SES-ECO

SES-ECO Intellectual Output 2

Textbook "Enhancing Ecoliteracy through Social-Ecological System Approach" – Curriculum set-up

Intellect Foundation

Contents

1. Introduction

The specific content of the book "Enhancing Ecoliteracy through Social-Ecological System Approach" is exploited for structuring of educational curriculum applying the Learning Outcomes (LOs) – based concept and approach.

The overall objectives of the learning outcomes-based curriculum structuring are to:

- Assist in formulation of trainees' attributes, that are expected to be demonstrated upon finishing of a training;

- Enable potential trainees, parents, employers and others to understand the nature and level of learning outcomes;

- Maintain national standards and international comparability of learning outcomes to facilitate trainees' mobility;

- Provide education institutions an important point of reference to design teaching/learning strategies.

The authors of the book were supplied with instructions and provided information following these instructions that allow the set-up of the curriculum, outlined here, below.

2. Basic elements for curriculum set-up

- **Learning Outcomes (LOs)** = Statements of what a learner is expected to know, understand and be able to do after successful completion of a learning process, and which are defined in terms of knowledge, skills, autonomy & responsibility that can be assessed and validated

- **Units of Learning Outcomes (ULOs)** = progressively accumulated learning outcomes for achieving a qualification, designed to be completed (assessed) independently

- **Qualification** = a formal outcome of an assessment and validation process

- **Credit points (ECVET)** = numerical representation of the overall weight of LOs in a qualification and of the relative weight of ULOs in relation to the qualification

3. Learning Outcomes' template

On the basis of the LOs' main elements, the content of the book is structured in a way that each chapter represents an independent Learning Outcome. Besides the learning content, the nine LOs reflect the

accumulated competences that can be evaluated and validated. For each LO, the required information is structured in the following template:

LO elements	LO Title
• **Authors & affiliations**	• Name and title
• **Aims**	• Brief information about the educational goals
• **Knowledge/skills**	• Statements of what a learner is expected to know, understand and be able to do after successful completion of a learning process
• **Autonomy & responsibility**	• Soft skills, common for all Learning Outcomes
• **Summary**	• 10 lines plain text; Times New Roman 12 pt.; line spacing 1.5
• **Key words**	• Up to 5 key words
• **Testing & Evaluation**	• Link to the (self)evaluation test • Credit points (ECVET)

4. "Enhancing Ecoliteracy through Social-Ecological System Approach" Learning Outcomes

4.1.   LO1: History of Environmental Pollution

LO 1	History of Environmental Pollution
• **Authors & affiliations**	• İbrahim ÖRÜN & Belda ERKMEN • Aksaray University, Turkey
• **Aims**	The section "History of Environmental Pollution" is important in showing how long our world and our environment have been exposed to pollution. As we can understand from the past and the course of pollution until today, our world and the environment we live in are very tolerant despite all the

	negativities. However, pollution threatens life in the world. Measures to be taken will be determined better by knowing the extent of the pollution. Also, with the understanding of this section, we will understand that we don't have time to spend. Our world and our environment will be harder to recover from this negative pollution. The aim of this chapter is to present knowledge about the: • To provide information about the history of environmental pollution. • To learn about the pollution problems experienced in the past, • The reader will see that pollution started with the appearance of human beings on earth. • The reader will learn that industrialization increases pollution even more. • By realizing the mistakes made in the past, making the same mistakes today will be prevented.
• **Knowledge/skills**	On successful completion of this chapter a trainee will be able to: • By realizing the mistakes made in the past, making the same mistakes today will be prevented; • Know the importance of keeping the environment clean. • Have an idea about how pollution makes our world a place. • Understand that pollution causes major pandemics, epidemics and diseases. • reach the awareness that pollution must be prevented for the sustainability of life.
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	This learning outcome provides information on the history of environmental pollution. While presenting information about the history of environmental pollution, it addresses the human impact on the environment. It provides information about the causes of environmental pollution. It provides information about the steps taken to prevent pollution from the past to the

