

Ecosystem-based Adaptation Measure and Activity Catalog - Forest Ecosystems

The biosphere reserves Desnianskyi, Roztochya, and Shatskyi encompass relatively large forest ecosystems that need to be preserved and supported in terms of future development and adaptability to climate change. In principle, the forest and its management should aim at maintaining, permitting, and promoting near-natural and self-regulated processes and structures. For this, both active and passive measures are necessary.

These functions and processes that are inherent in forest ecosystems include plant growth, succession with aging and regeneration of different interacting tree species, the interaction of all organisms including plants, animals, fungi, and microorganisms, accumulation of living and dead biomass, soil formation, microclimatic (self-)regulation, etc., and structures formed by these processes, e.g. old trees, deadwood, humus, mixed-age, and mixed-species stands. Healthy forest ecosystems are efficient systems, being especially effective in buffering environmental conditions and self-enhancing their growing conditions. They also provide benefits to neighboring areas, especially by positively influencing landscape temperature regime and hydroecology.

Semi-natural broad-leaved and mixed broad-leaved forests with predominantly native species have both species and structural diversity that form an important basis for their resistance and resilience to climate change. Thus, impairment of this diversity is detrimental to functionality and should be avoided by any means. Due to the outstanding importance of these stands in terms of regulating ecosystem services, the highest priority must be given to protection and promotion, as well as connecting near-natural forests to improve the ecosystem network. In addition, forest areas should be established where natural development can occur with as little anthropogenic interference as possible.

Coniferous forest plantations are less healthy and functional than natural ecosystems, but also fulfill important regulating functions, e.g., fresh air production and microclimatic regulation, and should therefore be preserved as well as transformed to natural stands, mixed stands, or broad-leaved forest. The focus here is on the development of regulating capacity, i.e., on the development of structures such as functional forest edges and enrichment with deadwood.

1	<i>Conservation of existing, functional ecological structures and (self-) regulating capacity</i>	2
1.1	Securing and protecting existing forest areas	2
1.2	Preservation of old trees and deadwood	2
1.3	Conservation of (near-) natural stocks on wetlands	2
1.4	Protection of existing (near-) natural structural and species diversity	2
2	<i>Reduction of direct anthropogenic ecological stress drivers limiting (self-) regulating capacity</i>	3
2.1	Deconstruction of building- and drainage structures	3
2.2	Reduction of use, use intensity, and interventions	3
2.3	Reduction of land access, traffic, and other soil, vegetation, and water degrading practices	3
3	<i>Restoration and targeted development of (self-) regulating capacity</i>	4
3.1	Promote natural regeneration and ecological succession	4
3.2	Wildlife management imitating natural dynamics	4
3.3	Development of structurally rich forest edges (layered and sufficiently wide)	4
4	<i>Development of enabling factors facilitating lines of action I-III</i>	5
4.1	Development of the legal and policy framework and status of forest ecosystems	5
4.2	Institutional development (Law enforcement, internal and external organization and administration, alliances, financing)	5
4.3	Area designation and planning (land acquisition, resource rights, forest zoning, site infrastructure, etc.)	6
4.4	Development of research and monitoring	6
4.5	Development of awareness, education, and training (formal education, capacity building)	6

