Ecosystem-based Adaptation Measure and Activity Catalog – Grassland Ecosystems

Grasslands are primarily anthropogenically created ecosystems of the open countryside (i.e., not in the immediate vicinity of settlements) that are used for agriculture, livestock breeding, or set aside for conservation purposes. The biomass growth consists mainly of grass and herbaceous plants and is regulated by grazing or mowing. Other open land systems are grasslands and other semi-natural areas with sparse to grouped tree cover (e.g., orchards). Due to their high degree of modification, comparatively extensive use, but low sealing and development, these areas have a medium functional efficiency.

EbA Measures and Activities in Grassland Ecosystems
1 Conservation of existing, functional ecological structures and (self-) regulatory capacity
1.1 Conservation and protection of existing natural grassland
1.1.1 Establish new grassland nature reserves to protect biodiversity, by full protection or sustainable use regulations
1.1.2 Prohibit and avoid official conversion of grassland into arable land or urban/commercial areas
1.1.3 Protection of natural, ungrazed grasslands from future grazing and/or conversion to annual cropland, perennial cropland, biomass, or bioenergy crops
1.1.4 Conservation and setting aside of species-rich grassland
1.1.5 Conservation of valuable grassland through extensive sheep and goat grazing
1.1.6 Systematic mowing before fruiting of aggressive, invasive species
1.2 Conservation and maintenance of species-rich, semi-natural grassland
1.2.1 Conserve species-rich grasslands, including hay meadows, litter meadows, and other semi-natural pastures
1.2.2 Maintain traditional water meadows (includes management for breeding and/or wintering waders/waterfowl)
1.2.3 If necessary, make use of mowing or grazing to maintain plant communities and wildlife typically associated with traditional water meadows
1.2.4 Water meadows must not have any agricultural activities from 1 April to June-July, pesticide use is prohibited as is cultivation and re-seeding, the areas must be mown or grazed at least once a year and water levels must be maintained
1.3 Conservation of existing woody plants and other near-natural green structures
1.3.1 Preservation of orchards
1.3.2 Protect and set aside areas with single trees or tree communities, hedges, shrubs, and other structures
1.4 Conservation of existing unsealed and undeveloped areas
1.4.1 Protect grassland from road construction and building infrastructure

2	**Reduction of direct anthropogenic ecological stress drivers limiting (self-) regulatory capacity**
2.1	Dismantling or reduction of drainage structures in grassland
2.1.1	Dismantling or deconstruction of existing dams, weirs, channels, and other water regulating structures (to reestablish a natural water regime)
2.1.2	Blocking or filling up of existing drainage ditches to retain water and reestablish hydrological regime (on areas of natural wet meadows)
2.2	Reduction of vehicle access to land
2.2.1	Reduce mowing and heavy machinery access
2.2.2	Delaying the mowing date until later in the summer
2.2.3	Bar mowers and double chop mowers are supposed to cause less damage or lower mortality among amphibians and/or invertebrates
2.3	Reduction of biomass extraction
2.3.1	Moderate mowing
2.3.2	A total of around 5%+ of areas mown later should remain in the grassland
2.3.3	Raise mowing height on grasslands
2.3.4	Leave uncut strips of ryegrass on silage fields
2.3.5	Promote and support extensive grassland with cutting time requirements
2.4	Reduction of use intensity and intensive cultivation
2.4.1	Introduce schemes of extensive management of meadows (and pastures)
2.4.2	Reduction of water use
2.4.3	Pastoral areas should pursue a balance between forage and animals
2.4.4	If possible, refrain from pasture maintenance and leave to the natural development
2.4.5	If necessary, choose adequate pasture maintenance (e.g. cupping cuts and maintenance cuts of the pasture)
Target: Adaptation of harvesting and grazing techniques	
2.4.6	Pasture care with extensive livestock keeping, e.g. merino sheep
2.4.7	The livestock structure should be optimized, and the number of grazing animals should be cut down
2.4.8	The grazing density depends on the site conditions and varies between 0.3 and 1.4 GM/ha
2.4.9	Use of nature-friendly mowing technology: Prefer double-blade mowers, which are also lighter in weight and require less energy/fuel. Disadvantages are higher maintenance costs (for sharpening the double knives) and sensitivity during use (slower, less area performance)
2.4.10	Delay mowing or first grazing date on pasture or grassland to ensure sufficient resting periods for the vegetation
2.4.11	Mow and/or graze between once and three times per year - Earliest cutting time is usually from the beginning to the middle of June, the most extensive forms are only mowed every two years
2.4.12	Occasional haying and seed harvest
2.4.13	Leave uncut patches as buffers and refuges during harvest or mowing
2.4.14	Conversion of intensively used areas into more extensive grazing and semi-open grazing systems
Target: Reduce impact from fertilization	
2.4.15	Reduce or stop the use of fertilizers, herbicides, and pesticides
2.4.16	If fertilization is necessary, prefer solid manure
2.4.17	No treatment with phytosanitary products and no renewal of the grassland by seeding with ´high efficiency´ grasses
2.4.18	Ensure slow release of nutrients and slow fertilizing effect with a low dosage
2.4.19	Low-impact recreational activities, such as hiking, photography, or moderate hunting

