

Habitat mapping of Natura 2000 sites in Szentendre Island in the Central Region of Hungary – experiences of the remapping

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Abstract: In the framework of the Nature Conservation Management Plan, the actual vegetation map of the Natura 2000 site has been prepared in 2008. The study has provided possibility to analyze vegetation maps of a certain area from different years (1993 and 2008 respectively), as a basis for vegetation monitoring. Although the keys of National Habitat Classification System (Á-NÉR) are defined, they can be adapted flexibly during mapping that is why they can be suitable for monitoring. The observed changes in 2008 documented by comparison to previous mapping are: (1) definite decreasing of valuable sandy grassland vegetation types; (2) in addition, significant habitat fragmentation of sand steppes; (3) according to some type of habitat transitions in some new patches on the “change map” has to be taken as “artefact”. The main reasons for this phenomenon are: (1) the new concept of habitat mapping introduced in 1997 (Á-NÉR) that is particularly concerned with the secondary, degraded habitats (especially in the case of “sand steppe” <-> “degraded dry grasses” transition), (2) boundary recognition problems (especially in the case of narrow, elongated changed patches).

Key words: Natura 2000, Pannonic sand steppes, habitat mapping, GIS

Introduction

The 31 kilometres long Szentendre Island is situated in the heart of Hungary, few kilometres to the north of Budapest. Parts of it belong to the Danube-Ipoly National Park that is one of the most diverse national parks in Hungary. Compared to other regions of the country, the environmental threats on the Szentendre Island appear to be more serious - therefore the protection of the natural habitats requires a great effort. In the seventeenth century, the Szentendre Island was covered with arable fields, pastures and grasslands. Due to the great flood of 1838, however, drainage of agricultural areas has started in the island, and more and more lands were turned into arable fields. In the first half of the nineteenth century, recreational areas were formed around settlements called Surány and Horány. The water reserves of the island have been used as a source of safe drinking water for Budapest since the end of the century. There are pastures near Tahitótfalu and south of Szigetmonostor, where grazing is still in practice, but most of the remaining grasslands are neglected (Kelemen et al. 2009).

Pannonic sand steppes are endemic habitats of Pannonic biogeographical region, with the centre of their distribution in Hungary, but existing also in Lower Austria, Slovakia, Romania and Bulgaria. In terms of non-EU countries, the habitat also extends into Serbia. Sand steppes are considered to be one of the most endangered habitats in Central Europe (Biró et al. 2008). At the beginning of the 20th century, sands were still widespread, now they have been reduced dramatically through stabilizing measures, intensive agricultural and forestry use and abandonment of traditional land use.

Materials and Methods

The “Szigeti homokok (“Island sands”) SAC Natura 2000 site (Site Code: HUDI20047) comprises of three separated sandy areas in Szentendre Island, near the settlements of Szigetmonostor, Tahitótfalu and Pócsmegyer. Geographically speaking, the site is part of the Vác-Pesti-Duna-valley (plain along River Danube) geographical microregion. Influenced by the wind, the site is a moderately wavy, sandy floodplain. Barren sand steppes on higher grounds provide valuable and sensitive habitats. Among habitats of Community interest Pannonic sand steppes have the largest cover (ca. 20%). To a smaller extent, there are softwood riparian forests and alluvial forests of Black Alder and Ash on the site (Kelemen et al. 2009).

Pannonic sand steppes are characterised by open sand grassland communities usually dominated by tussock-forming, narrow leaved grass *Festuca vaginata* and *Stipa borysthenaica*. Other important species include *Fumana procumbens*, *Euphorbia seguieriana*, *Dianthus serotinus* and *Gypsophila fastigiata*. In Szentendre Island *Ephedra distachya* and *Colchicum arenarium* can also be found. Closed sand steppes are characteristic with vegetation cover higher than 50%. These habitats are typified by *Festuca wagneri* and *Festuca rupicola*, *Chrysopogon gryllus*, *Stipa capillata*, *Poa angustifolia*, *Bothriochloa ischaemum*.

The following subtypes (communities) of vegetation have developed in the Szentendre Island:

- Central Pannonic calciphile sand fescue steppes (*Festucetum vaginatae danubiale*),
- Central Pannonic feathergrass sand steppes (*Festucetum vaginatae stipetosum*) and
- Pannonic closed sand steppes (*Astragalo austriacae-Festucetum rupicolae*) and their transition or degraded stands (Zsolt 1943, Seregélyes et al. 1993, Gergely 2008).

