DOKSAY

Çok Nemli İklime Sahip Doğu Karadeniz Bölgesinde
Entegre Doğal Kaynak Yönetimi

Integrated Natural Resource Management in Very Humid
Climatic Regions of Eastern Black Sea Coastal Region in Türkiye

FOREST ECOSYSTEM SERVICES

Local Solutions for a Climate-Resilient Future

Forest Ecosystem Services Booklet, 2025

Republic of Türkiye Ministry of Environment, Urbanization and Climate Change General Directorate of Combating Desertification and Erosion

Mustafa Kemal Mahallesi 2082. Cadde
No:52, 06510 Çankaya Ankara/Türkiye
Tel: +90 312 410 10 00
Faks: +90 312 207 57 56
Eposta: cem@csb.gov.tr
www.cem.csb.gov.tr

United Nations Development Programme (UNDP)
Oran Mah., Mustafa Fehmi Gerçeker Sokak No:12,
06450 Çankaya, Ankara/ Türkiye
Tel: +90 312 454 1100
Faks: +90 312 496 1463
E-posta: registry.tr@undp.org
www.undp.org.tr

Nature Conservation Centre Foundation (DKM)
Çiğdem Mah. 1594. Sokak No:3,
06530 Çankaya Ankara/Türkiye
Tel: +90 312 287 40 67
Faks: +90 312 286 68 20
Eposta: dkm@dkm.org.tr
www.dkm.org.tr

Graphic Design:
carnavale.com.tr

Baskı:

The Integrated Natural Resource Management in Very Humid Climatic Regions of the Eastern Black Sea Coastal Region in Türkiye (DOKSAY) Project is a project supported through GEF-7 cycle carried out in partnership with the General Directorate of Combating Desertification and Erosion Control (ÇEM) under the Ministry of Environment, Urbanization and Climate Change (MoEUCC), relevant governmental institutions, and with financial support from the Global Environment Facility (GEF). The project is being implemented by the Nature Conservation Centre (DKM) with the support from the United Nations Development Programme (UNDP).

DOKSAY

Çok Nemli İklime Sahip Doğu Karadeniz Bölgesinde Entegre Doğal Kaynak Yönetimi

Integrated Natural Resource Management in Very Humid Climatic Regions of Eastern Black Sea Coastal Region in Türkiye

FOREST ECOSYSTEM SERVICES

Local Solutions for a Climate-Resilient Future

ABBREVIATIONS

LDN	Land Degradation Neutrality
UN	United Nations
CICES	Common International Classification of Ecosystem Services
DLDD	Desertification, Land Degradation and Drought
DKM	Nature Conservation Centre
DOKSAY	The Integrated Natural Resource Management in the Very Humid Climatic Regions of the Eastern Black Sea Coastal Region in Türkiye Project
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
MEA	Millennium Ecosystem Assessment
SLM	Sustainable Land Management
SDGs	Sustainable Development Goals
TEEB	The Economics of Ecosystems and Biodiversity
UNDP	United Nations Development Programme

ECOSYSTEM SERVICES

Forest ecosystem services are the entirety of the direct and indirect benefits that forests provide to living things.

