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

Massive open online course "Sustainable Development of Mountain Territories in the Context of the Concept of Ecosystem Services"

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Host institution	Gorno-Altaisk State University http://sunraise.gasu.ru/
Level	Intermediate
Course duration	Self-paced
Approximate workload	1 ECTS = 36 academic hours (in accordance with Russian system)
Language	English, Russian

Summary

The key to sustainable development is achieving a balance between the exploitation of natural resources for socio-economic development, and conserving ecosystem services that are critical to everyone's wellbeing and livelihoods (Falkenmark et al., 2007). Many development goals are likely underpinned by the delivery of one or more ecosystem services, the benefits nature provides to people. Despite the fact that the concept of "ecosystem services" originated in the works of ecologists in the second half of the 20th century, the majority of people do not understand what they are. Most documents and research works concerning this issue are still available only in English. Moreover, they are written in a very complicated scientific language.

The authors of this course made an attempt to develop educational materials covering the issues of ecosystem services as a key part of sustainable development in general and in particular of mountain territories, easy to understand, and available to all in both English and Russian languages.

Unlike most similar MOOCs, this course is accessible all year round (no exact starting days), 7 days a week, and 24 hours a day, which allows studying it at any convenient time. The course is free of charge; no certificates are given after completing the course.

Target student audiences

This educational resource is intended for university students, schoolchildren, teachers and a wide range of people interested in the issues of sustainable development of mountain territories and ecosystem services.

Prerequisites:

There are no pre-requisites for taking this MOOC, apart from having access to a computer with an internet connection.

Erasmus+ CBHE project Sustainable Natural Resource Use in Arctic and High Mountainous Areas

Aims and objectives

The aim of the course is to provide students with basic knowledge about the ecosystem services and the role they play in the sustainable development of mountain territories.

The objectives of the course are:
- students will be introduced to general characteristics of mountain territories;
- students will study the specific features of mountain biodiversity and the factors it is caused by;
- students will gain an understanding of global significance of mountain territories;
- students will be introduced to the concept of ecosystem services and history of its development;
- students will study the types of ecosystem services;
- students will study the types and methods of valuation of ecosystem services;
- students will gain an understanding of key threats to mountain ecosystem services and the way they can be restored.

General learning outcomes:

By the end of the course, successful students will:

- be able to describe the general characteristics of mountain landscapes and climate and the way they are formed;
- be aware of natural and man-caused disasters that occur in the mountains;
- understand the reasons for high biodiversity in mountain areas;
- understand the concept of the “biodiversity hotspots”;
- recognize the global significance of mountain natural and cultural resources;
- understand the advantages of alternative energy development in mountain areas;
- be aware of the concept of ecosystem services and history of its development;
- be able to list the types (categories) of ecosystem services and define their “components”;
- be able to describe the role of mountain territories in the provision of ecosystem services;
- be able to define the value of ecosystem services;
- be able to choose the methods for valuation of a particular ecosystem service;
- identify threats to mountain ecosystem services ; and
- be aware of possible methods for restoration of ecosystem services.

Course structure

The MOOC includes six themes, each consisting of:
- an introductory video lecture;

- a text for reading with interactive links, which help to understand the meaning of new scientific terms, study in detail one or another aspect of the given topic, and get to know basic documents in the sphere of sustainable development of mountain territories and ecosystem services;
- a presentation summarizing the information the students have seen and read;
- a short test for self-control, which can be performed an unlimited number of times.

After completing the course, the students should do a final test covering all topics:
- the test consists of 30 randomly chosen questions;
- students have 60 minutes to perform it;
- the test can be performed only once;
- the course is considered successfully completed if 70% of tasks are performed correctly.

Course contents

The MOOC covers the following issues:

Theme 1. General Characteristics of Mountain Territories. General characteristics of mountains. Mountain belts and their description. Types of mountains (fold (folded) mountains, block and fault-block mountains, volcanic mountains) and their formation. Mountain relief, its characteristic features, and natural processes it depends on. Mountain climatic conditions; causes for climatic variability in the mountains. Natural and man-caused disasters that occur in the mountains (avalanches, mudflows, landslides, etc.) International recognition of the importance of mountain systems. Chapter 13 of the Agenda 21.

Theme 2. Biological Diversity of Mountain Territories. The term "biodiversity" and its origin. The phenomenon of the diversity of living organisms. Three independently acting processes causing biodiversity: spontaneously occurring genetic variations (mutations), natural selection, and geographic and reproductive isolation. Earth's biodiversity and its functions. Reasons for high biodiversity in mountain areas. Major centers of maximum biological diversity. The concept of the "biodiversity hotspots." World's biodiversity hotspots.

Theme 3. Global Significance of Mountain Territories. General characteristics of natural and cultural resources of mountain territories. Mineral mountain resources. Mountains as "water towers of the world." Development of alternative energy in mountain areas (hydro, solar, and wind power). Mountain economic activities (agriculture, forestry, hunting, etc.). Mountain tourism development. Population of mountain territories; indigenous communities and traditional cultures. Role of special laws and organizations in the sustainable development of mountain territories. The Alpine Convention. International organizations fostering sustainable development of mountain territories (the Mountain Forum, the Mountain Partnership, and others).

Theme 4. Ecosystem Services: Essence and History of Development. The concept of ecosystem services and history of its development. Definition of ecosystem services. Fundamental

international research on the economics of ecosystem services. The Economics of Ecosystems and Biodiversity (TEEB). Millennium Ecosystem Assessment (MEA). Types (categories) of ecosystem services (provisioning, regulating, cultural, and supporting); their role and "components." The role of mountain territories in the provision of ecosystem services.

Theme 5. Economic Valuation of Ecosystem Services. Mountains as major sources of ecosystem services. Three types of valuation of ecosystem services (ecological, economic or monetary, and social). Total economic value of ecosystem services and its subcategories: use value (direct use value, indirect use value, and option value) and non-use value (bequest value, altruistic value, and existence value). Ecosystem services valuation methods: the avoided cost method, the replacement cost method, the factor income method, the travel cost method, the hedonic pricing (valuation) method, the contingent valuation method, and the group valuation method. The willingness to pay approach. Payments for ecosystem services (PES).

Theme 6. Threats to Mountain Ecosystem Services and Their Restoration. Increasing demands for ecosystem services and their degradation. Global change research in mountain areas. Key direct drivers of change in ecosystem services: climate change, environmental pollution, reduction of natural habitats (land use change and physical modification of rivers or water withdrawal from rivers), overexploitation, and invasive alien species.