In the framework of the Nature Conservation Management Plan the actual vegetation map of the site has been prepared by Gergely (2008). As it can be seen in this study, analyses are not only done by GIS but the actual mapper is asked to document the spatial and biological changes. Although the keys of National Habitat Classification System (the so called Á-NÉR, see in: Fekete et al. 1997) are defined, they can be adapted flexibly during mapping, that is why they can be suitable for monitoring. The observed changes in 2008 are documented by comparison to previous mapping (done in 1993 by Seregélyes et al.): the changes of pannonic sand steppe habitat, i.e. the changes of each patch are plotted on a change map (i.e. the disappearance, appearance of a patch, the changes in the size and/or the location, habitat type change) (Takács and Molnár 2008).

Analysis of map layers was performed by ArcGIS 9.2 and ESRI Patch Analyst 4.2 (Rempel et al. 2008).

Discussion

The results show a definite decreasing of valuable sandy grassland vegetation types. The decrease of pannonic sand steppes reaches ca. 98,7 ha during 15 years period. In these years the 46,2% of the former patches of pannonic sand steppes disappeared (i.e. turned into an other habitat type) and 13,8% appeared (i.e. sand steppes have developed). Moreover, the results indicate significant habitat fragmentation of sand steppes: increasing index of shape complexity, edge density and number of patches as well as decreasing of average patch size.

The main trends of habitat transitions are the following: “disappeared” sand steppe patches became: 1/ dry degraded grasslands, 2/ dry shrublands, 3/ Black Locust plantation, 4/ uncharacteristic woodlands. The newly appeared sand steppes origin from: 1/ dry degraded grasslands, 2/ Black Locust plantation, 3/ Black and Scots pine plantation, 4/ agricultural habitats (mainly old-fields) (fig. 1 and 2).

There are pastures near Tahitótfalu and south of Szigetmonostor, where grazing is still in practice, but most of the remaining grasslands are neglected. The overgrazing causes degradation (developing dry degraded grasslands), the undergrazing (or lack of grazing) generates the increasing of spontaneous dry shrub vegetation.

The most of important threats on the Natura 2000 site (mainly in the sand steppe patches) are the invasion of alien trees (*Robinia pseudo-acacia*, *Amorpha fruticosa*, *Ailanthus altissima*) and weeds (*Solidago gigantea*, *Asclepias syriaca*).

Forestry activities of Black Locust forests present an indirect threat on valuable grasslands by spontaneous dispersion of specimens (seedlings and sprouts).

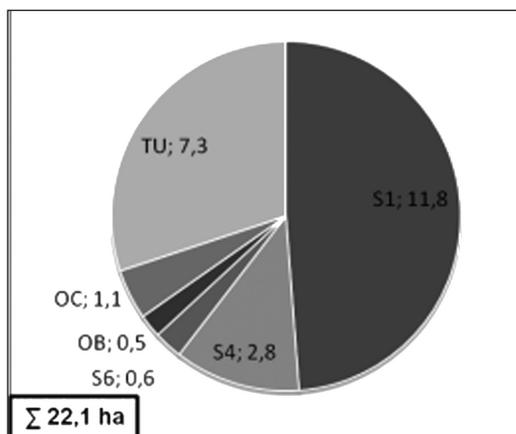


Fig. 1. Habitat quality changes - appeared patches (ha)

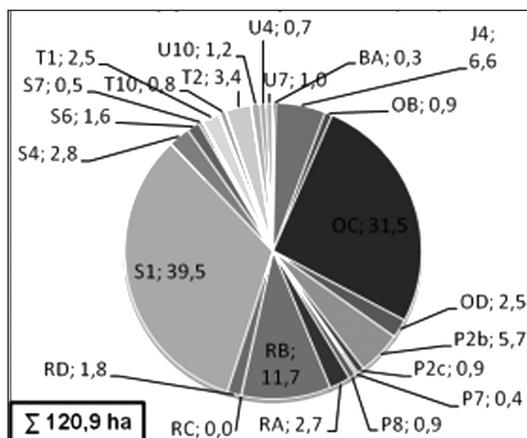


Fig. 2. Habitat quality changes - disappeared patches (ha)

Conclusions

It is difficult to analyze vegetation maps of a certain area from different dates (1993 and 2008 respectively in this study), namely vegetation monitoring. Comparison of maps with monitoring purposes made in different dates is much more reliable if the present mapper knows and acknowledges the vegetation concept of the previous surveyor and prepares the new map by the thorough knowledge of the former documentations. Thus - as in recent situation - we can significantly improve the accuracy and reliability of time analyses.

According to the above-mentioned, some type of habitat transitions in some new patches in the "change map" has to be taken as "artefact". The main reasons are: (1) the new concept of habitat mapping introduced in 1997 (Á-NÉR) that is particularly concerned with the secondary, degraded habitats (especially in the case of "sand steppe" <-> "degraded dry grasses" transition), (2) boundary recognition problems (especially in case of narrow, elongated changed patches).

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