	present. It states that pollution is primarily caused by human effects. It shows what big problems we face if pollution cannot be prevented. It emphasizes that if the bad course is not prevented, we may face great disasters. Necessary steps must be taken in order to prevent global climate change, which is the biggest environmental disaster of our age. The environment does not need us; we need a clean environment. Therefore, prevention of environmental pollution is important for a sustainable world and life.
• **Key words/phrases**	• Environment • Pollution • Industrialization • Global climate change
• **Testing & Evaluation**	• TEST • Credit points (ECVET): 3

4.2. LO2: Global Environmental Problems

LO 2	**Global Environmental Problems**
• **Authors & affiliations**	• Altan DIZDAR, Ertugrul DIZDAR, Cagan DIZDAR • ORKON International Inc., Turkey
• **Aims**	Environmental problems, rather in relation to socio-economic issues, display a complex picture & can act on a global level. Global environmental problems endanger the sustainability of the environment without recognizing political boundaries; it is a threat to human beings, health, safety & productivity, survival of other species & food safety & water resources. Climate change, global warming, desertification, environmental degradation, destruction of the ozone layer, acid rains, air, water & soil pollution, depletion of natural resources, loss of biodiversity, destruction of the forests, sea & ocean pollution, acidification of the oceans, hazardous wastes, adverse conditions caused by the waste, the results generated by the erosion & unplanned urbanization problem are all among the global environmental problems. So, at an international level, attempts are taking place to solve these environmental problems altogether. The aim of this chapter is to present knowledge about the: • Causes & Impacts of Climate Change, • How to Reduce Greenhouse Gases? • How to Reduce Carbon Footprint? • Causes & Impacts of Water Resources Pollution/ Depletion

	• Causes & Impacts of Loss of Biodiversity, • Causes & Impacts of Land-Use Problems in Urbanisation, Agriculture & Forestry
• **Knowledge/skills**	On successful completion of this chapter a trainee will be able to: • Know the core concept and subject of Global Environmental Problems; • Understand the Global Environmental Problems & their components & solutions; • Interpret the climate change, greenhouse gases, carbon footprint, water resources pollution/depletion, loss of biodiversity, land-use problems; • Apply the solutions for the global environmental problems; • Understand the main recommendations for achieving the global environmental problems and their approaches; • Apply these approaches to make effective in global environmental problems teaching and learning; • Reflect on the importance of protection of the environment; • Address the causes & impacts of the pollution in the environment, • Demonstrate solving the problems in global environmental problems will lead to a clean nature & environment & prevent climate change, global warming & greenhouse effects. • Provide information about Green environmental problems and find their solutions, • Develop awareness & attitude towards green environmental problems & their solutions, • Supervise on climate change, global warming, greenhouse effect, increased water, soil & air pollution, decrease of biodiversity, land-use problems, ozone layer depletion & wastage of natural resources, • Be able to predict measures to solve the environmental problems origination from global pollution; • Be able to distinguish the main strategies to follow to solve the global environmental problems; • Provide issues for the sustainability of green environment and how they can be successfully managed and effectively monitored.
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools;

	• Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	This Learning Outcome presents the main problems & its solutions in global environment. Environmental protection is heavily on the international agenda & these problems can only be solved by the efforts of the non-governmental organizations, public & private sectors, civil society, national efforts & international cooperation & also an important dimension of efforts to protect the environment is to increase public awareness & the participation of whole groups. The triggering nature of environmental problems requires coordination & synergy in the processes for solution efforts. The "1.5°C Global Warming" report of the Intergovernmental Panel on Climate Change (IPCC) states that, along with global warming, climate-based risks related to health, food safety, water desire, human safety and economic growth will increase. The main aim of environmental policies is to have social welfare to top possible level by keeping environmental quality at a certain level. Although environmental policies differ across countries, the main concept that stands out as a common goal is the "sustainable development". While sustainable & economic and social developments are recorded, it is aimed to reduce the people's affects on the environment by protecting the nature & supply a clean environment to future generations. In this learning outcome, after explaining the global environmental problems in detail, the solutions are given to solve these problems to protect the environment and the ways to be followed are shown to prevent the climate change, how to reduce greenhouse gases, how to reduce carbon footprint, prevent the water resources pollution/ depletion and loss of biodiversity, finding solutions to land-use problems in urbanisation, agriculture & forestry are given by examples in detail.
• **Key words/phrases**	• Global Environmental Problems • Climate Change • Global warming • Water, Soil & Air Pollution • Decrease of Biodiversity