EbA Measures and Activities in Forest Ecosystems
1 Conservation of existing, functional ecological structures and (self-) regulating capacity
1.1 Securing and protecting existing forest areas
1.1.1 Forest inventory to identify particularly (functionally) valuable areas or individual trees
Target: Preservation of the tree population
1.1.2 Logging moratorium for near-natural and especially of continuous, old-growth mixed broad-leaved forests
1.1.3 Enforce total ban of clear-cutting of any size (see also 4.1)
1.1.4 Enforce complete ban of grazing in forests in core, buffer, and development zones, as it is incompatible and counterproductive for the natural development of forest ecosystems
1.1.5 Reduce and prohibit new road construction through forests
Target: Establish new reserves / protected forest areas
1.1.6 Preparation of scientific evidence for the establishment of protected areas
1.1.7 Protection (inclusion to protected area status) of forests with high conservation value
1.1.8 Define, declare, and secure buffer areas sufficient to ensure a benefit for the core zone
1.1.9 Realign boundaries of sensitive forests (inclusion of adjacent areas to a specific forest or territory worthy of protection)
1.1.10 Inclusion of abandoned land (barren lands) and quarries to protected areas fund
1.2 Preservation of old trees and deadwood
1.2.1 Protect and leave ancient/old and dead trees at their place of origin
1.2.2 Establish a network of old-growth forest islands without management, in which trees can remain until full natural decay
1.2.3 Requirement and promotion of old and deadwood in industrial forests (>10% of the area)
1.2.4 Deadwood should be left in gaps at the place of origin. Accumulation of larger dimensions of deadwood by letting the trees grow old and die naturally
1.2.5 Connection of larger process protection areas with integrative elements in the commercial forest
1.2.6 Allow natural buildup of deadwood stock of underrepresented early and late successional stages of natural forest development, especially on the age and decay phases
1.2.7 Cavity trees of rare and endangered animal species are to be preserved in any case
1.2.8 Preservation of old hollow trees
1.2.9 Compensation schemes for yield loss <i>The owner receives a corresponding compensation payment in a long-term contractual security and grants a limited registered easement: It states that in the area covered by the contract agreement, the secured trees and area covered are excluded from any forestry until the natural decay of the trees</i>
Target: Proper treatment of calamity areas
1.2.10 Do not clear area (leave dead/infected trees on site)
1.2.11 No sanitary cuttings
1.2.12 Focus on the natural development and conduct active restoration only if natural processes are not sufficient (wait 5-10 years at least and then decide if active interventions are needed)
1.3 Conservation of (near-) natural stocks on wetlands
Target: Protection of wetland forests and wet habitats in forests
1.3.1 Legally and strictly protect wetlands and riparian forests and their basins (see measure 4.1)
1.3.2 Actively raise the water level (e.g. via closing drainage ditches (see measure 2.2))
1.3.3 Conserve natural headwater areas with a sufficiently large buffer area (at least 100m). Exclude from forest management and leave to natural dynamics
1.3.4 Control overlogging near water bodies
1.3.5 Prevention of the discharge of soil, garbage, construction, and other materials into water bodies in forests
1.4 Protection of existing (near-) natural structural and species diversity
1.4.1 Leave and protect groups of especially healthy seed trees on site of origin
1.4.2 Leave available broadleaved trees while carrying out logging in coniferous plantations
1.4.3 Leaving at least sufficiently large groups of old (seed) trees on logging sites

2 Reduction of direct anthropogenic ecological stress drivers limiting (self-) regulating capacity
2.1 Deconstruction of building and drainage structures
2.1.1 Remove (deconstruction) drainage systems
2.1.2 Closure of drainage ditches in forests
2.1.3 Remove flow control structures of forest water bodies
2.1.4 Deconstruct edifices and remove sealed surface on forest territory, hindering natural development and succession
2.2 Reduction of use, use intensity, and interventions
Target: Minimize the impact of logging and logging techniques
2.2.1 Reduction of wood and biomass extraction
2.2.2 Reduce logging activities (by commercial forestry, and private timber logging)
2.2.3 Change from clear-cutting to gradual and selective logging systems (remove few trees and leaving the rest intact) Such that uneven-aged forest structure is promoted
2.2.4 Apply directional, careful tree felling technique to ensure falling direction to protect the residual trees from logging damage and to preserve undergrowth and soil (preferably manually and moto-manually)
2.2.5 Abstain from using harvesters and heavy machinery damaging forest soil, flora, and fauna
2.2.6 Apply ecosystem-based logging technologies, which will ensure natural regeneration
Target: Dealing with areas where calamities have occurred, are intensifying, or will occur
2.2.7 In case of calamities, adopt a binding treatment guideline for all tenure types
2.2.8 Ban on clear-cutting and area-wide driving, as well as soil treatment
2.2.9 Large amounts of deadwood must be left on the land and understood as an investment in regulating ecosystem services
2.2.10 Felled infected trees should be left, but stripped of bark to prevent infestation by bark beetles and their spread
2.2.11 Suppression of natural regeneration with pioneer tree species must be prohibited
2.2.12 Give time and space to the processes of self-healing and natural regeneration
2.2.13 Natural regeneration must be prioritized before seeding, seeding must be prioritized before planting
2.2.14 Establishing new monocultures of any kind must be prohibited
2.3 Reduction of land access, traffic, and other soil, vegetation, and water degrading practices
2.3.1 Prevent and restrict infrastructure development and an increased access
2.3.2 Deconstruction of logging trails and forest roads
2.3.3 Refrain from creating new skid trails or forest roads
2.3.4 Abandonment and non-use of existing skid roads or, at least, increase the distance between skid trails (e.g. only use every second trail)
2.3.5 Make use of timber harvesting horses
2.3.6 Make use of cable- or rope winches (rope systems) when removing individual trees
2.3.7 Limit and penalize uncontrolled access to forests, as well as soil and water use or treatment
2.3.8 Refrain from large-scale soil manipulation
2.3.9 Elimination of existing and prevention of future damage and pressure caused by recreational activities/tourism by suitable control measures: Blocking off shortcuts and creation of path-accompanying trails