3	**Restoration and targeted development of (self-) regulatory capacity**
3.1	Restoration of natural grassland
3.1.1	Dismantling of drainage/ameliorative systems to re-establish a more natural groundwater level
3.1.2	Reduce cover of invasive species while retaining the existing native species and increasing their abundance and diversity
3.1.3	Apply selective vegetation control measures to reduce the cover of invasive species while avoiding damage to the native, present species
3.1.4	Apply “interseeding” or “overseeding” planting strategies. Here, sowing of species into the existing vegetation is done instead of into a prepared seedbed
3.1.5	Careful species selection to avoid harming existing natives
3.2	Creation of retention areas and natural intermediate water storage
3.2.1	Restoring or creating traditional water meadows, also known as wet meadows
3.2.2	If necessary, apply topsoil removal, which rapidly reduces nutrient levels in nutrient-enriched soils and increases flooding frequency by lowering the ground surface
3.2.3	If native, diverse target plant species are not present in the seed bank or plant species have limited dispersal, it may also be important to introduce plant species through sowing, planting or spreading hay from existing wet meadows
3.3	Creation of near-natural buffer zones and margins
3.3.1	Blooming/hem stripes should be left at the edge of the parcels and, in the case of large grassland parcels over 50 m wide, also at a distance of 30-60 m across the parcel.
3.3.2	Introduce protective, keyline-based forest strips or patches as buffer areas and natural mosaic structures and corridors
3.3.3	The growth of these uncut strips or areas can be mowed again with the second mowing of the grassland and e.g. used as animal feed by mixing with the remaining growth
3.4	Enabling and support of near-natural structural elements
3.4.1	Leave and, if necessary, introduce new native and diverse structural elements (trees, bushes, shrubbery, etc.)
3.5	Transformation of grassland areas into forests
3.5.1	Successional development of remote and unused grasslands – allow for (and promote) natural succession
3.6	Diversification and adaptation of paludi- and agricultural practices, crops, and livestock to site conditions
3.6.1	Support of semi-open pasture systems with mixed-use
3.6.2	Diversification of grass-biomass utilization options - income generation opportunities for the local communities
3.6.3	Haymaking on flooded meadows (Paludiculture – also see wetland ecosystem catalog)
3.6.4	Harvesting of medicinal plants
3.6.5	Apiculture on extensive and non-used grassland areas
3.6.6	Composting and use of biomass as natural fertilizers
3.6.7	Creation of Orchard meadows, which should be owed or extensively grazed two to three times a year
3.6.8	If combined use with grazing, care should be taken to protect the trunks of the trees from browsing
3.6.9	The tree population itself requires regular care/pruning, which may be paid for separately by protection funds
3.6.10	It is important to use native and, where appropriate, regionally typical orchard varieties
4	**Development of enabling factors facilitating lines of action I-III**
4.1	Development of the legal and policy framework and status of grassland ecosystems
4.1.1	Payments/ subsidies for farmers to implement measures to protect grasslands on state land
4.1.2	Legal protection of natural, ungrazed grasslands from future grazing and/or conversion to annual cropland, perennial cropland, biomass, or bioenergy crops
4.1.3	Support of traditional land-use practices (e.g. moderate grazing, extensive livestock breeding)
4.2	Institutional development (Law enforcement, internal and external organizational management & administration, alliances, financing)
4.2.1	Administrative reform/organization/forming of territorial communities
4.2.2	Boost fiscal support to natural and near-natural (used) grassland development

4.2.3	Social capital will be supported to set up a grassland protection fund to be involved in grassland protection and restoration
4.2.4	Funding opportunities for measures that allow extensive grassland to be kept open on low-yield sites
4.2.5	Reform paid use of state-owned grassland resources to support extensive and near-natural grasslands
4.2.6	Pay farmers to cover the cost of conservation measures
4.2.7	Financing mechanisms supporting year-round extensive grazing systems
4.2.8	Additional advertisement/payments for farmers through subsidies, e.g. via direct local payments
4.2.9	Support of extensive sheep and goat small farm and husbandry types
4.2.10	Promotion of preservation of existing, replanting of orchards, or creation of new of orchard stands
4.2.11	Law enforcement in key grassland areas needs to be strengthened
4.3	Area designation and planning (land acquisition, resource rights, use zoning, site infrastructure, etc.)
4.3.1	Grassland/Pasture management plans
4.3.2	Actively involve local communities and stakeholders
4.3.3	Assignment of meadows and pastures to individual communities (for protection from building activities)
4.3.4	Dialog between producers - authorities - local communities
4.3.5	Promoting the idea of optimizing the territorial balance according to local strategies
4.4	Development of research and monitoring
4.4.1	Improve grassland survey system: Base numbers, including grassland types, ownership, area, distribution, quality, and utilization status should be clearly identified
4.4.2	Monitoring and evaluation team for grasslands should be set up and improved, along with corresponding, ecosystem-based techniques, standard and site-adaptable, community-based systems
4.4.3	Monitoring and early warnings for biohazards should be strengthened
4.4.4	Early detection of fires and emergency plans for a grassland fire should be elaborated/improved
4.4.5	Invasive species monitoring
4.5	Development and promotion of awareness, education, and training (formal education; capacity building)
4.5.1	Conduct eco-educational activities on the value, protection, and natural development of grasslands
4.5.2	Actions aimed at prevention of burning dry grass (flyers)
4.5.3	Educational work on the negative impact of adventitious species
4.5.4	Awareness-raising of local communities on grasslands, ecological functions, services, and sustainable management
4.5.5	International cooperation, training, and knowledge exchanges on grassland protection and restoration should be strengthened
4.5.6	Training in protected areas abroad
4.5.7	Study of international experiences in grassland conservation, restoration, and sustainable use

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