.

The requirements of a Young Ecologist are:

A Young Ecologist should have:

- a) the skills needed to understand and address environmental issues
- b) general skills of interrogation, analysis and interpretation
- c) basic knowledge of environmental processes and systems
- d) personal and civic responsibility

a) Abilities for understanding and addressing environmental issues

Skills are to define, learn, understand, assess and act on environmental issues. Skills and knowledge are refined and applied in the context of environmental issues. These environmental problems are real-life dramas in which different points of view are presented about environmental problems and their potential solutions.

b) Interrogation, analysis and interpretation skills

Interrogation, analysis and interpretation skills depend on students' ability to ask questions, speculate and make assumptions about the world around them, search for information and develop answers to their questions. Students should be familiar with environmental investigation, master the fundamental skills for collecting and organizing information, and interpret and synthesize information to develop and communicate explanations.

c) Knowledge of environmental processes and systems

Understanding the understanding of environmental processes and systems is an important component of Environmental Education that encompasses the environment, including human systems and influences. This understanding is based on knowledge synthesized from all traditional disciplines. The guidelines in this section are grouped into four subcategories:

- Earth as a physical system;
- Living environment;
- People and their societies;



- Environment and society.

d) Personal and civic responsibility

PRC is formed and developed through EE Ecologically educated citizens are willing and able to act on their own conclusions about what should be done to ensure the quality of the environment. As learners develop and apply concepts and skills for research, analysis, and action, they also understand that what they do individually and in groups can make a difference. From among them constituted in Ecology circles, young people can be selected based on their communication skills, who in turn can transfer information and messages about environmental problems and remedial solutions, true voices of the young generation.



4. THE DEVELOPMENT OF THE NEW ENVIRONMENTALIST EDUCATION MODEL - THE TRAINING

4.1 PHASE I - information activity in classes

a. Description of the activity, the advantageous of it, the results expected

First, one day classical phase of the environmental education program will be carried out. The New Environmentalist Education Model developed in the project will be used. In this phase, resources from "Pollution and solutions in BSB - Handbook for everyone" will be used. The current document provides detailed module for the one day classical phase of the environmental education program.

Environmental education has a very important role in promoting the environmental protection (chapter 25 of the Agenda 21 deals with this problem) [16]. Environmental education of young people enables necessary synthesis of knowledge whose aim is to protect and improve the environment. Through the planned educational system, the environmental knowledge is developed, the knowledge of basic characteristics of the environment and ways of preserving and improving the environment, as well as the knowledge of basic environmental issues of the modern society. Environmental education must also point to increasing degradation of the environment. Thus, this kind of education implies the necessity of rational usage of natural resources, getting informed of the facts in regard with the environment, as well as improving and raising the awareness of young people when it comes to environment and its preservation.

Environmental education and forming of environmental way of thinking with the young people begins in the early childhood, hence the very important role of educational organizations on all levels of knowledge acquirement (elementary schools, high schools and universities). The task of upbringing and education is knowledge acquirement, so that future generations who are included in solving environmental problems, possess systemized knowledge of temporary environmental problems, character and the essence of endangered environment and the ways of eliminating negative consequences of the disturbed environmental balance.

b. Environmental information which will be use/teach

b1. General Topics - short definition/description

Basic Environmental Concepts and Terminology , presents by teaching objectives

APPROXIMATE DURATION: FIRST DAY OF THE TRAINING MODUL- 5 hours.

GENERAL OBJECTIVE 1: To introduce students to basic environmental concepts and terminology
To draw a distinction between various concepts and terms commonly used in connection with the environment: clarification of concepts such as nature, ecology, environment, natural environment, flora, fauna, etc.



To raise individuals' environmental awareness, they need to be taught a series of basic concepts so that they can gain their bearings in relation to the environment and to lend support to students from outside environmentalist circles.

Topics to be teach:

ENVIRONMENT: Animate and inanimate surroundings in which beings live. It includes human beings, animals, plants, objects, water, soil, air and interrelations between them plus aesthetic, natural science and cultural history values.

ENVIRONMENTAL FACTORS: are elements that influence the state of the environment and can be:

- abiotics (physical) - air, water, soil, light, heat, humidity
- biotics (referring to living things) - interrelationships between species
- anthropic (referring to the influence of human activities) - pollution, deforestation, drainage

ECOSYSTEM: Clearly distinguishable unit within the biosphere, for example a wood, pond or river together with the associated plants and animals (biotic community). Self-regulating system sustained by the interactions between the abiotic (non-living) and biotic (living) factors. Ecosystems are of two types: natural and artificial. Natural ecosystems. Examples: forests, rivers, lakes, seas. Artificial ecosystems. Examples: garden, orchard, artificial lakes. For an ecosystem to be functional it needs to contain three basic elements: producers, consumers and decomposers.

Examples of ecosystems:

The Danube Delta Reserve are uniquely ecological, which must be protected and conserved;
River, aquatic ecosystem

The Black Sea, which is unique among the seas of the world

The lake, aquatic ecosystem

The forest, which remains in a natural regime, is a complex and stable ecosystem. It has a characteristic horizontal and vertical stratification;

BIODIVERSITY: Variety of life on earth. This can be described in terms of genes, species and ecosystems. Is the term that describes the full range of variability of living organisms within an ecological complex. Biodiversity encompasses ecosystem diversity and diversity genetics of a species in this ecosystem.

Biodiversity is divided into:

- Plant biodiversity: Flora: These are plant communities that are active in a certain area. These are communities that complete the adaptive process and can continue the action in life. It also includes fungi and bacteria.

- Animal biodiversity. Fauna: Animal communities that are vital in a given area. These are communities that complete the adaptation process and can continue the action in life.

So, biodiversity is the variability of organisms in terrestrial, marine, inland aquatic ecosystems and ecological complexes.

ECOLOGY: Study of the relationships between living organisms and their abiotic surroundings (environment).

FLORA: Community of plant species living at a particular site.

FAUNA: Community of animal species living at a particular site.



HABITAT: Dwelling place of a species of plant or animal. Is the inhabited territory or set of environmental conditions that provide all the conditions of existence and make up the living environment of the species / individual.

-The biotope is the habitat in which several species of plants or animals coexist and it is called an extended habitat.

-The community is a lot of different populations (animals, birds, insects, butterflies) that occupy a certain habitat.

