The role of haphazardly executed conservation treatments in the preservation of botanical values on the shore of Lake Balaton

Bence Fülöp[1, 2] – Bálint Pacsai[1] – Judit Bódis[1]
[1]Hungarian University of Agronomy and Life Sciences, Institute for Wildlife Management and Nature Conservation, Department of Conservation Biology, Keszthely
[2]Balaton-felvidéki National Park Directorate, Csopak
9112bence@gmail.com

Most semi-natural habitats in Europe have been traditionally maintained by grazing or mowing (Penksza et al., 2008; Carboni et al., 2015), which halted successional changes and preserved biodiversity on a higher level. Since the 1950s the large-scale mechanisation of agriculture resulted in expansion of cropland and the abandonment of grasslands became an increasing issue in Europe. Recognizing the negative consequences of abandonment in the diversity of wildlife, habitat reconstruction interventions for mainly nature conservation purposes began in the 1980s to preserve the biodiversity of these semi-natural habitats (Burnside et al., 2007; Valkó et al., 2011, 2012, 2018; Penksza et al., 2010; Kiss and Penksza, 2018; Kiss et al., 2011; Besnyői et al., 2012; Halász et al., 2016).

The grasslands once surrounding the largest lake in Central Europe, Lake Balaton had a great importance until the 1950s (Szabó et al., 2003). In the 20th century the role of agriculture as a livelihood was gradually replaced by tourism. Livestock farming in coastal settlements was restricted from 1969 by law to support the expansion of tourism, thus the coastal grazing was almost completely abolished (Szabó, 2001). The shore of Lake Balaton at Fenékpuszta were a rare exception to this, because cattle were grazing here until 1983, therefore an about 3 km long coastline remained in a close-to-nature state with wet grasslands and wide beds of reed connected to them. After 1987 conservation management started and minor treatments were done. The most extensive management happened between 1999 and 2002, when 5–28 cattle grazed in the area (Zentai et al., 2006). Detailed monitoring and documentation of botanical values were carried out at the end of this period (Benke, 2003; Zentai, 2003). Then the intensity and the extent of grazing subsided and became less documented.

Our aim was to assess the current natural condition of the area and to summarize the changes in habitats and the distribution of protected species in connection with the current treatments in Fenékpuszta, on the western coast of the Lake Balaton near the town of Keszthely (Hungary). The examined area covers 130 hectares, it is 3 kilometres long and its width ranges between 320-820 meters. Most of the study site is part of the Natura 2000 site Balaton (N2K HUBF30002) which is a Special Area of Conservation and a Special Protected Area. To compare archive and current extent of habitat types we digitized the habitat map created by Zentai in the early 2000s (Zentai, 2003) and surveyed the area on land and from water as well during vegetation periods of years 2019 and 2020. We classified the vegetation data /habitat descriptions of Zentai (2003) and current field data as well/ to habitat classes, based on the species pool and structure according to the General National Habitat Classification System of Hungary (Á-NÉR) (Bölöni et al., 2011). We collected data on protected plant species by counting individuals and recording GPS coordinates on each occurrence. The extension of the current management was mapped also on the field.

The overall size of the study area decreased by almost 6 hectares between 2002 and 2020 as a result of an average 20-meter retreat of the reed beds on the 3 km coastline. The reed beds were the habitat type category which extent decreased the most among the categories. This happened because by the die-back from the direction of the open water and on a smaller extent by the area loss caused by shrubbing and afforestation. A noticeable decrease in the size (-13%) of the wet meadows is also was detected. Wet meadows where grazing after 2002 were abandoned, became densely covered by invasive and native tree and shrub species by 2020. The highest situated part of wet meadows, where the grazing management is still ongoing became mesophilous meadows with the dominance of *Arrhenatherum elatius* and *Helictotrichon pubescens*. The advance of woody stands (both invasive and native species) is also noticeable in the whole area. These habitats have expanded the most, currently their cover more than twice than during the earlier study; unfortunately, these stands are mostly dominated by invasive alien tree species such as *Robinia pseudoacacia*.

