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Socio-ecological perspective on prioritizing semi-natural grassland restoration sites: the experience of LIFE project GrassLIFE (Latvia)

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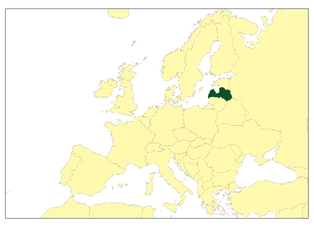
ABSTRACT

GrassLIFE project aims at active protection of five grassland habitats of EU importance on 1320 ha in Latvia. Semi-natural grasslands are ecological systems intricately linked with and affected by the social systems of local farmer communities and conservationists. A socio-ecological approach identifies management needed to achieve conservation objectives, and defines the social constraints and opportunities for implementing that management (Wyborn et al., 2012). To address the restoration sites as socio-ecological systems, a three-level approach was developed and prioritization criteria for each level were set up (see section *Prioritization Approach)*. We emphasize the notion that grassland restoration actions should consider not only the potential for restoration of structures, functions and typical species of habitats but also the potential for restoration of economically feasible farming system and development of management strategies for areas, which are difficult to integrate in the daily farming practices but important for habitat connectivity. We conclude that in order to ensure the cost-effectiveness and sustainability of the investments in restoration, the landscape-scale restoration should factor not only ecological but also social aspects of grasslands.

STUDY AREA



Latvia is a lowland country (highest point is 312 m) located at the eastern coast of the Baltic Sea in the boreonemoral ecotone of Northern needle-leaved forest biome and Central European broad-leaved forests biome. Forests cover about 50 % of the country, mires 6 %, and agricultural land 38 %, while semi-natural grasslands occupy only about 0.7 % of the territory. The mean annual temperature is 6.2 oC (February –4.6 oC, August +17.1 oC), and precipitation is 650 mm. The vegetation period lasts for 180–200 days.

OBJECTIVE

Development of systematic approach for prioritizing of restoration sites to implement restoration actions that most cost-effectively improve habitat conservation degree and achieve conservation goals which are sustainable in a long-term perspective.

PRIORITIZATION APPROACH

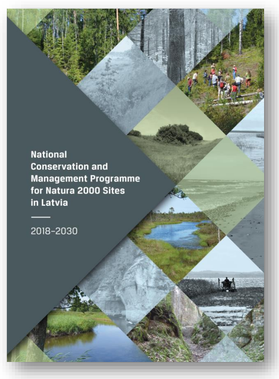
PROJECT PROPOSAL PHASE

PRIORITIZATION OF NATURA 2000 SITES AT **NATIONAL LEVEL**

Priority Natura 2000 sites for project implementation initially based on the existing national priority list of Natura 2000 sites.

Priority Action Framework for Latvia 2014-2020 (PAF)

National Conservation and Management Programme for Natura 2000 sites in Latvia 2018-2030



Selection of Natura 2000 sites based on farmers' interest in joining the project (Bottom-Up approach).

An invitation for owners and managers of grassland habitats of EU importance was published in media inviting to express their interest in joining the project. 79 applications were received from farmers with the total area of potentially restorable grasslands 1600 ha.

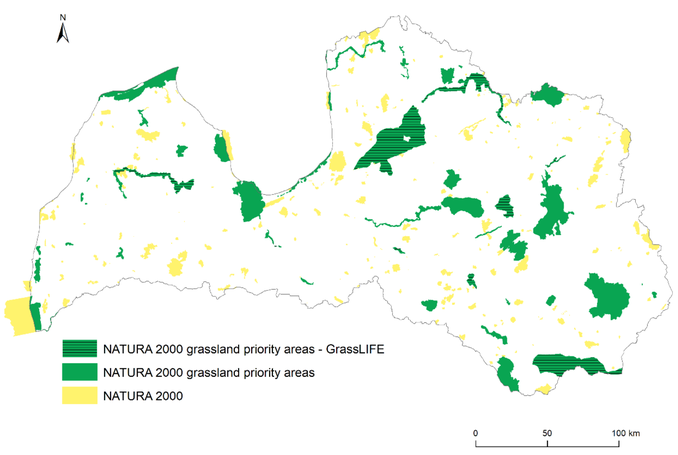


Fig. 1. 57 out of 333 Natura 2000 sites are listed in National Conservation and Management Programme for Natura 2000 sites as priority sites for semi-natural grassland conservation in Latvia. GrassLIFE project selected 10 of them.

PROJECT IMPLEMENTATION PHASE

PRIORITIZATION OF FARMS AT **LANDSCAPE LEVEL**
Social and Landscape-ecological criteria

12 farms selected with 668 ha of restorable grasslands.

Social constraints and opportunities for implementing the restoration:

- land ownership (only private lands were included to ensure long-term management);
- grassland management system (priority given to farms using grasslands for agricultural production – livestock or hay production).