POLLUTION: Any type of impurity, material or physical influence (such as noise or radiation) in a specific environment above normal levels which could endanger or damage the ecosystem. Pollution is the contamination of the environment with materials that interfere with human health, quality of life or the natural function of ecosystems (living organisms and the environment in which they live).

Soil pollution: Soil pollution is the accumulation of chemicals, at levels that can cause adverse effects on plant growth and can affect both human and animal health.

Air pollution: Air pollution is one of the forms of pollution with major, disastrous effects on the environment. From a technical point of view, 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 and humans.

Water pollution: Water pollution can be characterized by the nature of the pollutants as:

- physical (due to thermal, radioactive water),
- chemical (discharges of petroleum residues, phenols, detergents, pesticides, carcinogens or other chemicals specific to various industries),
- biological (resulting from contamination with pathogenic bacteria, enteroviruses, coliform organisms, fungi, algae, crustaceans, etc.).

Water pollution can be identified as any change in the composition or quality of water, as a result of human activities or as a result of natural processes, so that it becomes less suitable for its uses.

Marine pollution: Marine pollution has several *peculiarities*:

- pollution by continuous accumulation of pollutants such as heavy metals, oil, herbicides, pesticides and detergents from the final collection of all water sources;
- intensification of coastal erosion;
- significant decline in biodiversity and severe decline in living resources.

POLLUTANT: Undesired substance in any environment which prevents or disturbs organisms' life and has an adverse effect on materials and the environment itself.

EMISSION: Discharge of gases, liquids or particles into the water, soil or air.

IMPACT: Effect of a given act on the environment.

DISCHARGE: Flow of liquid, solid or gaseous wastes into the environment.

WASTE: Any substance or object which the owner disposes of or intends or is under an obligation to dispose of.

RECYCLING: Return of waste products or components thereof to industrial activity to save raw materials and energy.

RENEWABLE ENERGY: Energy obtained from inexhaustible or renewable sources. Renewable energy harnesses the wind (windpower), water (hydroelectricity), sun (solar energy).



THE WATER CIRCUIT IN NATURE: The circuit of water in nature (also called the hydrological cycle or water cycle) is the process of continuous circulation of water within the Earth's hydrosphere. This process is driven by solar radiation and gravity. Water moves from one component of the circuit to another, for example from a river to an ocean, through various physical processes, the most important of which are evaporation, perspiration, infiltration and runoff. The sciences that deal with the study of water movement in this circuit are hydrology and meteorology.

THE OXYGEN CIRCUIT IN NATURE: The atmosphere contains oxygen. For the most part, oxygen is produced by plants through photosynthesis. Oxygen is used in the respiration of plants and animals, for the decomposition of organic materials, for the burning of fossil fuels and in the process of erosion of rocks (reactions of some rocks with oxygen). A certain amount of CO₂ - produced by respiration, after decomposition and combustion is deposited in the form of sediments (calcium carbonate) on the bottom of seas and rivers, but most of it is used in photosynthesis. There must be a balance between the circuit of oxygen and that of carbon dioxide in nature: the volume of oxygen consumed by animals and humans must be approximately equal to the volume of oxygen returned to nature by plants. If oxygen consumption increases and its production decreases, the biological balance is disturbed.

THE CARBON CIRCUIT IN NATURE: On Earth, the carbon circuit in nature consists of a series of exchanges of substances, which entrain carbon, between the biosphere, atmosphere, hydrosphere and lithosphere. Most of the carbon in the circuit is in gaseous form, especially as carbon dioxide.

- The circuit between the atmosphere and the biosphere: plants during the night and animals always remove carbon dioxide by breathing. During the day, plants assimilate carbon from CO₂ and, with the help of sunlight, through the process of photosynthesis, transform it into organic combinations, releasing oxygen.

- The circuit between atmosphere and hydrosphere: CO₂ is a relatively water-soluble gas and there is a balance of CO₂ concentration in water. The oceans contain huge amounts of dissolved CO₂, which, if the balance were disturbed, could be released into the atmosphere, leading to extreme climate disturbance.

GENERAL OBJECTIVE 2: To understand the relationship between the environment and economic and social development:

1. (a) principal characteristics of the current development model: economic growth, international inequalities, unlimited consumption, population and resources;
2. (b) consequences of the current development model: degradation of living conditions and the environment;
3. (c) towards a sustainable development model;
4. (d) taking account of the environment in sectoral policies and everyday life.

Awareness of environmental problems has changed enormously in recent years. From a minority concern for species and habitats in the middle of the 20th century, today it has turned into a central issue in a global debate on the future of mankind.



It is clear that environmental problems stem from the use made of natural resources by society and that pollution is the result of inefficient production methods and literally unsustainable lifestyles.

Over and above this reality, there is the social and environmental situation in other countries which still have great wealth in terms of biodiversity but whose citizens live in misery. This therefore takes us on to social issues: justice, efficiency and democracy.

Cooperation between states is therefore essential, first to end poverty as a sine qua non for sustainable development and, second, to avoid and repair environmental degradation on the planet by pooling know-how and technology.

At the same time, at national level states must shape efficient environmental policies setting out the environmental objectives and priorities. As clearly stated in Article 6 of the Amsterdam Treaty, these policies must be integrated in all other sectoral policies with the objective of reflecting environmental concerns in all areas of society.

Topics to be teach:

NATURE CONSERVATION: Biodiversity conservation is currently one of the most important issues at the international level, but lately, the problem of biodiversity conservation, at the level of ecosystems, species, populations and even at the level of genes, is becoming more acute, due to intensifying the human impact on the biosphere. In this context, maintaining biodiversity is necessary not only to ensure life now, but also for future generations, because it preserves the regional and global ecological balance, guarantees the regeneration of biological resources and maintains a quality of the environment necessary for society.

ENVIRONMENTAL PROTECTION: is the set of regulations, measures and actions aimed at maintaining, protecting and improving natural environmental conditions, as well as reducing or eliminating, where possible, environmental pollution and sources of pollution.

Environmental protection can covers several areas: Biodiversity, Climatic changes, Dangerous substances and chemicals, Sol, Subsol, Industrial emissions, Biosecurity, Air quality, Ambient noise, Waste, Sustainable Development

SUSTAINABLE DEVELOPMENT: A term which first appeared in the Brundtland report entitled “Our common future” (United Nations World Commission on Environment and Development, 1987) which defined it as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

POLLUTER PAYS PRINCIPLE: The principle, enshrined in Article 130r of the Maastricht Treaty, that anyone causing pollution must pay for the resultant damage to the environment. In line with this principle, persons responsible for a pollution incident must pay the costs of all measures necessary to end it or reduce it to a legally admissible level.

