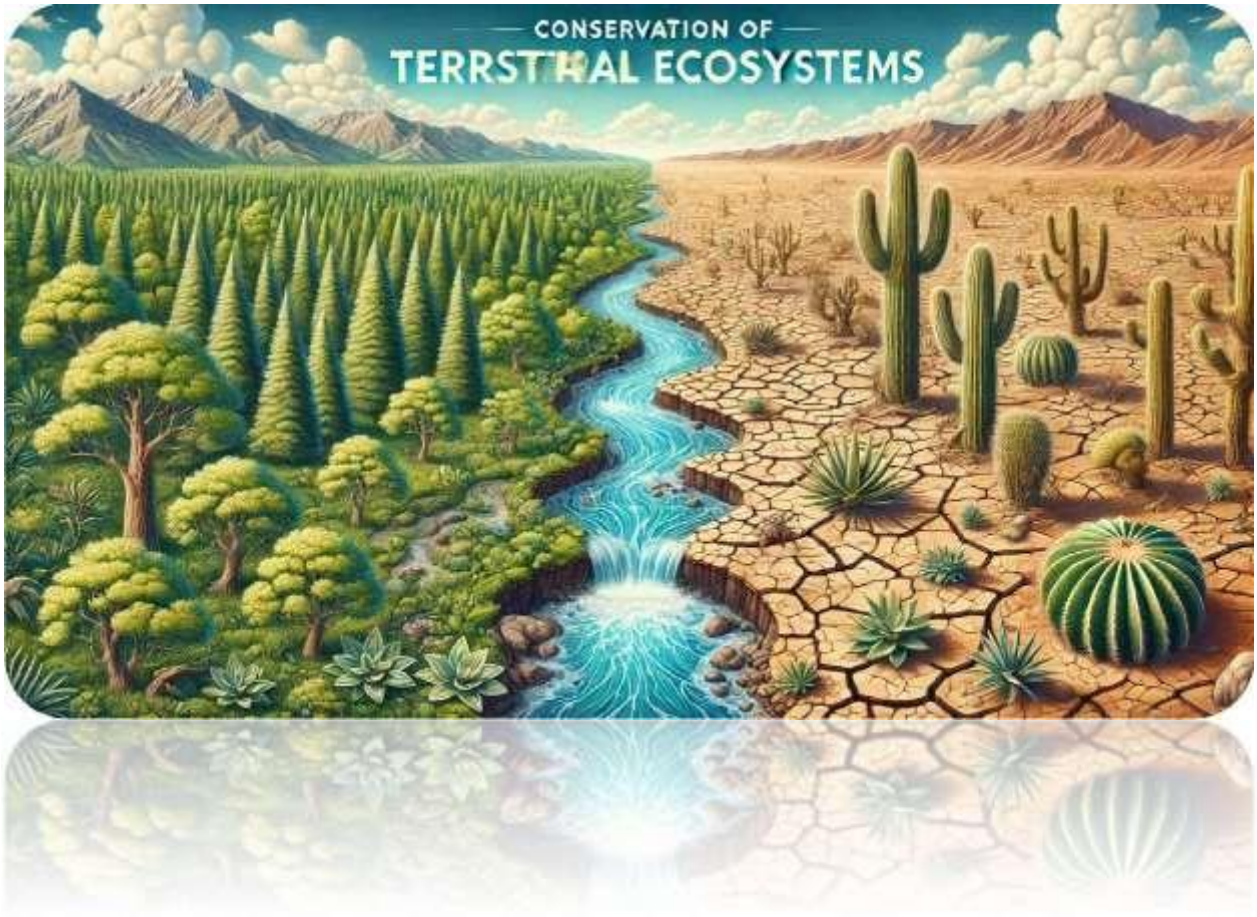
NP JSC **"South Kazakhstan University named after M. Auezov"**

"Life on land"



