**Supplementary Table S1**: Relationships found in literature between ES (and indicators used to measure them) and drivers (land management regimes and agricultural practices) at diverse spatial scales. Methodologies utilized and main evidences are also presented.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ES / Indicator | Scale / Driver | Methodology | Evidences | Authors |
| Biodiversity* Birds
* Arthropods/ pollinators
* Plants
 | Field/patch* Land use change
* Intensification
* Abandonment
* Grazing intensity
* Agricultural practices (combinations of mineral nutrients (N, P, K, Mg), lime addition and herbivore exclusion (insects, rabbits))
* Agri-environmental restoration

Farm * Intensification
* Farming system (organic vs. conventional)
* Landscape composition
* Farm characteristics

Region/landscape* Land use change
* Encroachment
* Abandonment
* Farming management/ Farming system (organic vs. conventional)
* CAP policies scenarios (payments coupled, decoupled and partially decoupled -30% reduced- from production)
 | * Species richness, species abundance, species-area relationship.
* Single species, pool of species, key species or all species.
* Ecological and taxonomic (single or multiple) groups.
* Taxonomic breadth of communities.
* Shannon index, evenness index.
* Biodiversity changes with prospective scenarios and habitat changes.
 | * Abundance and species richness are negatively affected by agricultural intensification, land abandonment and/or landscape homogenization.
* Grazing intensity and plant species richness are negatively correlated on farms where strict rotational grazing is practised.
* Grazing intensity resulted in differences in species composition of insect-pollinated plants (higher cover of plant species with short flowering periods or with flowering periods starting in June on extensively grazed fields).
* Higher grazing pressure limiting tree and shrub encroachment is favourable to biodiversity.
* Low-intensity sheep grazing has little impact on vegetation but the different burning rotations produce substantive changes.
* Extensive grazing led to slow but continual increases in diversity of plants compared to intensive grazing. The reduction in livestock grazing (stocking rates) does not greatly enhance diversity.
* Species richness of insects increased with the area of semi-natural grassland, but was negatively related with the proportion of grazed grassland.
* Butterfly diversity is significantly higher in the agroforestry systems than in the monoculture system.
* Some nutrient treatments (N-only, NP, NPKMg) are associated with the lowest number of plant species when compared to K-only, or PK nutrient additions.
* Permanent grassland are characterized by high
* taxonomical diversity and suitable conditions for soil fauna compared to arable land. Grazing does not cause any significant effect on soil macroinvertebrate fauna.
* Farming system influence on biodiversity: higher diversity in organic compared with conventional fields.
* Grassland restoration (ecological compensation areas-meadows) enhanced species richness of arthropods and plants respect to intensively managed grasslands.
* Payments coupled to production encouraged overly intensive production to the detriment of biodiversity \*
* The historical land use scenarios are most favourable for biodiversity, followed by the nature conservation scenarios, instead of outdoor recreation and energy production scenarios.
* Other \*\*
 | Holzschu et al. (2007); Franzen and Nilsson (2008)1; Lindborg et al.(2009); Marriot et al. (2009)2; Weigelt (2009); Albrecht et al. (2010); Batáry et al. (2010)3; Fonderflick et al. (2010); Morón-Ríos et al. (2010); Brady et al. (2011); Menta et al. (2011); Acs et al. (2013); Andersson et al. (2013)4; Beilin et al. (2013); Fornara et al. (2013); Kennedy et al. (2013); Lee et al. (2013); Schneider et al (2013); Varah et al. (2013). |
| Landscape (evolution, diversity) | Region/landscape* Depopulation, abandonment, decrease of livestock and traditional primary activities.
* Changes in management (transition from an agrosilvopastoral system to a market economy with intensified animal production).
* CAP policies scenarios (payments coupled, decoupled and partially decoupled -30% reduced- from production)
 | * Spatially explicit model of pasture-woodland dynamics with different stocking rates
* Photo-interpretation of aerial photograph.
* Landscape assessment in terms of diversity (Shannon–Wiener Index) and average field size.
 | * Land abandonment (suspension of human influence and interruption of traditional farming practices) in areas with heavy rural exodus have caused dramatic changes in landscape: significant shrubland expansion and reforestation of shrubland and cultivated areas, generating a reduction of habitats, landscape closure and homogeneization.
* High cattle stocking rates generally dominate simulated succession, leading to a slow development of quite homogenous landscapes.
* Payments coupled to production ensured a greater diversity of production and hence land uses, while decoupling payments results in extreme homogenization of land use and consequently greater loss of species and mosaic value.
 | Brady et al. (2011); Beilin et al. (2013); Kizos et al. (2013); Peringer et al. (2013); Sanz et al. (2013). |
| Landscape (aesthetic value) | Field/patch* Grazing management
 | * Environmental appreciation of plant species richness.
 | * Environmental appreciation was higher in fully grazed areas due to significantly greater plant species richness, more forb species and more forbs flowering than in un-grazed areas.
* Aesthetic appreciation of the environment improves with reduction in grass in favour of flowering plants. Tall grasses are more dominant in the un-grazed areas.
 | Ford et al. (2012). |
| Pollination | Field/patch* Grazing intensity (stocking rate)