GENERAL OBJECTIVE 3: To introduce students to a knowledge and understanding of the causes of the principal environmental problems and threats to the planet

1. (1) Introduction to the causes of air pollution:
 1. (a) the greenhouse effect;
 2. (b) acid rain;
 3. (c) the hole in the ozone layer;



4. (d) other forms of air pollution.
2. (2) Idem for water pollution:
 1. (a) urban discharges;
 2. (b) industrial discharges;
 3. (c) agricultural discharges.
3. (3) Idem for soil pollution:
 1. (a) urban waste;
 2. (b) packaging;
 3. (c) industrial waste (non-hazardous, hazardous, toxic and radioactive);
 4. (d) agricultural wastes;
 5. (e) medical wastes.
4. (4) Idem for deterioration of the natural environment:
 1. (a) global loss of biodiversity;
 2. (b) depletion of natural resources;
 3. (c) deforestation;
 4. (d) desertification;
 5. (e) natural disasters.
5. (5) Idem for the urban environment:
 1. (a) town and country planning;
 2. (b) urban climate;
 3. (c) urban demography and sociology;
 4. (d) principal urban environmental problems: air pollution, noise, waste, transport and energy consumption.

The air is the natural resource on which environmental problems have the most tangible impact. Every day, enormous quantities of polluting gases are emitted into the air. The effects which they can have all over the world vary widely, both at local level (at the emission site) and on global scale. Some of the most representative and, at the same time, most damaging include:

Topics to be teach:

GREENHOUSE EFFECT : The greenhouse effect is a natural phenomenon in the atmosphere, in which the earth's surface reflects only part of the solar energy coming into contact with it and absorbs the rest.

This absorption has a warming effect, in the form of irradiation of energy to the atmosphere. However, on its way through the atmosphere this radiation collides with other gases which slow it down and prevent the energy from escaping to the outside. Instead, it returns to earth, warming up the planet's surface even further.

This produces the "global warming" effect (approximately 4oC over the last 100 years). This results in thawing of the polar regions, thus raising the average sea and ocean levels which, in turn, is already beginning to have serious consequences in certain parts of the planet (floods, cyclones, coastal erosion, etc.).

The principal gases causing the greenhouse effect are:

- carbon dioxide (CO₂) from combustion of fossil fuels, emissions from motor vehicles and industry, etc.;



- CFCs and HFCs from aerosols, air conditioning systems, refrigerators, etc.;
- methane (CH₄) from agricultural waste.

Since the sources of these greenhouse gases are known, corrective action can be taken: reduction of emissions by means of filters, use of alternative transport, etc.

OZONE HOLE: The upper atmosphere contains abundant supplies of ozone (O₃), the gas protecting the earth against ultraviolet radiation. The introduction of new man-made compounds such as fertilisers is reducing the ozone concentration in the atmosphere, allowing more ultraviolet rays to penetrate, with grave consequences for plant and animal life and potentially causing skin cancers, genetic mutations, etc.

The principal causes of depletion of the ozone layer are:

- artificial sources of chlorine and bromine, which are present in industrial and household refrigerators, aerosols, etc.;
- oxides of nitrogen (NO_x), found principally in fertilisers.

ACIDIFICATION: Acids form in the atmosphere when water vapour is mixed with gases emitted by industry. They fall back to earth in the form of rain, leading to acidification of soil and water, loss of farmland, trees and woods, erosion, etc. This phenomenon can occur far from the emission source (the USA is suffering from pollution from Northern Europe). Consequently, the effects are felt over a very wide area.

The principal gases causing acidification are:

- sulphur compounds (SO₂);
- nitrogen compounds (NO).

WATERPOLLUTION: Water is the most abundant naturally occurring chemical compound. Its properties make it a key component in sustaining life. Resources are limited and if they were to run dry the consequences would be drastic. One of the major problems affecting these resources is pollution leaving the water unfit for the intended use. There are a wide variety of sources of pollution, but the most important are:

- **URBAN DISCHARGES:** sewage systems (cesspools, septic tanks, sewers), domestic activities, landfills for solid urban waste and spreading of effluent or sewage sludges on land.
- **INDUSTRIAL DISCHARGES:** pollution by wastewaters, effluent, discharges or storage of solid waste, smoke, raw materials storage and transport, accidents and leaks.
- **DISCHARGES FROM AGRICULTURE:** principally as a result of massive use of chemical fertilisers and pesticides in agriculture. This results in diffuse pollution, in contrast to urban pollution which can be considered point source pollution.

SOILPOLLUTION: This applies to the part of the soil where quality has deteriorated as a result of direct or indirect point source discharges of toxic and hazardous wastes or products. These discharges result in concentrations of certain substances which turn the soil toxic, insalubrious, dangerous or unfit for certain uses.

Today some contaminated sites have been abandoned, while others are still in use, the most important being uncontrolled landfills predating the legislation on toxic and hazardous wastes.

The problems which soil pollution can cause are as diverse as the substances in the landfills. Generally, they can give rise to the following damage and risks:



- gravely endanger performance of the basic functions of the soil;
- pollute groundwater, surface water and the air;
- cause poisoning due to direct contact or through the food chain;
- cause fires as a result of explosions, etc.

WASTE: Waste is one of the principal causes of soil pollution. Waste treatment is one of the key points in environmental legislation as the volume of waste generated has been increasing alarmingly over the last 20 years. There are various types of waste:

URBAN WASTE: This covers waste generated in urban areas in the course of the inhabitants' everyday activities (shops, offices, services, homes, etc.) This is commonly known as "refuse". Estimates suggest that 1 kilogram of waste is generated per inhabitant per day. Given the great quantity of waste generated every day, proper management, i.e. perfectly organised collection, transport and treatment with the support and collaboration of the public (selective collection) is indispensable. Glass, paper and organic matter (food leftovers) are each collected in separate circuits. That leaves the problem of collection of the different types of plastics and tetrapacks. Rules were recently adopted on these as well in the form of Law 11/1997 of 24 April 1997. This extremely important piece of legislation is the first to impose an obligation to find an outlet other than landfills for these materials.