• **Testing & Evaluation**	• TEST • Credit points (ECVET): 5

4.3. LO3: How Ecosystems Work

LO 3	How Ecosystems Work
• **Authors & affiliations**	• Belda ERKMEN & İbrahim ÖRÜN • Aksaray University, Turkey
• **Aims**	So far, we have been looking primarily at the living part of the natural world, but we know that when earth was born, it did not have any life on it. Changes in the non-living components and their composition have perhaps played a key role in the evolution of life on earth. This implies that the environment and changes in the environment, impact species and their evolution on the planet. Even today the non-living environment affects lifeforms of the earth and these together with the interactions taking place between the living and the non-living world, give rise to a variety of Ecosystems. The aim of this chapter is to present knowledge about the: • To elaborate upon the structure of an ecosystem. • To state the significance of the biotic and abiotic components of the ecosystem and the influence they exert on each other. • To understand that the various ecosystem types of the world are connected to each other. • To understand that how living things move energy through an ecosystem. • To understand that how feeding relationships are important in ecosystems. • To understand that how the amount of energy changes as it flows through an ecosystem.
• **Knowledge/skills**	On successful completion of this chapter a trainee will be able to: • Learn basic concepts related to environment. • Obtains information about the matter cycles continuously through an ecosystem. • Obtains information about the chemicals that cause environmental pollution. • By realizing the living things are part of the water, carbon, and nitrogen cycles. • Have an idea about the environmental problems arising human-environment interactions and their solution ways.

	• Environmental health information collection, collation, analysis, and gains the ability to forge a solution.
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	This learning outcome provides information on the ecosystem functions. Ecosystems are biological systems consisting of organisms and their environment. Organisms thrive within a range of abiotic conditions; altering those conditions can have severe consequences and can even cause extinction. Organisms require many different abiotic factors to survive. Altering concentrations of these factors can result in dramatic fluctuations in living organism populations. Organisms are biotic components of ecosystems; they form an interdependent community of life. Photosynthetic organisms such as plants and algae produce food within ecosystems. Their well-being is essential to survival and well- being of all other species. Food and energy flow through food chains that are part of much larger food webs in ecosystems. Food chains are biological avenues for the flow of energy and the cycling of nutrients in the environment. Energy flows in one direction thorough food chains, but nutrients are recycled. The position of organism in a food chain is called its trophic level. Carnivores are on the third level. The length of a food chain is limited by the loss of energy from one trophic level to another. The largest number of organisms is generally supported by the base of the food chain, the producers. Nutrients are recycled in global nutrient cycles. In these cycles, nutrients alternate between organisms and the environment. Humans can disrupt nutrient cycles in many ways, with profound impacts on ecosystems and our own future.
• **Key words/phrases**	• Ecosystem • Abiotic factors • Biotic components • Energy flow • Nutrient cycle • Human impact