Landscape-ecological:

- habitat connectivity needs (only farms with high share of grasslands needing restoration of connectivity were selected) (Fig. 2). Betweenness of Centrality index was used. It is a measure of centrality in a graph based on shortest paths. From a landscape connectivity perspective, measures of centrality are interpreted as a patch's importance for keeping the network from fragmenting (Bodin and Norberg, 2007; Bodin and Saura, 2010; Saura and

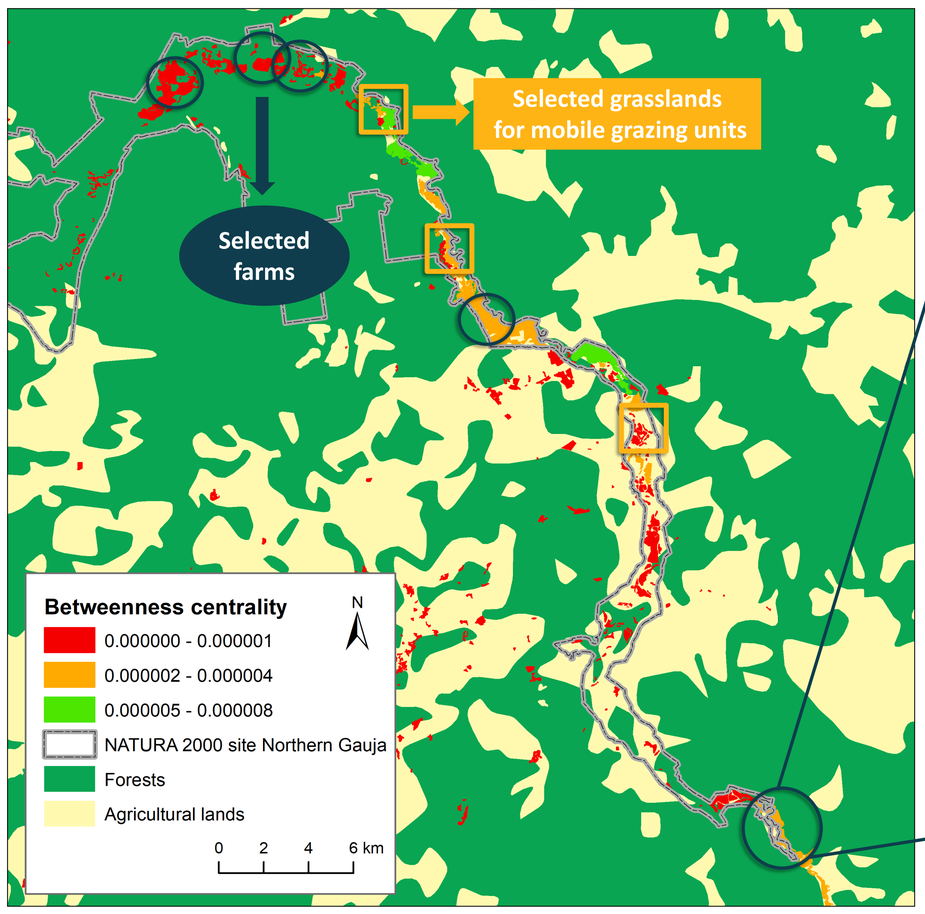


Fig. 2. Connectivity model for Natura 2000 site «Northern Gauja». Connectivity threshold is 100 m.

PROJECT IMPLEMENTATION PHASE

PRIORITIZATION OF RESTORATION SITES AT **LOCAL LEVEL**
Ecological and social criteria

Ecological:

- soil fertility;
- cover of expansive and invasive plant species.

Social:

- farmer is willing and capable to further manage the restored grassland, by integrating it into the farm production system;
- Farmer accepts the constraints linked to the maintenance of semi-natural grassland in its most optimal condition for the biodiversity, i.e. reduced soil fertility and agricultural productivity as a tradeoff for improved species rishness.

GrassLIFE project introduced mobile grazing units as a management strategy for areas, which are difficult to integrate in the daily farming practices but important for habitat connectivity (sites which did not comply with social criteria for prioritization at landscape level). Restoration sites for mobile grazing units were selected based on connectivity model.

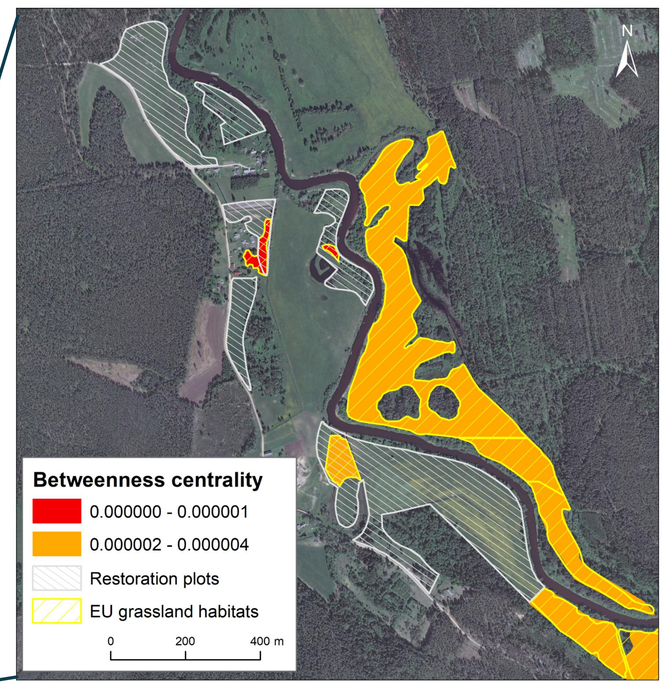


Fig. 3. Selection of restoration sites at farm level based on the results of connectivity model and farmers decision to keep areas for production or for restoration. Connectivity threshold is 100 m.