INDUSTRIAL WASTE: Industrial installations produce two types of waste: inert or semi-urban waste; and toxic and hazardous wastes with one or more of the following characteristics: inflammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, etc. Wastes of this type must be dealt with by an authorised manager who will dispose of them in secure landfills licensed for the purpose.

MEDICAL WASTES: Hospitals generate large quantities of waste every day (3.5 kg per bed per day), posing the risks of infection (biological medical wastes) and pollution (chemical and radioactive wastes). Given the variety and danger of medical wastes, every hospital must have an in-house waste management plan so that it can classify each type of waste generated and deal with it appropriately.

AGRICULTURAL WASTES: Wastes generated by farming could potentially cause pollution since they contain products which could be dangerous or affect the environment in various ways. Like urban waste, wastes of this type are not governed by any specific rules. In practice, however, they are treated differently from ordinary municipal waste, in that most of the waste can be re-used on the farms themselves.

DETERIORATION OF THE NATURAL ENVIRONMENT

GLOBAL LOSS OF BIODIVERSITY: Biodiversity is one of the basic principles of sustainable development. Biodiversity covers all species of plant, animal and micro-organism plus the genetic variability that they embody and the ecosystems of which they form part. Today the threats to biodiversity are truly disheartening. The majority of the biodiversity on the planet is in tropical forests in developing countries, which are experiencing rapid population growth. This population growth and the development necessary in order to sustain it threaten to wipe out 70% of all living species by the end of the century.

The importance of biodiversity lies in the large number of organisms on earth and the variability within the same species. All this information is a potentially valuable source for new pharmaceuticals, chemicals and materials.



The most immediate consequence of loss of these species would be to upset the balance of the ecosystems and of the planet. In the long term, however, the loss of potentially extremely valuable information would be more important.

For this reason, these problems are serious enough to demand a rapid response. Individual countries are taking measures, such as drafting legislation on conservation of their species, declaring sites with great biological riches as heavily protected areas of natural interest, etc.

At international level, the most outstanding achievement is the Convention on Biological Diversity. The objective of this Convention is to ensure maximum conservation of biodiversity for the benefit of present and future generations and to ensure sustainable use of resources.

DEPLETION AND POLLUTION OF WATER RESOURCES: Marine pollution issues have remained virtually unchanged for the last decade. What has changed, however, is public perception of these problems. Of the 20 000 million tonnes of dissolved salts and suspended matter washed into the sea by rivers, only 10% reach the deep sea. The rest builds up in the coastal waters which supply 90% of the world's fish, putting consumers' health at risk.

Another problem facing the marine environment stems from discharges of urban sewage. Bacteria use oxygen dissolved in the water to break down the organic matter in sewage. If the volume of sewage is very high there is sometimes not enough oxygen in the water to support many fish and bacteria proliferate instead. In the black Sea region, for example, 90% of the sewage is discharged without treatment of any kind, causing public health problems (pollution of bathing water, pollution of fish and shellfish, illnesses such as typhus, cholera, etc.).

Good management on land can solve all these problems; the sea could be the resource offering us the greatest benefits in the future.

DEFORESTATION AND DESERTIFICATION: Deforestation is the loss of forest cover (trees, undergrowth, etc.) in a given area, which also implies loss of fertile soil. The principal factors behind deforestation of certain regions of the planet include:

- massive demand for wood as a fuel at certain times of the year and as a material for building houses, boats, etc.;
- road and path clearing;
- felling for the paper industry;
- fires.

The most significant effects of deforestation include:

- soil erosion, as a result of the lack of vegetation;
- loss of fertile soil as nutrients disappear from the soil;
- loss of flora and fauna;
- increase in polluting gases (CO₂) when forest is burnt;
- interruption of the water cycle.

This deforestation process is inextricably linked with the process of desertification. Once deforestation sets in desertification follows, almost in parallel. This process has a direct impact on the living conditions of large numbers of people and places and is both the cause and effect of poverty and emigration. As a consequence, more than one-third of the earth is arid. There are three aspects to combating this process:

- introduction of farming practices protecting soil fertility;
- reconstitution of the vegetation cover;



- construction of forest waterworks.

Finally, a distinction must be drawn between desertisation and desertification. Desertisation is a natural process, whereas desertification is caused by human activity.

URBAN ENVIRONMENT: Technological progress in recent decades has brought with it strong economic development in the industrialised countries and a concentration of the population in big cities.

This technological progress has been accompanied by pollution of various kinds. Urban pollution can be of various origins, principally air pollution, noise and generation of waste of various origins.

Urban areas are subjected to a wide range of pollutants, some of them potentially carcinogenic. Their impact on health includes respiratory diseases and skin or eye irritations. Alongside this, they erode buildings and damage the natural environment. Most air pollutants stem from the following sources: industry, motor vehicles and burning of fossil fuels for heating and energy generation.

The measures to curb or reduce emissions of the various pollutants include:

- energy saving, which should be given priority in view of its potential to reduce CO₂;
- switch from fossil fuels to natural gas or alternative energy sources;
- greater research and development effort to reduce emission levels in the medium and long term;
- reforestation and phasing-out of CFCs, etc.

Because of their transfrontier implications all the issues listed above are of EU-wide importance for the internal market and shared resources, both from the point of view of cohesion and in terms of their environmental impact in all regions of the EU.

Citizens also generally feel that global environmental problems are beyond their control. They feel powerless and are overcome by apathy; they give up and feel that all they can do is to leave it to politicians and technology to find solutions.

A sense of personal responsibility for the environment must therefore be fostered, by informing all citizens of the fundamental roles which they play in environmental management in their everyday life, as consumers of goods and services with a free choice and also as direct generators of pollution and waste, at home, at work, on their travels and in recreational areas.

GENERAL OBJECTIVE 4: To introduce students to a knowledge of the institutional and social responses (international and European) to the environmental crisis; To know the main legal responses and the resources currently earmarked for environmental issues/projects.

Topics to be teach:

INTERNATIONAL LEVEL: The environment has an exceptional international dimension since pollution knows no frontiers and, day by day, the major pollution problems are becoming worldwide, forcing states to reach global agreements which really will be able to offer effective solutions to the problems. For this reason, the various international organisations are attaching increasing importance to environmental issues:



UNITED NATIONS ORGANISATION (UNO): In 1972 the Stockholm Conference conceived the idea of the United Nations Environment Programme (UNEP), the objective of which is to support, stimulate and supplement action at all levels of human society on all issues of interest to the environment.