3 Restoration and targeted development of (self-) regulating capacity
3.1 Promote natural regeneration and ecological succession
Targets: Promote/Enable site-typical, mixed, complex old-growth tree stands. Develop heavily modified, i.e. (conditionally) unnatural forest monocultures and stand accordingly.
3.1.1 Leave available broadleaved trees while carrying out logging in coniferous plantations
3.1.2 Leave individual productive seed trees for genetic material (see 1.4.1)
3.1.3 Preservation of deadwood in maximum quantities possible on site of origin (tree trunks, branches, leaves, wild herbs, perennials) (see also 1.2)
3.1.4 Allow open areas (e.g. created by the collapse of severely damaged trees) for natural succession and regeneration
3.1.5 If the forest is too dense for naturally regenerating, apply only careful opening of the canopy (maintain at least 80% closure)
3.1.6 Controlled local burning in coniferous forests can promote natural regeneration with pioneer broad-leaved tree species and provide a critical impetus for forest development
3.1.7 Active planting measures are limited to native species whose natural spread is extremely slow
3.1.8 Seeds and plants should be taken from corresponding, autochthonous stocks
3.1.9 Create functional planting holes (size, depth, substrate) or habitats for trees
3.1.10 Creation of subculture structures by targeted planting of native species
3.1.11 Promote natural regeneration, succession, and self-organization by giving it more time and space
3.1.12 Supplementation of natural regeneration only by additional seeding/planting of native tree species depending on site conditions, taking into account growth dynamics
3.1.13 Natural regeneration must be prioritized before seeding, seeding must be prioritized before planting (see 2.2.13)
3.1.14 If needed growing/breeding of native species of flora to support with targeted plantings
3.1.15 Test creative and innovative approaches to promote and support natural forest development
3.1.16 Formation of forest edges (see 3.3)
Target: Extension of forest areas and creation of eco-corridors/forest belts
3.1.17 Allow for succession and regeneration of lands unsuitable for agriculture
3.1.18 Transfer of self-forested lands (hayfields, not cultivated lands) to (official) forest lands/fund
3.1.19 Reforestation of degraded lands
3.1.20 Reforestation of forest-free areas that are outside agricultural and forestry use
Target: Activities to increase the number/area of broadleaved trees and forests
3.1.21 Seeding and planting of broad-leaved trees (if this is not happening by natural succession)
3.1.22 Afforestation of gaps and clear-cuts with broad-leaved species or mixed cultures (where conditions allow)
3.1.23 Active planting measures are limited to native species whose natural spread is extremely slow
3.2 Wildlife management imitating natural dynamics
Target: Adapt wildlife management to near-natural conditions to ensure the growth of young trees
3.2.1 Monitor the development of forest vegetation (browsing impact) and the spatial distribution and development of the large herbivore population regularly (e.g. every five years)
3.2.2 Consider fencing off areas of young trees and stands (to prevent browsing)
3.2.3 Limit the regulation of populations of large herbivores as far as possible temporally and spatially; Apply focal point hunting or interval hunting
3.2.4 If sufficient reduction of large herbivores populations cannot be achieved, allow short-term and very targeted hunting
3.2.5 Use targeted hunting to contain epidemic diseases
3.3 Development of structurally rich forest edges (layered and sufficiently wide)
Target: Restoration and formation of forest edges
3.3.1 Forming of a multi-layer structure of forest edges including site-typical tree species, native shrubs, rare woody species, briars, softwoods, berry bushes
3.3.2 Active planting of diverse, native species only if necessary (if natural succession does not occur)
3.3.3 Enable strongly dimensioned old-growth and standing deadwood with a diameter of more than 30 cm
3.3.4 The depth of the forest edge is based on the crown width of the largest trees; it should not be less than 10 m
3.3.5 Regulate and, if necessary, prohibit cattle grazing