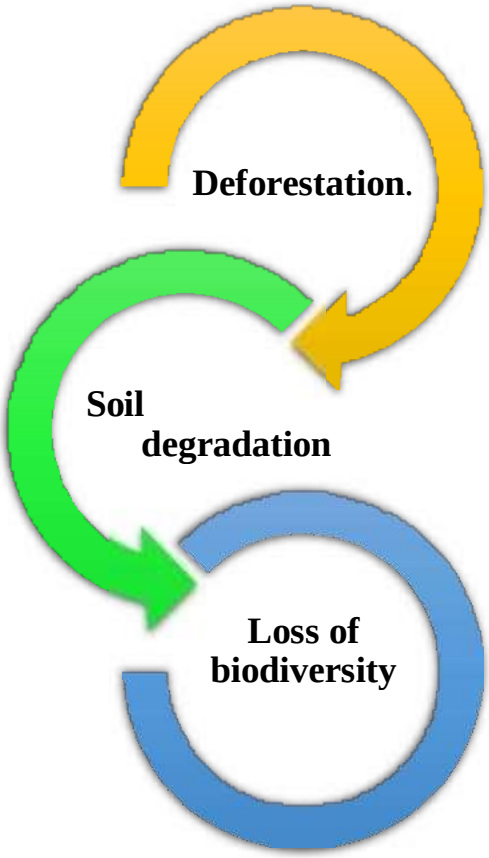
Shymkent 2024

Introduction

Terrestrial ecosystems are natural complexes that include all living and inanimate elements, such as forests, meadows, mountains, deserts and tundra. These ecosystems play a key role in maintaining life on the planet: they provide us with oxygen, regulate the climate, support biodiversity, and serve as sources of food, water, and materials. The preservation of terrestrial ecosystems is a global task, because their destruction directly affects the sustainability of the environment and the well-being of mankind.

Problems of terrestrial ecosystems

Terrestrial ecosystems face many challenges caused by both natural processes and human activities.