Under the auspices of the United Nations, in 1992 the United Nations Conference on Environment and Development was held in Rio de Janeiro. This produced the following results:

- The Rio Declaration: this is a statement of joint, individual and government rights and obligations relating to the environment and development and of their responsibility to future generations.
- Agenda 21: this is an ambitious plan of action to be taken by governments and international organisations to integrate the environment on the eve of the 21st century.
- Framework Convention on Climate Change and Convention on Biological Diversity, two binding conventions signed by the Heads of State during the conference.

COMMUNITY LEVEL

1958 Treaty of Rome (establishing the European Economic Community): This contained no express reference to powers for Community authorities on environmental matters.

1986 Single European Act: Three new articles targeted specifically on environmental protection became Community law:

- Article 130r defines the objectives of action by the Community relating to the environment;
- Article 130s requires unanimous adoption by the Member States of the action to be taken by the Community in this field;
- Article 130t conceives the action taken by the Community as the minimum, leaving each Member State free to introduce more stringent protective measures on its territory.

1992 Maastricht Treaty: The objectives include "... to promote ... a harmonious and balanced development of economic activities, sustainable and non-inflationary growth respecting the environment."

1998 Amsterdam Treaty: Not only is sustainable development established as one of the essential objectives of the Community but also Article 6 of the Treaty imposes an obligation to integrate environmental protection requirements into policies for all other sectors.

Beyond this, the European Community has adopted a host of regulations, directives, decisions and rules of all kinds relating to the environment. There are too many to mention them all here.

Some of the best known and most important examples are:

- - Council Directive 85/337/EEC on the assessment of the effects on the environment;
- - Council Directive 79/409/EEC on the conservation of wild birds;
- - Council Directive 96/61/EEC concerning integrated pollution prevention and control;
- - Council Directive 91/271/EEC concerning urban waste-water treatment.

Action programmes on the environment

Alongside the legislation (Treaties and Community law), the Community has produced action programmes on the environment setting out the principles of the action by the Community on the environment. Five such programmes have been produced to date. The latest, the fifth (1993) programme, identifies sustainable development as the only form of development compatible with environmental protection and selects five sectors on which the measures will be targeted



because of the decisive role which they play in sustainable development, namely: agriculture, tourism, energy, transport and industry.

Community bodies responsible for the environment

Directorate-General XI. European Commission:

This is the department responsible for implementing the Community's environmental legislation and drafting proposals for further legislation. It draws on the formal or informal means placed at its disposal by the Community legislation (proposals, recommendations, etc.) in order to perform this task. It is based in Brussels.

European Environment Agency:

The Agency was set up by the European Council in 1990 with the objective of establishing a European environment information and observation network. Its objective is to provide the Community and the Member States with reliable information which will enable them to take the measures required to protect the environment and to provide the technical support required for this purpose. It is based in Denmark.

b2. Specific Topics to BSB - short definition/description

Specific Environmental Concepts and Terminology connected to Black Sea Basin:

APPROXIMATE DURATION: FIRST DAY OF THE TRAINING MODULE - 2 hours.

Topics to be teach:

BLACK SEA POLLUTION: The pollution of the Black Sea is accentuated, which has led to a severe ecological imbalance. Until recently, the Black Sea was considered a "dead sea" a real ecological danger due to the collection of polluted water and due to the increase of H₂S content in water layers below 150m. Since the 50s of the twentieth century, due to industrialization and neglect of environmental issues, in the Black Sea basin and across the Danube in almost all of Central and Eastern Europe, the Black Sea has undergone major changes, as follows:

- pollution by continuous accumulation of pollutants such as heavy metals, oil, herbicides, pesticides and detergents, especially from water collected from the extended basin;
- intensification of coastal erosion;
- the continuous degradation of the sea water quality due to the increasing eutrophication until the end of the '80s and the extension of the lack of oxygen in the deep layers;
- increase of H₂S concentrations in layers below 200m;
- significant decline in biodiversity and severe decline in living resources;

EUTROPHICATION: The phenomenon defined as the excessive enrichment of a body of water with organic matter and nutrients (nitrogen, phosphorus and silicon), elements that are necessary for the development of organisms. In addition to the supply of nutrients and organic matter brought by the Danube, Dniester and Dnieper, and by sea currents, the balance of the ecosystem is disturbed by industrial, agricultural and urban activities in the area. Excessive enrichment of these waters leads to the uncontrolled development of some unicellular algae species (phytoplankton). As a result, algal blooms are very common. which reduce the transparency of water, having negative effects on biodiversity.

H₂S LAYER: The most pronounced hydrogen sulfide (H₂S) content of deep water in the world. The concentration of hydrogen sulfide increases with depth, as follows: at a depth of 150



m it is 0.47 cm³ / l, and at a depth of 200 it is 5.8 cm³ / l, the concentration continuing to increase with depth. The tank created in this way is constantly increasing in volume due to the special conditions and pollution in particular, constituting a real ecological bomb with development and risks that are difficult to predict.

GREAT BRACKISH: Due to the supply of fresh water from the collection of water from rivers and streams flowing into the Black Sea and due to rainfall collected throughout the basin, salinity is reduced to 1.7-1.9% at the surface (about half compared to the planet's own). It is thus the largest brackish water basin with a very large water intake collected by about 600 km³ of the extended Black Sea Hydrological Basin, with high contents of mineral salts (nutrients) and pollutants collected from wastewater which in turn causes the growth of the oxygen-free water tank with high concentrations of H₂S.

HYDROGRAPHIC SYSTEM EVOLUTION: The Black Sea transfers water only to the Mediterranean Sea, so all flows and outflows occur in the Bosphorus and Dardanelles. The Mediterranean inflow has a higher salinity and density than the flow from the Black Sea to the Mediterranean Sea. The following water budget can be estimated:

- Incoming water: river discharge 370km³ / year, precipitation 180km³ / year, entrance through the Bosphorus 350 km³ / year
- Outgoing water: evaporation 400km³ / year, exit through the Bosphorus 500km³ / year

OFFSHORE GAS EXPLOITATION: Offshore gas exploitation and infrastructure projects have major risk of pollution. In the Black Sea area, considering the latest prospecting, there are very large deposits of natural gas, especially in the economic area of Romania. In addition to the special advantages of gas exploitation on a very large scale, there are also potential environmental risks in case of accidental pollution. The environmental risk in our case is aggravated by the existing special conditions, the Black Sea being a semi-closed sea with a reduced horizontal marine circulation and without vertical marine circulation. Accidental pollution, such as in the Gulf of Mexico, in the conditions of the Black Sea would be an unimaginable ecological catastrophe.