During the 2002 survey 23 different protected plant species were described from the area. In the year 2020 we found 17 protected plant species, from which four species (*Epipactis tallosii*, *Cephalanthera damasonium*, *Equisetum variegatum*, *Neottia nidus-avis*) were not described previously from the area. Some species which disappeared between 2002 and 2020 were present earlier only by a few individuals: *Anacamptis coriophora*, *Botrychium lunaria*, *Carex paniculata*, *Cirsium brachycephalum*, *Epipactis helleborine*, *Spiranthes spiralis*, but in other cases considerable populations vanished or we were not able to find them: *Anacamptis morio*, *Epipactis palustris*,

Hydrocotyle vulgaris, *Schoenus nigricans*, *Urtica kioviensis*. The 13 species which were observed in the area during both surveys had some changes in their distribution as well. There are species, which population declined considerably, such as *Acorus calamus*, which disappeared from the northern area and also from most of its former localities on the southern area. In 2020 its single large population is located on the grazed wet meadows on the southern part. Populations of *Nymphaea alba*, *Ranunculus lingua*, *Anacamptis palustris*, *Orchis militaris* and *Dactylorhiza incarnata* also had significantly reduced in size. *Cicuta virosa*, *Allium carinatum*, *Ophrys sphegodes* and *Anacamptis morio* retained their populations in roughly the same extent and number. *Cephalanthera longifolia*, *Neottia ovata* and *Samolus valerandi* significantly increased in its number of individuals and its occurrences as well.

Our results confirm the results of a previous research on wet grasslands that complete lack of treatments can lead to habitat depopulation and species decline or even complete extinction (Kołos and Banaszuk, 2013; Swacha et al., 2018), but according to precious studies this process might be reversible (Török et al., 2007). Therefore, we need to strive for maintaining some appropriate treatment in an area as large as possible, preferably by grazing, which can be replaced with mowing on areas where grazing is not feasible. This could prevent the loss of biodiversity by maintaining the species pool and preventing the advance of invasive alien species.

The article is dedicated to the memory of Sándor Palkó (1959–2002), who noticed the natural value of Fenékpuszta and loved that place very much. The authors are thankful to Kinga Zentai for the detailed descriptions as well as Anikó Benke and Szabolcs Benke for their valuable help in the field. The publication is supported by the EFOP-3.6.3-VEKOP-16-2017-00008 project. The project is co-financed by the European Union and the European Social Fund.

***Keywords**: abandonment, grazing, protected species, wet meadows*

REFERENCES

Benke Sz. (2003): A legeltetés hatása a védett flórára és faunára, a Balaton-felvidéki Nemzeti Park fenékpusztai területén. (Impact of grazing on the protected flora and fauna of the area at Fenékpuszta of the Balaton Uplands National Park.), BSc thesis, Gyöngyös. pp. 73 (in Hungarian)

Besnyői V.-Szerdahelyi T.-Bartha S.-Penksza K. (2012): Kaszálás felhagyásának kezdeti hatása nyugat-magyarországi üde gyepek fajkompozíciójára. (The initial effect of abandoning mowing on the species composition of fresh grasslands in western Hungary) Gyepgazdálkodási Közlemények 10(1-2): 13-20.

Bölöni J.-Molnár Zs.-Kun A. (eds.) (2011): Magyarország élőhelyei. A hazai vegetációtípusok leírása és határozója. ÁNÉR 2011. (Habitats in Hungary. Description and identification guide of the Hungarian vegetation). MTA ÖBKI, Vácrátót, HU (in Hungarian)

Burnside, N. G.-Joyce, C. B.-Puurmann, E.-Scott, D. M. (2007): Use of vegetation classification and plant indicators toassess grazing abandonment in Estonian coastal wetlands. Journal of Vegetation Science 18: 645-654.

Carboni, M.-DengLer, J.-MantiLLa-Contreras, J.-Venn, S.-Török, P. (2015): Conservation value, management and restoration of Europe's seminatural open landscapes. Hacquetia, 14(1): 5-17.

Halász, A.-Nagy, G.-Tasi, J.-Bajnok, M.-Mikoné, J. E. (2016): Weather regulated cattle behaviour on rangeland. Applied Ecology and Environmental Research 14(4): 149-158.

Kiss T.-Penksza K. (2018): A legeltetés hosszú távú hatása kiskunsági füves pusztákon. Természetvédelmi Közlemények 24: 104-113.