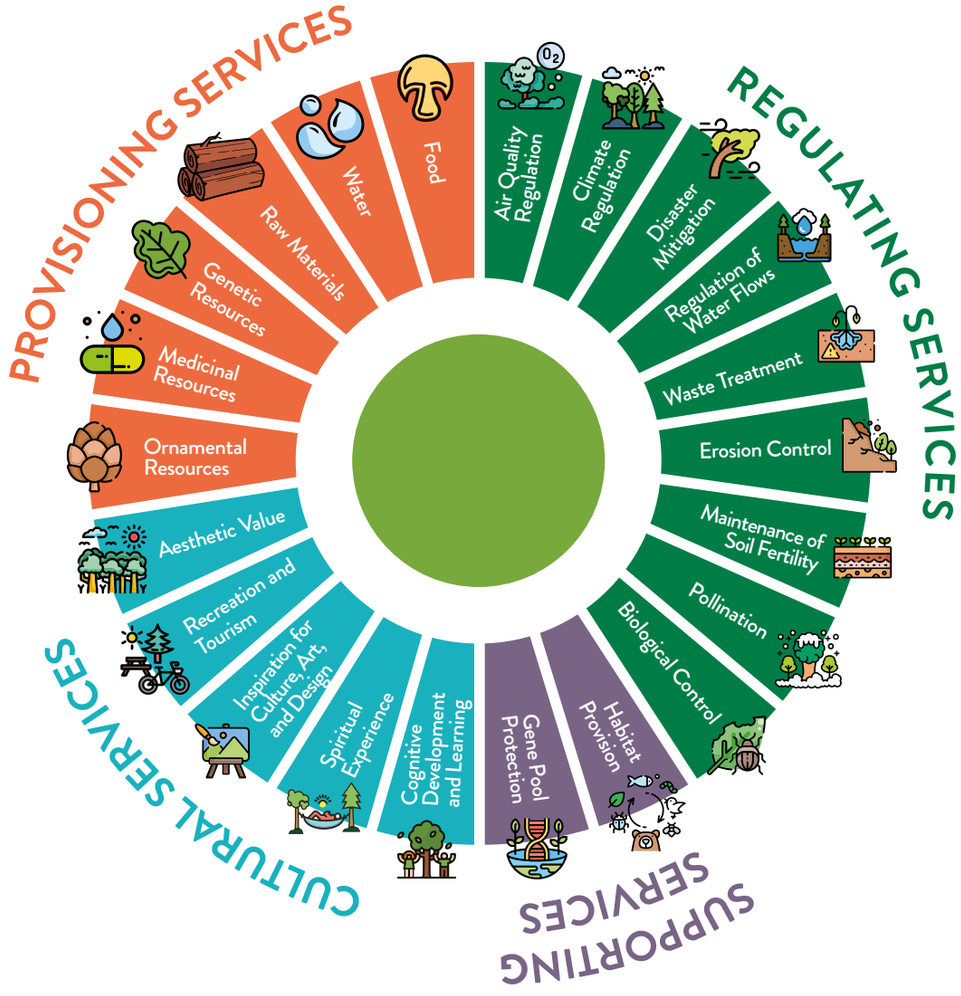
Ecosystems provide numerous products and services essential for the continuation of life. The concept of “ecosystem services” refers to all the material and non-material benefits that ecosystems on Earth provide to living beings. These benefits cover a wide spectrum, including food production, clean water supply, climate regulation, biodiversity conservation, maintenance of soil fertility, improvement of air quality, and provision of cultural-recreational opportunities.

Different classification approaches have been developed for the concept of ecosystem services. The Millennium Ecosystem Assessment Report established the foundation for these approaches by defining ecosystem services in four main groups: provisioning, regulating, supporting, and cultural services. The TEEB (The Economics of Ecosystems and Biodiversity, 2010) study enriched this framework with economic valuation and policy development dimensions, applying a similar classification. A more recent approach, the Common International Classification of Ecosystem Services, with its 2018 updates, categorizes ecosystem services under three main themes: provisioning, regulation and maintenance, and cultural; it addresses subcategories such as energy, materials, nutrition, climate and air quality regulation, water cycle management, and aesthetic-spiritual values in detail.

These different classifications not only highlight the ecological dimensions of ecosystem services but also their economic and social aspects, providing multifaceted contributions to management and planning processes.

In this context, forest ecosystem services represent an important area that expresses the entirety of ecological, economic, and cultural contributions of forests to humans and other living beings. To clearly present what components these contributions consist of, the widely internationally accepted TEEB ecosystem services classification provides a fundamental starting point.

Forest ecosystem services are the entirety of the direct and indirect benefits that forests provide to living beings, not limited to the provision of economic products; they include multi-layered functions such as climate regulation, protection of water and air quality, maintenance of biodiversity, support of soil processes, and provision of cultural and spiritual values. As critical components of natural capital, forests also play a fundamental role in maintaining ecological balance for the protection of human well-being and in the formation of values to be passed on to the future.