| • Testing & Evaluation | • TEST |
| | • Credit points (ECVET): 3 |

4.4. LO4: Ecosystems Services

LO 4	Ecosystem Services
• **Authors & affiliations**	• Gamze YÜCEL IŞILDAR and Cağlan GÜNAL • GAZI UNIVERSITY, TR
• **Aims**	The 'ecosystem service' (ES) is relatively new concept. Simply, ecosystem services are the direct and indirect contributions of ecosystems to human well-being. The structure and processes of the ecosystems underpin the capacity of an ecosystem to provide goods and services. The aim of this chapter is to improve the knowledge of ecosystem services. • Understanding the ecosystem services in terms of ecological, social, cultural and economic values • Understanding conceptual framework for ES • To teach how to classify ES • Mapping and assessment of ES for better understanding of potential implications of ecosystem changes • The ways of integrating ES concept into policies
• **Knowledge/skills provision**	On successful completion of this chapter a trainee will be able to: • Understand the "ecosystem services" concept • Interrelate ES and human well being • Classify biotic and abiotic ES • Assess the anthropogenic impacts on provision of ES • Understand Impacts of spatial and temporal differences on demand from ES • Mapping and integrated assessment of ES • Integrate ES concept into environmental policies
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work

• **Summary**	This Learning Outcome explains the importance of improved knowledge of ecosystems and their benefits in terms of ecosystem services for more sustainable ecosystem valuation and management. To this aim, conceptual model characterized by its biophysical structures and processes; function; services and benefits in line with human well- being are described. Framework for integrated mapping and assessment of ecosystems and their services that helps people to understand the full spectrum of ways in which the natural environment contributes to people's well being are given in detail. Finally, how ecosystems should be integrated into environmental policies are discussed.
• **Key words**	• Supporting Services • Provisioning Services • Regulating Services • Cultural Services • ES mapping
• **Testing & Evaluation**	• TEST • Credit points (ECVET): 3

4.5.   LO5: Ecoliteracy

LO 5	**Ecoliteracy**
• **Authors & affiliations**	• Anna KUJUMDZIEVA, Maya NUSTOROVA & Trayana NEDEVA • Intellect Foundation, Bulgaria
• **Aims**	Ecoliteracy means understanding and internalization of sustainable ecological relationships in the nature and transfer of this sustainable lifestyle to daily life. The need of ecoliteracy is grounded on our understanding of the ecosystems of our planet and the ways, in which humans can more efficiently and sustainably live within those systems. In this context, it is important that trainees improve their ability to understand the complex natural systems that are being affected by human activities, i.e. to improve their ecoliteracy. The aim of this LO is to present knowledge about the: • Ways to build ecoliteracy and educate in ecoliteracy; • Interrelation between ecoliteracy and sustainability and the contribution of educational management to sustainability improvement; • Main strategies and policy goals for balancing the world

	economies development and the public well-being.
• **Knowledge/skills**	On successful completion of this LO a trainee will be able to: • Know the core concept and subject of ecoliteracy; • Understand the ecoliteracy related components; • Interpret the ecological intelligence, social intelligence, economy, and emotional intelligence as basic elements of the alternative ecoliteracy model; • Apply the basic practices of building ecoliteracy; • Understand the main recommendations for achieving ecoliteracy and their approaches; • Apply these approaches to effective ecoliteracy teaching and learning; • Reflect on the three pillars of sustainability; • Address environmental damages through ecoliteracy education; • Demonstrate how policy goals and strategies for sustainable ecoliteracy can contribute to harmonized economic growth and societal well-being.
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	This LO presents the main features of ecoliteracy as an understanding of the ecosystems and the ways, in which humans can more efficiently and sustainably live within them. It provides information about the basic elements of the alternative ecoliteracy model concept in terms of ecological, social, and emotional intelligence, economy and green consumer behaviour. The need of ecoliteracy and the approaches to build ecoliteracy are discussed. The man guidelines for ecoliteracy education are revealed. The interrelation between ecological literacy and the transition to sustainability is outlined. Details about the three pillars of sustainability (economy, society, environment) are given, and the impact of educational management to their improvement is shown. Finally, the trainees are acquainted with the main strategies of sustainable

	ecoliteracy development.
• **Key words/phrases**	• Essential ecoliteracy • Ecological intelligence • Social intelligence • Emotional intelligence • Green consumer behavior
• **Testing & Evaluation**	• TEST • Credit points (ECVET): 3