MARINE BIODIVERSITY: Biological diversity is the variability of living organisms and the ecosystems of which they are part, including diversity within species, between species and ecosystems. Following the heavy pollution of the Black Sea, the totally lifeless anoxic zone is constantly growing and most species have suffered a negative impact, which has led to the extinction of certain species and the reduction of populations in general.

THE EXTENDED BLACK SEA BASIN: It includes the sum of river basins from six riparian countries and collects the waters of dozens of important rivers and streams such as the Danube, Dniester, Bug, Dnieper, Don, Kuban, Kura, Kizilirmak, Enige. The contribution of the waters collected from the sum of the hydrographic basins of these rivers and streams on the quality of the Black Sea water is very important, so only the contribution of the Danube waters represents 30% of the total pollution of the Black Sea Basin.

INFLUENCE OF THE DANUBE RIVER BASIN: The most important river is the Danube, with an average annual flow of 7,100m³/s and an annual contribution of approximately 200,000,000,000 m³. The huge 800,000 km² river basin collects water from 120 rivers that cover a third of continental Europe in 20 countries. It is estimated that the waters of the Danube, the largest



pollutant, which collects wastewater from the entire river basin, causes 30% of the pollution of the Black Sea with nutrients, chemicals and heavy metals.

4.2 PHASE II - playing activity of the game

a. Description of the Activity, the advantageous of it, the results expected

Research into the use of videogames in education is on the rise, and they are cementing their position as part of the modernized, digital classroom. Sustainability education has also become a subject of interest among environmentally minded game developers and understanding the educational impact of such games is rapidly becoming an important field.

In order to educate the public about environmental issues, novel and creative methodologies are required (Klößner, 2015). One way of communicating environmental issues is through videogames, due to their long history of raising awareness, educating and presenting contemporary research (Eisenack and Reckien, 2013).

Virtual environments, such as educational games, constitute promising new research tools in various kinds of environmental behavior research (de Kort et al., 2003), and have demonstrably been shown to alter behavior in real-life settings. Educational games are also receiving increased attention within the field of sustainability education and conservation (Sandbrook et al., 2015). Here, researchers focus on topics ranging from the effects of environmental change on marine ecosystems (Ghilardi-Lopes et al., 2013) to knowledge of energy use (Yang et al., 2016) and sustainable land management (Schulze et al., 2015). Sustainability games are used in order to make intangible environmental issues more salient, although the learning outcomes from playing them vary (Boomsma et al., 2018). On the positive side, one study revealed a significant correlation between experiencing a high degree of *game enjoyment* while playing a game about local biodiversity (*BioDiv2Go*) and a subsequent increase in attitude toward nature (Schaal et al., 2018). Enjoying environmental gameplay is theorized to have a significant effect on the subsequent learning outcomes from playing (Fjællingsdal and Klößner, 2017), thus lending support to the study's findings. Another study revealed that individuals who played Red Redemption's *Fate of the World*, a simulation revolving around a 200-year period of societal and environmental impacts (Klößner, 2015, p. 198), showed a higher degree of environmental *systems thinking* than a control group (Waddington and Fennewald, 2018). *Systems thinking* - the ability to understand the complexity of all the individual parts of an interconnected system (Aronson, 1996) - is crucial in the understanding of ecosystems.

The project team is well aware that learning by playing at young ages is the most attractive and a good method of learning and creating new behaviors.

It will be distributed 25 tablets to the 25 students in a series and the game-learning phase will be conducted. To the 25 students will be presented by the trainer the environmental educational game developed in the project. Inside of this training the young will discover and play the game. Also in this phase of the training program to the students will be presented the online platform of the project.



b. The Game - Presentation of its Story. Playing the game

APPROXIMATIVE DURATION: SECOND DAY OF THE TRAINING MODULE - 6 hours

There are two games.

The first game is targeted for older young environmentalists (secondary and high schoolers) whereas the second game is appropriate for primary school students.

The games could be used additionally to the lectures (in the end) on the Black Sea culture, environment and geography; either separately or altogether.

The first game consist of content with regards to environment (Black Sea, fish, pollution), Black Sea Geography and cultural aspects. It is a 3D game. There are two basic levels hierarchically. The first level is the practice and learning whereas the second level is the competition level. Horizontally, the game could be played in three regions; Romanian, Turkish and Georgian underwater world. Additionally, the young environmentalists could play in four (English, Romanian, Turkish, and Georgian) languages by their choosing. Youngsters learn the basic fish types by exploring the Black Sea underwater; when they have no more lives left, they could answer questions regarding the Black Sea environment and gain additional lives to continue playing.

The first game is played as follows:

When the application is loaded, the login screen appears. If users have not registered before, user need to register. After user registered, users login with their e-mail address and password. The language is automatically the language of our phone. If users want, they can change the language.

Maps and game modes appear after logging in. This screen includes both explore mode and game mode for each country. When a country is selected, cultural video is shown. If the user wishes, they can skip this video and begins to navigate the submarine environment.

In explore mode, information is obtained by clicking on the fish. Game mode cannot be switched to without discovering all the fish in this mode. After all fish are discovered, the game mode is activated for that country and cultural video is shown again.

In game mode, the user starts to navigate in the submarine environment again. When he clicks on the fish he encounters, a question is asked about that fish. If he answers correctly, points are earned, if he answers incorrectly, the tube is lost. The user has 3 tubes in total, and when these tubes are finished, a question about the black sea comes before him. If he answers this question correctly, he wins the extra tube, if he answers wrong, the game is over. Game statistics(points, time, fish etc) are displayed on the screen.

While navigating the submarine, there are materials such as barrel, algae and trash around. Clicking on the trash will earn extra points. Also, the user has a certain amount of time to complete the game, and the remaining time is transferred as bonus points to the user who finishes before this time. Users can also see the leaderboard in the game.

The game is still on developing phase. However, the link given provides a download of a playable prototype for android gadgets.



Video game1 link:

https://drive.google.com/file/d/15_NVK4VCNxMd1GN_SZue7vo6lqablT2k/view?usp=sharing

The second game is a 2 D game. Compared to the first one, it is more simple and suitable for the little children. The main focus is on fish. The logic is similar to the first one. First students learn the game to play. Then they can proceed with the competitive mode. It has three difficulty levels. On the last and the most difficult level the fish move fastest. The sea gets darker. This game is also being developed.