PROVISIONING SERVICES

Provisioning services are defined as the products and services obtained directly from ecosystems. Among ecosystem products and services, provisioning services are the most visible and the most studied.

Provisioning services are among the most fundamental benefits provided by forest ecosystems and include elements that directly support human life. Provisioning services are evaluated in six categories: food, water, raw materials, genetic resources, medicinal resources, and ornamental resources.

◆ Food

Food is one of the most basic provisioning services offered by ecosystems. Forests are a source of various wild fruits, edible mushrooms, and natural foods like honey. For example, fruits such as raspberries and blackberries, or honey obtained through natural beekeeping, are among the food services of forests. These products both meet the needs of the local population and have economic value.

◆ Water

Forest ecosystems play a critical role in regulating the water cycle. Forests contribute to the replenishment of groundwater while improving the water quality of streams and ponds. The clean water provided from these areas is used for both drinking and agricultural irrigation.

◆ Raw Materials

Many natural materials used in human activities are obtained from forests. Products such as timber, wood, and fibers used in paper production are among the important non-wood forest products provided by forests. Additionally, other products like resin and mushrooms are valued as raw materials in various sectors.

◆ Genetic Resources

Forest ecosystems are rich in genetic diversity. Genetic materials obtained from endemic plant species are used in agriculture and the pharmaceutical industry. For example, the genetic traits of some forest trees provide a resource for developing new species resistant to drought or diseases.

◆ Medicinal Resources

The origin of many medicinal products is based on plants that grow in forests. Medicinal herbs, alkaloids extracted from barks, and other natural compounds provide valuable raw materials for the pharmaceutical industry. For example, salicylic acid, obtained from the bark of the willow tree, is the raw material for pain-relieving drugs.

◆ Ornamental Resources

Forests host many natural resources used for aesthetic and cultural purposes. Ornamental resources such as flowers, cones, and branches used for handicrafts are especially valued in decoration and traditional arts. These products hold significant potential for both individual and commercial use.

REGULATING SERVICES

Regulating services, unlike provisioning services, do not involve services directly obtained from nature, but rather the benefits derived from the outcomes of natural processes.

Regulating services are processes that particularly help maintain the balance of natural systems. They are basically categorized as air quality regulation, climate regulation (including carbon sequestration), mitigation of disasters (extreme events), and regulation of water flows.

◆ Air Quality Regulation

Forests produce oxygen by absorbing carbon dioxide from the air and also filter pollutants. Urban forests play a significant role in reducing air pollution in urban areas.

◆ Climate Regulation

Forests reduce the effects of climate change by capturing and storing carbon from the atmosphere. Especially large forested areas function as carbon sinks.

◆ Disaster Mitigation

Forests mitigate the effects of floods, storms, and extreme weather events, and in this process, they help reduce flood risk by facilitating soil absorption of water.

◆ Regulation of Water Flows

Forest ecosystems enable water to infiltrate the soil through natural means and replenish groundwater reserves. They also control surface runoff, thereby reducing flood risk.

◆ Waste Treatment

Forest soils and vegetation filter pollutants in the water, thereby improving water quality. This process plays a critical role in the protection of clean drinking water sources.

◆ Erosion Control

Tree roots hold the soil in place, preventing erosion and thus contributing to the protection of natural habitats, agricultural lands, and settlements. This prevents the loss of agricultural soil and reduces sedimentation in dams and irrigation infrastructures.

◆ Maintenance of Soil Fertility

Forests enrich the soil’s organic matter content, thereby increasing soil fertility. This ensures the sustainability of both natural ecosystems and agricultural production.

◆ Pollination

Forests provide habitat for many pollinator species and support the increase of agricultural products through these species.

◆ Biological Control

Predatory species in forests control pest populations through natural means, thereby maintaining ecosystem balance. Waste treatment, maintenance of soil fertility, and pollination are among the services provided by forests for biological control.

SUPPORTING SERVICES

Supporting services are the natural processes that form the basis of all other products and services provided by ecosystems, making their existence possible. These services encompass a very broad spectrum, from nutrient cycling to soil formation, and from pollination to the conservation of genetic diversity. Therefore, these services are of indispensable importance not only for human well-being but also for the sustainability of life on Earth.