4.6.   LO6: Social Ecological System Approach

LO 6	Social Ecological System Approach
• **Authors & affiliations**	• Rainer PASLACK & Jürgen SIMON • SOKO Institute, Bielefeld Germany (Institut für Sozialforschung und Kommunikation)
• **Aims**	In this Learning Outcome, the ES goals are taken up again by providing them, or rather the interrelationships between humans and nature, with a theoretical foundation based on fundamental insights of general systems theory. More precisely, the aim of this LO is to present knowledge about: • the basic assumptions of the theory of complex and dynamic systems, which are relevant for both human social systems and natural ecosystems; • introduction of the reader to "systemic thinking". • Presentation of "social-ecological systems" (SES), as well as the particularities that distinguish especially complex and dynamic systems from other (non-systemic) entities - such as simple things (stones, tools, etc.) In this way, the trainees will understand the system-theoretical terms from the outset to anyone who is not already professionally familiar with them, and the misunderstandings or perplexity can be omitted.
• **Knowledge/skills**	On successful completion of this LO a trainee will be able to: • Understand the systems theory that not only models and analyzes the dynamics of individual (isolated) systems in exchange with their environment, but also the complex

	interplay of several systems that are interdependent with each other's environment by examining the internal effects of each of the systems on the other;
	• Interpret the system theory in a way that considers the interrelationships between the various systems as if they were the interactions between the components of a single "supersystem", but without ignoring the respective characteristics of the two "components" (the subsystems);
	• Know the trans- or inter-systemic approach, the "theory of social-ecological systems", which is decisive for our context, has emerged in recent decades, in which human systems (societies) and ecosystems (nature) are interlinked
	• Realize SES approach is an "integrative approach", which, investigates and models the causal interconnection of systems of different types.
	• Know the specific epistemological and methodological problems each system theory has to struggle with;
	• Explain the determination and coherent modelling of the individual components of a system (or even several systems coupled with each other) and their interactions
	• Show the reasons why we one should consider the world as a comprehensive social-ecological system
	• Reveal the most important characteristics of complex dynamic systems in society and nature
	• Understand the indicators ("key tools") that SES research use and how do they support the SES monitoring
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	We all live in an extremely complex and dynamic world. No one can any longer grasp the multitude and variety of components

	and their complex interplay, which together produce what we call "our reality". In the course of the modern globalization of the world in economy, politics and culture, the earth has been covered with a huge and unmanageable network of traffic connections, on which countless people and goods as well as data are transported day and night. And although there are numerous international agreements that attempt to order and regulate this "jungle", this process is on the whole rather "wild", since in the mostly neo-liberal economic systems, especially in the western world, the transnationally active companies act primarily according to business efficiency and return criteria and seize every opportunity that presents itself to develop further profitable products and to open up new markets wherever this is possible and appears opportune.
• **Key words/phrases**	• System individual components • The world as a SES • SES theory • SES research indicators • SES monitoring
• **Testing & Evaluation**	• TEST • Credit points (ECVET): 3

5. LOs organization for curriculum set-up

The technical organization of the curriculum on the web-site will be done through the following scheme

Screen 1: List of LOs

LO No	Title
LO 1	History of Environmental Pollution
LO 2	Global Environmental Problems

LO 31	How Ecosystems Work
LO 4	Ecosystem Services
LO 5	Ecoliteracy
LO 6	Social Ecological System Approach

Each title to be hyperlinked to the corresponding Table, listed in 3.1. For instance:

EXAMPLE!

LO 4	Ecosystem Services (Hyperlinked to Table 4)

Screen 2 Table 4, containing the basic elements for LO4:

EXAMPLE!