Video game2 link:

https://drive.google.com/file/d/1j3_h2ST1OIFlQBSisi7ovk5-jpDyNTOx/view?usp=sharing

4.3 PHASE III - Practical Activity in Nature

a. Description of the activity, the advantageous of it, the results expected

Co-curricular activities are the true practical experience received to students . The theoretical knowledge gets strengthened when a relevant Co-curricular activity is organized . In the context of Environmental education Co-curricular activities have an important role. Through the practical experience students acquire knowledge, and they use the knowledge in their life also. Students prefer activities that occur in nature, in which they are direct participants and where they feel that they are actually doing something for the preservation of the environment (organization and maintenance of green areas around the school, forestation and planting of crops).

b. The Practical Activities - their development

APROXIAMTIV DURATION: THIRD DAY OF THE TRAINING MODULE - 6 hours

Interactive group activity (for groups of 25 students):

Activity 1:

Divided into groups of 5 students (5 groups of 5 students), each group chooses a leader who will raise an environmental issue (eg: Black Sea water salinity, sea water quality, number of marine animal species, etc.) and each leader will talk to his group; thus creating a competition between groups in which the accumulation of information and knowledge about the environment will be more easily fixed;

Activity 2:

Identifying the state of the environment through direct observations in a location in nature (eg on the beach, or in meadows, forests, etc.) through direct observations and using the information received at training (about pollution, eg: air pollution: it is felt something special in the air, do you see sources of pollution ?; soil pollution: you see something special: waste, etc .; water



pollution: because they are accumulated algae, about the phenomenon of algae flowering (eutrophication), etc.)

Activity 3:

Conduct group practice using Trash/Resource Cards Remind students that everything is made from natural resources—things in nature. Ask students to name some natural resources; as they do, list them (e.g., trees, plants, animals, sand, rocks, air, water, oil, coal, natural gas, metal ore).

Explain that some natural resources are never used up or they can be replaced; for example, more trees can be grown. Tell students that these natural resources are called renewable, because we can get "new" resources.

Explain that other natural resources cannot be replaced when we use them; for example, once we use all the metal ore in the ground, we cannot get more. Tell students that these natural resources are called non-renewable, because we cannot get "new" ones.

Hold up each Trash/Resource Card and ask:

1. What natural resource does this item come from?
2. Is this natural resource renewable—one we can get more of—or is it non-renewable, meaning it cannot be replaced once we use it all up?

- Help students to realize that even though some resources won't run out completely, it takes time and money and energy to get the resources and make them into products.
- Continue practice and invite them to playing by asking in team one to one, by determining the resource base of various objects in the nature. Help students discover that everything comes from the environment.

Activity 4:

A scene of the game can be take in real framework, as it is possible.



5. TESTING THE NEW METHOD AND THE YOUNGS ENVIRONMENTALISTS

The student's **environmental literacy (EL)** is a vital component to improve the awareness of student on environmental issues.

EL is the ability to care for the environment and ability to solve environmental problems. EL, affirmed by the Environmental Education and Training Partnership is the ability to overcome the existing environmental problems and avoid the emergence of the new problems. The concept of EL is emphasized on three aspects: nature, environmental issues, and suitable and sustainable solutions to existing problems .

The data of EL will be measured by testing knowledge, attitude and concern.

The knowledge of Young Environmentalists on concepts of environmental issues will be tested by fourteen main questions followed by supported questions. Instrument type for the knowledge component are in the form of: Simple grid test (single answer) or Grid test with multiple answers.

The attitude of Young Environmentalists will be measured by New Ecological Paradigm (NEP) consisting of fifteen items.

The NEP has five aspects that include

- the fragility of nature's balance,
- the reality of limits to growth,
- the possibility of an eco-crisis,
- anti- anthropocentrism,
- rejection of exceptionalism .

The concern will be measured by fifteen statements about environment, which was modified from Al-dajeh (2011). Instrument component of concern is prepared to know the readiness of students in behaving friendly environment. The instrument of concern is arranged with three aspects covering the basic concept aspect consisting of 22 items to measure the students' concern of ecology concept to environmental problem, frequency aspect with 15 items to measure the habit which is often done by the students to care for the environment, and the availability aspect with 15 items to measure students' awareness to protect the environment with daily life activities. Preparation of an instrument of concern for each aspect uses a questionnaire containing a question and statement with a 5 point Likert scale assessment as follow:

- Total disagreement / not important -2
- I do not agree little / little important -1
- Neutral / neutral opinion 0
- Agree a little / quite important +1
- Total agreement / very important +2



For the correct evaluation of the environmental education transmitted and assimilated by the students, in the project which develop this training module/new environmental educational model, it is proposed that **2 questionnaires will be applied, one at the beginning of the training, and a questionnaire at the end of the training**, the interpretation of which will illustrate the success rate.

The specialists ICSRPA, will develop two sets of questionnaires, one pre-training and one post-training.

These questionnaires will analyze the degree of environmental education (on general issue of environment and also on specifically issue of BSB environmental challenges) of trainees before training and after training. The analysis of the performance of the proposed new model of ecological education and its performance will be pursued. It will also be followed how students have acquired new concepts for BSB as a whole area, for environmental challenges in this area, about BSB pollution solutions. The questionnaires will also look at how the new educational model leads to the creation of a new mentality and/or enhancing environmental friendliness. The effective questionnaire will be applied by each partner's team, both at the beginning of each class and after each series. The once-applied questionnaires will be collected by each partner and will be sent to the partner ICSRPA which through the specialists and expertise, will analyze the queries and prepare an Analysis Report on the performance of the integrated training program.

The interpretation of the tests and questionnaires will illustrate the success rate of the new environmental educational model /training module proposed through this document.



6. WHAT WE SHOULD GET AFTER THE NEW ENVIRONMENTAL EDUCATIONAL MODEL

6.1 The profile/the features of the young ecologist/environmentalist

Profile of the Young Environmentalist

Young Environmentalist should

- understands environmental issues and how environmental quality is impacted by human decisions.
- uses this knowledge to make informed, well-reasoned choices that also take social and political considerations into account
- be able to investigate issues using both primary and secondary sources of information and synthesize the data gathered.
- to identify alternative solutions for various issues and their associated value perspectives.