Unlike other ecosystem services, the effects of supporting services emerge over the long term. For example, while the impacts of human activities on cultural or regulating ecosystem services can be observed within a few years or even a decade, the formation and change of supporting services can take centuries, even millennia. For this reason, it is quite difficult to measure the direct effects of human interventions on these services. However, processes such as habitat loss, climate change, and the decline in biodiversity seriously threaten the sustainability of supporting services.

◆ Habitat Provision

Forests provide a natural habitat for countless species of living things. In particular, forest ecosystems function as a kind of “nature’s nursery” for flora and fauna, providing favorable environments for the growth, nourishment, and protection of young plants and animals. They create nesting sites for birds, shelters for mammals, and microhabitats for insects. Additionally, fungi, mosses, and soil organisms living on the forest floor contribute to the continuity of the ecosystem by sustaining their life cycles. This diversity strengthens the continuity of ecological networks and the stability of food chains.

◆ Gene Pool Protection

Forests play a vital role in the conservation of genetic diversity. The richness of plant and animal species is a fundamental resource not only for today’s life but also for the future ecological balance and agricultural security. Rich gene pools increase the resilience capacity of ecosystems against diseases, climate change, and environmental shocks. For example, wild relative plants found in forests harbor genetic traits—such as drought tolerance and disease resistance—that agricultural species may need in the future. This situation both strengthens the adaptive capacity of ecosystems and indirectly supports humanity’s food security.

The continuity of other ecosystem services is not possible without supporting services. In other words, regulating (e.g., carbon sequestration), provisioning (e.g., wood, water), and cultural (e.g., recreation) services are built upon the ecological foundation created by supporting services. Therefore, the habitat and genetic diversity provided by forests are not only a biological richness but also serve as a form of insurance for the long-term existence of human societies.

CULTURAL SERVICES

Cultural services express the non-material connections people form with nature. These services encompass individuals' sensory, spiritual, aesthetic, and cognitive experiences rather than physical products derived from nature. The feelings of inspiration, beauty, belonging, and meaning that people experience in their relationship with nature form the basis of cultural ecosystem services. These services enhance individuals' psychological well-being and strengthen communities' cultural identity.

These services not only provide individual happiness and life satisfaction but also strengthen public awareness and support for nature conservation policies. As people's emotional and cultural ties with nature deepen, their motivation to protect forests and natural areas also increases.

◆ Aesthetic Value

Forests offer profound aesthetic pleasure to people with their visual beauty. The diversity of tree species, seasonal color changes, lake and stream landscapes, and the melodies of birds create a unique aesthetic experience integrated with nature. These experiences are a source of inspiration for many art forms, from photography to painting, and from literature to architecture.

◆ Recreation and Tourism

Forests provide the natural setting for many recreational activities such as hiking, biking, camping, bird watching, picnicking, climbing, and various sports. Ecotourism practices are one of the strongest examples of sustainable tourism, creating new livelihoods for local people and helping to strike a balance between nature conservation and economic development.

◆ nspiration for Culture, Art, and Design

Forest ecosystems are a source of inspiration for literature, music, architecture, and other art forms. Throughout history, forest ecosystems have been one of the most important sources of inspiration for cultural production... In music, the sounds of birds and the rustling of the wind have inspired composers; in architecture and design, the forms, rhythms, and textures of nature have been reinterpreted. Forests are an inexhaustible source that nurtures human creativity, cultural continuity, and inspiration.

◆ Spiritual Experience

Forests offer people opportunities for peace, tranquility, and spiritual renewal. Individuals who move away from the noise and intense pace of city life experience a process of "mental purification" in nature. Research has shown that time spent in a forest environment reduces stress hormones, lowers anxiety levels, and significantly increases overall life satisfaction.

◆ Cognitive Development and Learning

Forests offer a unique learning environment for nature education and environmental awareness. Children and young people, through the time they spend in nature, have the opportunity to directly observe ecological processes, recognize biodiversity, and experience the principles of sustainable living. Outdoor education programs support cognitive development by encouraging experiential learning. These experiences not only contribute to academic knowledge but also create a strong value system in individuals, fostering responsibility, curiosity, and sensitivity towards nature.