LO 4	Ecosystem Services
• **Authors & affiliations**	• Gamze YÜCEL IŞILDAR and Cağlan GÜNAL • GAZI UNIVERSITY, TR
• **Aims**	The 'ecosystem service' (ES) is relatively new concept. Simply, ecosystem services are the direct and indirect contributions of ecosystems to human well-being. The structure and processes of the ecosystems underpin the capacity of an ecosystem to provide goods and services. The aim of this chapter is to improve the knowledge of ecosystem services. • Understanding the ecosystem services in terms of ecological, social, cultural and economic values • Understanding conceptual framework for ES • To teach how to classify ES • Mapping and assessment of ES for better understanding of potential implications of ecosystem changes • The ways of integrating ES concept into policies
• **Knowledge/skills provision**	On successful completion of this chapter a trainee will be able to: • Understand the "ecosystem services" concept • Interrelate ES and human well being • Classify biotic and abiotic ES • Assess the anthropogenic impacts on provision of ES • Understand Impacts of spatial and temporal differences on

	demand from ES • Mapping and integrated assessment of ES • Integrate ES concept into environmental policies
• **Autonomy & responsibility**	• Communication skills: good verbal and written communication skills; • Computing skills: competences and skills in use of modern technological tools; • Use of media: knowledge on the principles of preparation and delivery of messages through media; ability to develop written and oral presentations • Personal issues: be independent and organized, able to think critically and creatively; • Collaborative working: capable of team work
• **Summary**	This Learning Outcome explains the importance of improved knowledge of ecosystems and their benefits in terms of ecosystem services for more sustainable ecosystem valuation and management. To this aim, conceptual model characterized by its biophysical structures and processes; function; services and benefits in line with human well- being are described. Framework for integrated mapping and assessment of ecosystems and their services that helps people to understand the full spectrum of ways in which the natural environment contributes to people's well being are given in detail. Finally, how ecosystems should be integrated into environmental policies are discussed.
• **Key words**	• Supporting Services • Provisioning Services • Regulating Services • Cultural Services • ES mapping
• **Testing & Evaluation**	• TEST • Credit points (ECVET): 3

The title **Ecosystem Services** in Table 4 to be hyperlinked with the corresponding educational content on screen 3, for instance:

Screen 3 Educational content of LO 4:

EXAMPLE!

The foods we eat, the air we breathe, the water we drink and the climate that makes our planet habitable all come from nature.

In spite of increasing public awareness and understanding the importance of the contribution of healthy ecosystems to human well-being in recent years; the degradation of ecosystems and loss of biodiversity still continue on a large scale. While people demanding more from the nature and overuse natural resources, destruction of ecosystems are increasing rapidly. In fact, ecosystems with high productivity are the guarantee of human safety with the services they provide. Healthy ecosystems are able to reduce risks and vulnerability where as poorly managed ecosystems may cause flood, decrease in crop quality, emergence of diseases like Covid 19 (Liu, 2005). Despite of this fact, ………

The educational content of each LO must finish with a "References" section. After this section, a Test comprising the test questions, prepared by the authors must be positioned. The test may be accessible through the word TEST, positioned after the References list and hyperlinked to the test itself, positioned on a new screen (Screen 4).

The self(evaluation) test must be also accessible through the word TEST in the Table displayed on Screen 2 (see page 18).

Example!

REFERENSES

……………………

Walz, A., Schmidt, K., Ruiz-Frau, A. Et Al. (2019). Sociocultural Valuation Of Ecosystem Services For Operational Ecosystem Management: Mapping Applications By Decision Contexts In Europe. Reg Environ Change 19, 2245–2259 .

TEST (hyperlinked to screen 4)

Screen 4: Test questions for LO 4:

No	Question
1	Food, genetic resources, and fuelwood are examples of: a) Regulating services ☐ b) Supporting services ☐ c) Cultural services ☐

	d) Provisioning services ☐
2	Recreation and ecotourism; sense of place are examples of: a) Cultural services ☐ b) Provisioning services ☐ c) Supporting services ☐ d) Regulating services ☐
3	The ecological valuation can NOT be expressed in terms of ethical values. a) True ☐ b) False ☐