4 Development of enabling factors facilitating lines of action I-III
4.1 Development of the legal and policy framework and status of forest ecosystems
Target: Adjustments and amendments to existing laws, policies, and strategies
4.1.1 Assessment of vulnerability and risk of the legislature and policy design
4.1.2 Increase penalties for illegal logging, careless handling of fire, and other anti-environmental actions
4.1.3 Adjustment of legislation and regulatory framework according to the best European norms and practices
4.1.4 Amendments to the "Forest Code" - Changes to the "Sanitary rules in the forests of Ukraine", "Regulations on Forest Protection", Supplements about "the fire-danger period"
4.1.5 Amendments to the Land Code of Ukraine: Development of standards and rules for logging and other nature-protection measures in the forests of the Protection Fund
4.1.6 Reformation of tax and profit schemes
Target: Development of new law and policy instruments
4.1.7 Legally binding reduction of use intensity and impacts by forestry
4.1.8 Forbid and penalize large-scale cutting and clear-cutting of any size
4.1.9 Enact a complete grazing exemption of forests in core and development zones
4.1.10 Drafting and passing a law on significant expansion of areas without timber use
4.1.11 Development of legislation on conversion (changes) of land categories
4.1.12 Area designation and compensation schemes for the protection of existing forests as relevant fresh air and ecological corridors
4.1.13 Development of a legal framework for compensating the losses of state forestry, caused by the restrictions, as a result of the establishment of protected areas on their territories (nature protected fund)
4.2 Institutional development (Law enforcement, internal and external organization and administration, alliances, financing)
4.2.1 Complete elimination of illegal logging in the region using tax and customs control mechanisms
4.2.2 Strengthening control and responsibility for unauthorized (illegal) logging
4.2.3 Establish a system of cooperation in fighting fires
4.2.4 Reintroduction/Restoration of a budget for financing forest protection enterprises
4.2.5 Explanatory work with the population to protect their environmental rights
4.2.6 Establish a new position within united territorial communities responsible for ecological issues on a local level
Target: Common vision building on socio-ecologically sustainable forest economy - circular, biodynamic, low-energy
4.2.7 Dialogue between producers - authorities - local communities
4.2.8 Assess regional potentials and potential networks
4.2.9 Consider the creation of regional, local citizen-based cooperatives (Value creation stays within the region and is re-invested into sustainable business ideas and models)
4.2.10 Define unique, region-based selling propositions and potential sales markets
4.2.11 Identify and support regional, alternative, quality-not-quantity production and service sectors, for example: - Use of wood (e.g. as building material) only for municipal/regional projects - Use of non-timber forestry products primarily for refinement and high-quality goods (both for local and export use)
4.2.12 Traditional occupations of the population and rational use of non-wood forest products
4.2.13 Introducing a system of science-based regulation on the use of forest resources
4.2.14 Development of a state program to support the restoration of ethnic crafts and sustainable tourism. State encouragement and support of entrepreneurs in this direction

4.3 Area designation and planning (land acquisition, resource rights, forest zoning, site infrastructure, etc.)
4.3.1 Significant expansion of areas without timber use
4.3.2 Designate existing forest stands as "official forest" in land use plans to not fall below a minimum of forest area
4.3.3 Develop ownership and compensation schemes for new conservation and non-use areas
4.3.4 Establish community-owned, protected (and minimally used) forest
4.3.5 Provide community/Oblast/State-based compensation/subsidies for private forest owners to compensate for non-utilization as well as for forest conversion measures, retention of deadwood, reforestation, etc.
4.3.6 Introduction of changes to the guidelines for forest management (e.g. Dauerwald management system (continuously productive forest))
4.3.7 More structured organization of territory according to forest purposes: Nature-protection, historical, cultural, -scientific; Recreational and health-restoring, protective; sustainable use
4.3.8 Introduction of changes to the guidelines for forest zoning
4.4 Development of research and monitoring
4.4.1 Development and implementation of a system of ecological monitoring of forest ecosystems in the region
4.4.2 Establish a system of monitoring ignition and wildfire risks
4.4.3 Regular forest inventory to identify particularly (functionally) valuable areas or individual trees (see 1.1.1)
4.5 Development of awareness, education, and training (formal education, capacity building)
Target: Increase explanatory activities within recreational zones
4.5.1 Awareness campaigns on focused topics in local communities (e.g. at schools, churches, NGOs)
4.5.2 Organizing informational activities for different target groups of the local population in BR
4.5.3 Increase fire-prevention literacy. Conduct explanatory work with the public: - Fire prevention propaganda; organization of public actions; regularly informing the population about the forest fire situation and measures taken to stabilize it, etc.
Target: International Cooperation
4.5.4 Experience exchange, training (with international partners) - Round tables, seminars, meetings, conferences
4.5.5 Annual (regular) seminars and conferences on forest protection and conservation
Target: Environmental/Ecological education of locals and tourists (scientific and private)
4.5.6 School lessons on forest ecosystems, their functions, and services; conducting of action-based forest protection and restoration projects
4.5.7 Promote rational resource usage according to seasons
4.5.8 Educational (informing) activities for the local population regarding invasive species
4.5.9 Establishment of tree stand network for environmental education (ecosystem services)
Target: Media and Broadcasting
4.5.10 Publications on ecosystem-based forestry activities in the mass media, social media, and websites
4.5.11 Involve local newspapers, television, broadcasters
Target: Involvement and networking of diverse forest users and local communities (stakeholders)
4.5.12 Regular meetings between private forest owners, the district manager, regional forester, and interested/affected citizens for networking and exchange of information

Compiled by: Kevin Mack, Centre for Ecnics, Eberswalde USD, November 2021

In collaboration with:



Supported by:



based on a decision of the German Bundestag



Ministry of Environmental Protection and Natural Resources of Ukraine