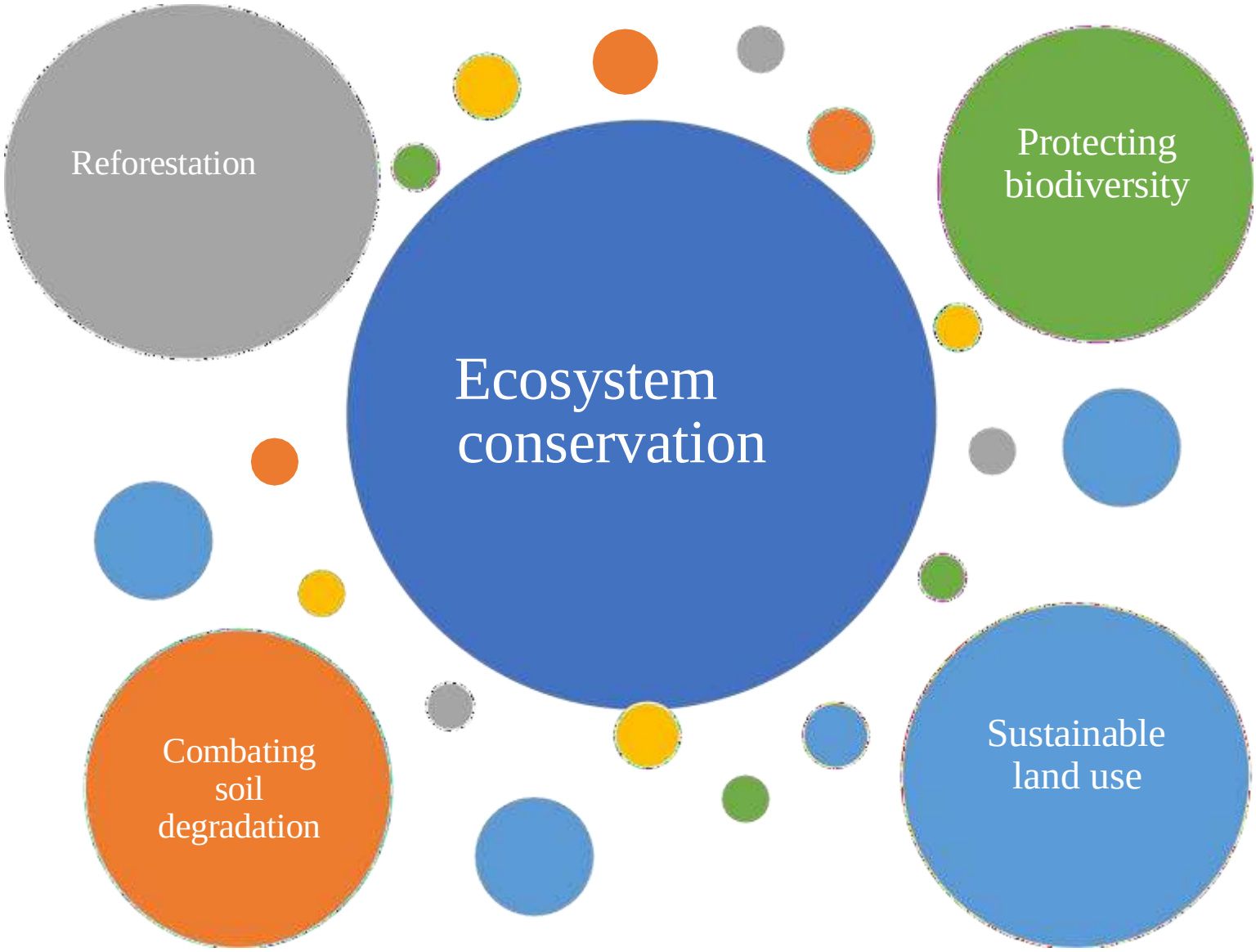


- **Deforestation.** Forests are the "lungs" of the planet, they absorb carbon dioxide and release oxygen. However, massive deforestation leads to the loss of these important functions, as well as to the destruction of habitat for many species of animals.
- **Soil degradation.** Unsustainable agriculture, excessive resource extraction an dim proper land management lead to soil degradation. Agriculture cannot exist without fertile soil, which threatens food security.
- **Loss of biodiversity.** Many plant and animal species are at risk of extinction due to the destruction of their natural habitat. This leads to an imbalance in ecosystems and can disrupt the stability of the entire system.

Factors affecting terrestrial ecosystems

- **Anthropogenic impact.** The development of industry and agriculture puts significant pressure on ecosystems. Mass urbanization requires new territories, which often leads to deforestation, depletion of natural resources and environmental pollution. Intensive use of chemicals in agriculture harms soils and water resources.
- **Climate change.** Climate warming is affecting ecosystems around the world. For example, many forests and savannas are becoming more prone to fires, which leads to mass extinction of flora and fauna. Changing temperatures and precipitation levels also alter natural processes such as the plant life cycle, thereby disrupting ecosystems.

Measures for the conservation of terrestrial ecosystems



✔**Forest restoration.** One of the most effective ways to preserve terrestrialecosystems is to restore forests. This includes both the protection of the remaining woodlands and the active restoration of deforested areas by planting trees and restoring local ecosystems**.**

- **Protection of biodiversity.** An important step is the creation of nature reserves and conservation areas where species can exist without the impact of human activity.The protection of rare and endangered species, as well as the prevention ofpoaching, plays a key role in maintaining the balance of ecosystems.
- **Combating soil degradation.** To prevent further soil degradation, it is important to apply sustainable farming methods. This includes the use of organic fertilizers, minimizing plowing and planting of forest belts to protect the soil from winderosion.
- **Sustainable land use.** Modern land use planning methods provide for the use of land in such a way as to minimize harm to nature. This includes the rational allocation of agricultural land, urban areas and protected natural areas.

A number of practical measures aimed at preserving terrestrial ecosystems can be implemented for universities. These measures will not only help to reduce the impact on nature, but can also become an example for students and contribute to their environmental education. Here are some ideas:

1. Green campus infrastructure

- **Landscaping of the territory.** Planting trees, shrubs and gardens on the university grounds contributes to improving air quality, reducing carbon dioxide and supporting biodiversity.
- **Garden roofs and vertical gardens.** This helps in maintaining the temperature balance of buildings and reduces energy consumption for air conditioning.
- **Creation of local ecosystems.** The university can organize nature reserves or botanical gardens where local plants and animals will be preserved and studied.

2. Reducing resource consumption

- **Sustainable management of water resources.** Introduction of rainwater collection systems for irrigation or sanitary purposes. The use of drip irrigation technology to minimize water losses.
- **Energy-efficient buildings.** The use of solar panels and other renewable energy sources to reduce dependence on non-renewable resources. Implementation of energy-efficient lighting and ventilation systems.