Kiss, T.-Lévai, P.-Ferencz, Á.-Szentes, Sz.-Hufnagel, L.-Nagy, A.-Balogh, Á.-Pintér, O.-Saláta, D.-Házi, J.-Tóth, A.-Wichmann, B.-Penksza, K. (2011): Change of composition and diversity of species and grassland management between different grazing intensity – in Pannonian dry and wet grasslands. Applied Ecology and Environmental Research 9(3): 197-230.

Kołos, A.-Banaszuk, P. (2013): Mowing as a tool for wet meadows restoration: effect of long-term management on species richness and composition of sedge-dominated wetland. Ecological Engineering 55: 23-28.

Penksza K.-Tasi J.-Szentes Sz.-Centeri Cs. (2008): Természetvédelmi célú botanikai, takarmányozástani és talajtani vizsgálatok a Tapolcai és Káli-medence szürkemarha és bivaly legelőin (Botanical, forage and pedological studies for nature conservation on the gray cattle and buffalo pastures of the Tapolca and Káli basins). Gyepgazdálkodási Közlemények. 5(1): 49-62.

Penksza K.-Szentes Sz.-Loksa G.-Dannhauser C.-Házi J. (2010): A legeltetés hatása a gyepekre és természetvédelmi vonatkozásai a Tapolcai- és a Káli-medencében. (Impact of grazing on grasslands and its nature conservation consequences in the Tapolca and Káli basins.) Természetvédelmi Közlemények 16: 25-49.

Swacha, G.-Botta-Dukát, Z.-Kącki, Z.-Pruchniewicz, D.-Żołnierz, L. (2018): The effect of abandonment on vegetation composition and soil properties in Molinion meadows (SW Poland). PLoS ONE 13(5): e0197363

Szabó I. (2001): Balaton vidéki gyepek botanikai, ökológiai jellemzése. (Botanical and ecological characterization of grasslands at lake Balaton) Debreceni Gyepgazdálkodási Napok 17. Debreceni Agrártudományi Egyetem, Debrecen, p. 66-70. (in Hungarian)

Szabó I.-Bódis J.-Zentai K.-Szekeres R. (2003): A Balaton-parti legeltetéses állattartás tapasztalatai természetvédelmi szempontból. Gyepgazdálkodási Közlemények 1: 25-28.

Török P.-Prommer M.-Valkó O.-Balogh A.-Vida E.-Tóthmérész B.-Matus G. (2007): Újrakezdett kezelés hatása fokozottan védett kékperjés láprét fitomasszájára, faj- és virággazdagságára (Effect of restarted treatment on phytomass, species and flower richness of astrictly protected *Molinia* meadow), Természetvédelmi Közlemények 13, 187-198. (in Hungarian)

Valkó, O.-Török, P.-Tóthmérész, B.-Matus, G. (2011): Restoration potential in seed banks of acidic fen and dry-mesophilous meadows: Can restoration be based on local seed banks? Restoration Ecology 19: 9-15.

Valkó, O.-Török, P.-Matus, G.-Tóthmérész, B. (2012): Is regular mowing the most appropriate and cost-effective management maintaining diversity and biomass of target forbs in mountain hay meadows? Flora 207(4): 303-309.

Valkó, O.-Venn, S.-Zmihoski, M.-Biurrun, I.-Labadessa, R.-Loos, J. (2018): The challenge of abandonment for the sustainable management of Palaearctic natural and semi-natural grasslands. Hacquetia 17(1): 5-16.

Zentai K. (2003): A fenékpusztai Balaton-part botanikai értékei és a természetvédelmi célú legeltetés hatása (Botanical values at the shore of Balaton at Fenékpuszta and the effect of grazing for nature conservation purposes), Conservation engineering thesis, Sopron (in Hungarian)

Zentai K.-Benke Sz.-Palkó S. (2006): A fenékpusztai Balaton-part botanikai értékei és a területen folyó természetvédelmi célú legeltetés hatása (Botanical values at the shore of Balaton at Fenékpuszta and the effect of grazing for nature conservation purposes), Természetvédelmi Közlemények 12, pp. 187-205. (in Hungarian)