BEYOND ECOSYSTEM SERVICES CLASSIFICATIONS: EXISTENCE / HERITAGE VALUE

Although common classifications that divide ecosystem services into main groups such as provisioning, regulating, supporting, and cultural comprehensively present the material and functional contributions of forests, they may be inadequate in fully expressing certain values. At this point, existence value emerges as a “supra-group” dimension beyond the service groups.

Existence value is based not only on the use-based benefits of forests but also on their cultural, historical, spiritual, and emotional meanings, as well as their quality as a common heritage to be passed on to future generations.

The fact that people value a forest they have never seen, a tree they have not cut, or a species they cannot access simply “because it exists” reflects the essence of this approach. This emphasizes both the intrinsic value of nature and its foundational role in social memory and identity.

Forests hold a central place in the mythologies, folk tales, and traditions of past civilizations. This heritage not only shapes the identity of today’s communities but also contributes to the common memory and cultural accumulation of humanity.

The existence of forests is directly related to the respect for the right to life of all living beings. From an ecological ethics perspective, the fact that species exist is a fundamental principle that requires their protection, regardless of the benefits they provide.

Forests are a vital heritage to be handed down to future generations. This heritage includes not only biodiversity but also elements such as clean air, clean water, aesthetic values, and spiritual peace.

The existence of forests is a powerful symbol that reminds humanity of its connection with nature and embodies the ideal of sustainability. This symbolic importance contributes to the development of social solidarity and nature conservation awareness.

Existence value represents an ethical and social dimension of ecosystem services that cannot be easily expressed in direct economic terms but is of critical importance for long-term conservation and planning. Therefore, beyond international classifications such as MEA, TEEB, or CICES, it should be considered as an independent category and placed at the center of policies for the protection of forest ecosystems.

REFERENCES

FAO. (2022). Forests and climate change: NbS for mitigation and adaptation. Rome: Food and Agriculture Organization of the United Nations.

FOREST EUROPE, (2014). Ministerial Conference on the Protection of Forests in Europe. Belgrade Workshop (Republic of Serbia), 24-25 September 2014

Haines-Young, R. and Potschin, M. (2013): Common International Classification of Ecosystem Services (CICES): Consultation on Version 4, August-December 2012.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC

Ülgen, H., Zeydanlı, U., Lise, Y. (editors), (2020). Orman ve Biyolojik Çeşitlilik (Forest and Biological Diversity). Doğa Koruma Merkezi, Ankara, 219 pages.

TEEB (2010) The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

DOKSAY

Çok Nemli İklime Sahip Doğu Karadeniz Bölgesinde
Entegre Doğal Kaynak Yönetimi

Integrated Natural Resource Management in Very Humid
Climatic Regions of Eastern Black Sea Coastal Region in Türkiye

The Integrated Natural Resource Management in Very Humid Climatic Regions of the Eastern Black Sea Coastal Region in Türkiye (DOKSAY) Project is a project supported through GEF-7 cycle carried out in partnership with the General Directorate of Combating Desertification and Erosion Control (ÇEM) under the Ministry of Environment, Urbanization and Climate Change (MoEUCC), relevant governmental institutions, and with financial support from the Global Environment Facility (GEF). The project is being implemented by the Nature Conservation Centre (DKM) with the support from the United Nations Development Programme (UNDP).

The DOKSAY Project is a multi-faceted project that aims to provide significant environmental, social, and economic contributions to Türkiye. It aims to develop low-cost and nature-based solutions to problems related to land management. This project, which blends traditional knowledge with innovative practices, plays an important role in the areas of environmental sustainability, rural development, and combating climate change. It particularly supports the transition to a sustainable development model with more resilient and compatible land use in the Eastern Black Sea Region.

The project directly contributes to the Land Degradation Neutrality (LDN) targets set by Türkiye within the scope of the United Nations Convention to Combat Desertification (UNCCD), the United Nations Sustainable Development Goals (SDGs), the Paris Agreement, and Türkiye's mitigation and adaptation strategies for combating climate change.