Farm* Farming system (agroforestry vs. monoculture)

Region/landscape* Land-use intensity (fertilisation intensity, livestock density, mowing frequency)
 | * Number of flowering plants species, blossom cover and flower reflectance spectra.
* Sampling of insect-pollinated plants (insects like hoverflies, bumblebees and solitary bees) and all plant species.
 | * Land use intensity decreases flower colour diversity and increases proportion of white blossom cover; which can affect the flower visitor fauna in terms of behaviour and diversity.
* There is higher pollinator abundance and species richness in the silvo-arable system compared with the monoculture system, but in the silvo-pasture systems there was no significant difference with monoculture system.
 |  Batáry et al. (2010); Binkenstein et al. (2013); Varah et al. (2013). |
| Carbon sequestration | Field/patch* Grazing intensity
* Agricultural practices (mineral nutrients combinations, lime addition, fertilizer application, plant seeding and plant biodiversity (as proxy for intensification))

Region/landscape* Land use change
 | * Carbon (C) and nitrogen (N) accumulation rates in soil (g of C and N x m-2 x year-1) and C and N pools in vegetation.
* C stock (t C ha−1) measured in four pools: soil, roots, plant litter and shoots.
* Land use change and C sequestration rate.
 | * Grazing exclusion increases proportion of shrubs, associated with increased plant litter mass, soil moisture content and the ratio of dissolved organic to inorganic N, and reduces rates of ammonium mineralisation, soil microbial activity and microbial biomass N.
* Grazing exclusion result in a slowing down of rates of C and N cycling.
* In drier sites, extensive grazing results in a build-up of soil carbon. At wetter sites there is a reduction of soil C and N in abandoned fields.
* Reduction of grazing increases dead organic matter and reduces nutritive value of vegetation.
* Soil organic carbon stocks under pastures are higher than the stocks under croplands.
* Soil C sequestration in permanent grasslands is increased by N-only additions; not by multi-nutrient additions (N, P, K, Mg), which only increase plant productivity.
* Long-term cessation of NPK fertilizer application and seeding of nitrogen-fixing legumes increased C and N storage in soil, but not in vegetation.
* Plant diversity has a positive effect on C and N stocks in vegetation.
 | De Deyn et al. (2009); Marriot et al. (2010); De Deyn et al. (2011); Ford et al. (2012); Lorencová et al. (2012); Medina-Roldán et al. (2012); Fornara et al. (2013). |
| Soil erosion | Region/landscape* Land use change
 | * Land use change and soil erosion indicators
 | * Soil erosion rates on grasslands are lower than in arable land.
 | Lorencová et al. (2012). |
| Flood control | Field/patch* Grazing management
 | * Water infiltration rate.
 | * The potential for flood control is greater in un-grazed grassland than in grazed grassland.
 | Ford et al. (2012). |
| Nutrient cycling | Field/patch* Grazing intensity
* Agricultural practices (manuring, mowing)
 | * Inorganic N fluxes into the microbial pool and uptake in plant communities by grasses, forbs and legumes.
* Net nitrification and ammonification rates.
 | * Reduced management is detrimental to the maintenance of soil-related ecosystem services.
* Reduced management intensity influences N cycling through a marked decrease in fluxes, although net nitrification rate was greater in un-grazed grassland.
 | Robson et al. (2010); Ford et al. (2012). |
| Traditional ecological knowledge | Regional/landscape* Transition from an agrosilvopastoral system to a market economy with intensified animal production.
 | * Knowledge and practices connected to each kind of production system.
 | * The transition from an agrosilvopastoral system to a market economy with intensified animal production has brought a significant loss of traditional ecological knowledge (simplification of current management practices in comparison to former ones).
 | Kizos et al. (2013). |

\* However, impact on biodiversity at the landscape level can be positive or negative depending on the marginal biodiversity value of competing habitat.

\*\* Exceptions to the general evidences: 1 Results are strongly modulated by interactions between the different components of land use and by regional context. The assemblage-level associations can mask the responses of individual species. Particular conditions may be favourable for some species of conservation concern but detrimental to others, and so they cannot be assumed to bring uniform conservation. 2 Abandonment does not always affect diversity. 3 Grazing may impair biodiversity. 4 Sometimes conventionally managed farms favour pollinator species.