Description of the profile desirable:

Knowledge of Environmental Processes and Systems

An important component of environmental literacy is understanding the processes and systems that comprise the environment, including human systems and influences. That understanding is based on knowledge synthesized from across traditional disciplines.

The Student can realize the importance of the protection of landscape values, especially the most important protected natural values of Black Sea Basin, respectively the most important protected natural values of the world, the ways of protecting natural values as well as the levels of protection.

The Student can recognize and observe the phenomena and processes of nature at a basic level.

Questioning, Analysis and Interpretation

Environmental literacy depends on learners' ability to ask questions, speculate, and hypothesize about the world around them, seek information, and develop answers to their questions. Learners must be familiar with inquiry, master fundamental skills for gathering and organizing information, and interpret and synthesize information to develop and communicate explanations.

Skills for Understanding and Addressing Environmental Issues

Skills and knowledge are refined and applied in the context of environmental issues. These environmental issues are real-life dramas where differing viewpoints about environmental problems and their potential solutions are played out. Environmental literacy includes the abilities to define, learn about, evaluate, and act on environmental issues. The skills are grouped in two sub-categories:

- Skills for analyzing and investigating environmental issues
- Decision-making and citizenship skills.



Personal and Civic Responsibility

Environmentally literate citizens are willing and able to act on their own conclusions about what should be done to ensure environmental quality. As learners develop and apply concepts and skills for inquiry, analysis, and action, they also understand that what they do individually and in groups can make a difference.

They should be able to evaluate alternative solutions with respect to their ecological and cultural implications.

The features of a good future ecologist.

1. Appreciate the beauty of nature.
2. Has extensive training in various ecological sub-disciplines.
3. Considers nature to be intrinsically valuable.
4. Considers that we are morally obligated to care for nature.
5. He likes outdoor activities.
6. Seeks to be useful to society.
7. He has a sense of duty to future generations.
8. Appreciate study and knowledge for his own sake.
9. Admire scientific research and the achievements of science in the field of environmental protection
10. Has a personal affinity for school, study, personal training.

6.2 Advises for a good environmentalist

Some advises for a good environmentalist.

- *Talk to people from different jobs and sectors and network, network, network!* Ecology careers can vary enormously with an overwhelming amount of options available, so take the time to go and talk to people who work in jobs that interest you. This can be a great way to learn about opportunities and open your doors. Participating in environmental conferences, science festivals, volunteering, and talking to your university can help you meet people from a variety of backgrounds and allow you to make better-informed decisions.

- *Show passion and knowledge for your subject!* It is essential to demonstrate a genuine interest in ecology and you must demonstrate this by doing things other than just studying, such as attending events, volunteering, writing or holding discussions and professional experience. However, some skills / knowledge desired by employers may not always be obtained from ecology specifically and so involvement in other activities, such as sports, may allow you to gain additional skills just as important.

- *Write about your science!* Publishing your work or writing about a field of ecology that you are passionate about can really show potential employers your interest and love for the subject.



From student / local newspapers and wildlife magazines to online blog forums and academic journals, they may be published in both print and online format.

- *Get practical experience!* but don't forget, quality beats quantity. Choosing a career can be difficult, so test it first! Experiencing work, internships and volunteering can be great ways to get to know people, to develop essential skills, e.g. for the lab or field, it gives you an idea of what it is like to work in that sector, as well as increase your CV. However, be strategic about what you choose to do to make sure you don't waste your time or other people's time.

- *Participate in discussions!* and even give one about your work. Participating in public discussions, scientific conferences and debates can be great for getting to know people and learning more about a topic. But don't stop here - why not give yours? You can present at a small conference, you can hold discussions at natural history societies or other local natural groups. This will develop your presentation skills and show that you are interested in communicating your science beyond your immediate colleagues.

- *Learn species identification skills!* People with species identification skills are increasingly in demand, and these skills may be needed for many careers in ecology, including consulting, research, outdoor education, and working with environmental NGOs. You can learn by using a field guide and recording what you find or attend specific courses or training events.

- *Be flexible!* While it may be good to consider a career goal, the nature of ecology means that there is often a huge variety in what you can do or end up doing. Remember that you need to be flexible and take advantage of opportunities as they come to you - starting a career in ecology can be difficult, but any opportunity can give you skills and experiences that can help you reach your ultimate goal.

- *Take advantage of social media!* Social networks are a great tool to boost your online profile, learn about new opportunities, and connect with people you may not necessarily interact with every day. Choosing the right platform for you is the key to correcting it and making it work for you.

- *Join an organization!* There are a lot of organizations relevant to ecology. These are great ways to network and make contacts in the field, to have the opportunity to participate in various events and conferences, to learn about new study or job opportunities, to have access to academic literature. , as well as to receive travel and research grants.

- *Sometimes additional training or learning is required!* For some jobs in the field of ecology, you may be required to undergo additional training, obtain another qualification or learn a new field. For example, in consulting you may be required to have specialist licenses or for a research job you will need a master's or doctorate. Be sure to research what additional training or qualifications you need, as you will need to consider funding and time in your decisions.



7. Conclusions

The environment provides numerous goods and services necessary for survival of humanity and preservation of the mankind [18], [19]. Keeping with this, the integration of ecology into general development, according to the principles of sustainable development, is an obvious necessity, with a special accent on the category of young people, having in mind that the future lies with them. “To care about sustainable development means to accept responsibility for the well-being of future generations and also of our habitat, of our planet. An affirmative attitude towards sustainability has to be an integral part of the moral foundation of our activities and of your lifestyle. This means that promoting sustainable development must be an important aspect of the educational agenda at all levels.” (Professor Konrad Osterwalder, PhD; Under Secretary General of the UN Rector of the United Nations University, Osterwalder 2009).

These are the reasons why it is necessary to include the category of young people in the field of protection of the environment and strengthening their activism on the local level and municipality level, having in mind that youth represents significant part of the population in the sustainable development issues, as well as "the resource" for supporting the changes of the present communities on their way to becoming sustainable communities. Today`s youth is directly struck with consequences of the behaviour of the previous generations and inherited polluted environment. Also, youth represents a group of population which can be influenced more easily when it comes to accepting new patterns of behaviour which are in accordance with the basic postulates and principles of sustainable development.



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<https://thinkearth.org/curriculum/second-grade>

http://eku.comu.edu.tr/index/4/1/zkostova_catasoy.pdf



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