3. Sustainable waste management

- **Sorting and recycling of waste.** Universities should have systems for separate garbage collection and recycling.

This is especially true for paper, plastic, glass and organic waste.

Composting of organic waste. Universities can create compost sites for processing food and plant waste, which helps to restore soils and reduce methane emissions.

4. Educational programs and research activities

Environmental education. Implementation of courses and programs on sustainabledevelopmentandecologyforstudentsofallspecialties.This will help toshapethe environmental awareness of the younger generation.

Researchprojects. Universitiescandevelopresearchaimedatpreserving ecosystems, developing sustainable technologies, restoring land and protecting biodiversity**.**

Environmental volunteer programs. Organization of programs for reforestation, cleaning of territories and environmental activities within the framework of volunteer movements among students.

5. Reducing the carbon footprint

Eco-transport. Universities can encourage the use of bicycles, electric vehicles and public transport. Creation of parking lots for bicycles and charging stations for electric vehicles on campus.

Online training and remote work. The development of online courses and digital technologies to reduce the need for travel and reduce resource consumption.

6. Environmental initiatives and activities

- **Eco-festivals and conferences.** Organization of environmental events where issues of ecosystem conservation, climate change and other environmental challenges are discussed. These activities can encourage students and teachers to actively participate in solving environmental problems**.**

- **Days of tree planting.** Carrying out tree planting campaigns, which helps to raise awareness and make a practical contribution to improving terrestrial ecosystems.

7. Sustainable land use

- **Creation of university farms and vegetable gardens.** These spaces can be used to grow local crops that will serve educational and research purposes, as well as help restore soil fertility.

- **Control over the use of land.** Universities can plan their infrastructure more responsibly by preserving natural areas and limiting development in areas with important ecosystems.

Research projects on the protection of biodiversity. University of Cambridge (UK): conducts research on the restoration of degraded lands and the development of strategies for the conservation of rare plant species. National University of Singapore: Studies endemic rainforest species and develops recommendations for their conservation.

Forest restoration. Yale University (USA): implements the Urban Canopy project aimed at restoring forest areas around cities. University of Oslo (Norway): cooperates with local communities in tree planting and monitoring programs.

Educational Initiatives -University of California at Berkeley: Offers students field courses where they study sustainable land use and ecosystem restoration. University of Melbourne (Australia): educates local communities on sustainable agriculture and natural resource

management.

Partnerships for Ecosystem Conservation - Kyoto University (Japan): cooperates with government agencies to create conservation areas and reforestation programs. University of Brasilia (Brazil): works with local communities to preserve the biodiversity of the Amazon.

Proposed measures of the South Kazakhstan University named after M. Auezov

Laboratories of sustainable ecosystems. Research sites are being created at the university, where students develop and test technologies for the restoration of forests, soils and water resources.

Projects for the protection of rare species. Launching initiatives to preserve populations of rare plants and animals with the participation of students, scientists and local residents. For example, installing cameras to monitor wild animals or creating nurseries for rare plants.

Interactive ecosystem map. The university is creating platforms where users can see the state of lands, forests and biodiversity, as well as learn about threats to specific regions.

Ecotourism programs. The university organizes tours for students and the local population for educational purposes to show the importance of preserving natural areas.

Student projects on agroforestry. Students develop sustainable farming practices that include planting trees that promote soil restoration. Organizing events where students, scientists and local residents work together to restore natural areas, plant trees or clean up polluted lands.

The implementation of these measures at universities will not only help reduce the negative impact on terrestrial ecosystems, but also educate students about the importance of sustainable development.

International and national initiatives

International programs. One of the most famous initiatives is the United Nations Convention to Combat Desertification (CCW).It is aimed at reducing land degradation and restoring already affected ecosystems. Under this program, many countries are taking measures to restore land that has been lost due to overuse.

National programs. Kazakhstan is also actively working to protect terrestrial ecosystems, such as projects to restore steppe landscapes and combat desertification. State environmental monitoring and control programs help to monitor the state of ecosystems and prevent their degradation. The preservation of terrestrial ecosystems is not only a task for Governments and organizations, but also the responsibility of every person. Each of us can contribute to the conservation of nature: from the reasonable consumption of resources to participation in environmental actions. A sustainable future depends on how much we care about nature conservation, because ecosystem health is the health of our planet.