

Traditional landscape management preserving botanical values in North–East Hungary

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Summary

The study area is the Putnok Hills micro-region in the Northern Hungarian Mountains. Besides floristical data unique for Hungary or interesting for a bigger area, also habitats in a close-to-natural state are taken into account during the research. Historical and current forms of landscape management are incorporated, since the valuable taxa found may be preserved for the future generations only within their original habitat, sustaining the management patterns used through hundreds of years in the past (grazing animals, hayfield management, extensive landuse on arable lands and in orchards and grape yards). Six habitat types found in the area are listed in the Annex I of Habitat Directive, five of them are effected by different landscape management methods.

Thousand years old agricultural activities on diverse habitats of the area resulted in specially structured landscape mosaics. Besides biological and landscape diversity, adequate cultivation structure is important, also in favour of preserving soil fertility and avoiding erosion. Land use of the territory is currently dominated by grassland and forest management methods. As a result of abandoning several cultivated areas after development of heavy industry in the Borsod Basin in the 1960's and move of village inhabitants to the towns, arable lands currently realize an average of 10 percent of the total area, even less in some places. Determinant part of the territory (above 80 percent) refers to natural or close-to-natural conditions. Mosaic situation of arable lands and relatively intact habitats assisted the new expansion of natural vegetation on the abandoned lands.

The botanical values are presented according to the types of their habitat after giving a draft about the geographical background and characteristics of nature, referring to the endangering factors and giving advice about the adequate management methods towards preserving the values.

Regularly mowed wet meadows along the streams Szuha and Csörgős maintained large sedge communities with *Carex cespitosa* and *Carex buekii*, tall herb fringe communities with *Inula helenium*, and *Molinia* meadows on peaty soils, alluvial meadows and lowland hay meadows with *Iris sibirica*, *Orchis laxiflora* subsp. *elegans*, *Dactylorhiza incarnata*, *Dactylorhiza majalis* and *Eriophorum* species. Pastures (grazed by sheep) with *Juniperus communis* formations on calcareous grasslands ensure a picturesque landscape view and preserve *Ornithogalum pyramidale*, *Platanthera bifolia* and *Orchis morio*. Nature protected species found in the regularly mowed lawns below and around old, extensively cultivated orchards with traditional fruit breeds are *Polygala major*, *Iris aphylla* subsp. *hungarica*, *Pulsatilla grandis* and *Orchis purpurea*. *Stipa joannis*, *Orchis tridentata* and *Linum* species occur in some abandoned grape yards.

Keywords: land use, landscape management, habitat, nature protected plant species

Introduction

Land use determines structure, function and dynamics of most landscapes and these are in tight interaction with each other. Dynamic nature of landscapes is obvious in the age of constantly growing human population and attached changes in landscape management and global environmental change (Forman & Collinge 1997, Moss 1987). In Hungary the changes in the use of landscapes are determined by economic and social forces.

The agricultural landscape should play a role in nature conservation during preservation, and its ability for this highly depends on its structure (Lóczy 2003). In optimal cases, besides their producing function, landscapes used by agriculture or forestry on the largest part of the Earth's surface preserved some of their role in ecological regulation, therefore they carry nature conservational, social and cultural importance too (Bastian & Schreiber 1999). Besides protected areas for nature, importance of habitats in close-to-natural conditions is more and more emphasized. However, if the advantages of large-scale agriculture become the sole aspect, a landscape „impoverished” in components will not be able to correspond to the large number of functions (Lóczy 2003).

Hungary joined the UN Convention on Biological Diversity in 1994, which lays severe pressure on agriculture. It is a requirement in the conceptions aiming the development of an up-to-date land use in Hungary (Harrach 1992) that agrarian landscape, besides its basic productive function, has to be capable to supply ecological functions, too. According to the conception (Ángyán and Menyhért 1997) based on the principle of biotope grids (Jedicke 1994), at least 8-12 percent of the agrarian landscape has to be covered by biotopes in close-to-natural conditions to achieve the mentioned aim. Among landscape ecological researches, joint observation of soil-plant connections has got high importance. Basic Hungarian surveys for joint handling of regularities were made by Centeri (2002) and Barczy et al. (2003).

Basic field researches are indispensable for works aiming at understanding the complexity of a landscape, observing the past and working towards sustainability in the future. In the current contribution, big emphasize was put on presenting the natural vegetation of the observed territory, that is a Hungarian landscape which was poorly researched previously, but has got good natural conditions.

Besides the fact that no detailed botanical data were collected on the territory previously, some data fragments can be found from the beginning of the 20th century. Budai (1914) presented data concerning the flora of county Borsod (that is the areas south of the territory observed by author). Besides that, he collected several herbarium pieces from the vicinity. Detailed herbarium collections in the historical county Abaúj-Torna have been done by Thaisz. He also presented several of these data, but, besides that, several herbariums can be found in the Herbarium of the Botanical Collection of Hungarian Natural History Museum. Ádám Boros collected plants in the Bükk Mountains, but he also spent a few days in the Putnok Hills, particularly around the peat bogs of Kelemér Mohosok. He published data of moss species from the areas adjacent to the Putnok Hills (Boros 1922, 1924, 1937). Hulják (1942) made floristical investigations in the counties adjacent to the studied area, in which he completed the flora of Putnok Hills with several data, and collected some herbariums, too. Besides by the author, no data were previously published concerning landscape management patterns occurring in the area.

Material and method

The studied area, Putnok Hills micro-region is part of the Northern Hungarian Mountains meso-region, ranging from the valley of Sajó river till the southern border of the main part of Aggtelek National Park (Marosi and Somogyi 1990).

Among floristical data, species that are nature protected in Hungary or are listed in the Annex II. of the Habitat Directive (henceforth abbreviated HD) are listed. Habitat types listed in the Annex I. of HD are also presented (the codes correspond to the Natura 2000 code). Enumeration of plant species follows the nomenclature of Simon (2000). Association names follow the work of

Borhidi (2003). Geographical names are listed according to the 1:10000 scale map published by the Institute of Geodesy, Cartography and Remote Sensing in 1981. Beyond literature review, the Herbarium Carpato-Pannonicum collection of the Botanical Collection of Hungarian Natural History Museum was reviewed concerning rare species.

Sources used during investigations on old management methods and landscape history of the area are maps of military mappings (made in the 1780's, 1850's and 1870's, based on which changes in land use can be followed up well), narrations of older inhabitants and working plans of forestry. Concepts about their sustainability, based on data collected locally, are discussed under Results and Discussions.

Results and discussions

Based on the narrations of inhabitants, working plans and own field investigations it can be generally stated that natural conditions of the observed territory are beneficial for forestry, pasture management, crop cultivation on arable lands and less heat-demanding, not frost-sensitive horticultures. Main crops on arable lands are potato, cabbages, bean and, in some places, oil pumpkin. Among cereals, oat, barley and maize are typical. In parallel with the establishment and development of settlements, the area of forests had decreased, and it had been gradually transformed into the area of crop production, animal husbandry, hayfield and pasture management, and this way the original vegetation is fragmented. This process, however, had given opportunity for new associations to develop and for biodiversity to increase. Wet hayfields, slope steppe grasslands, old grape yards and traditionally managed orchards – abandoned in many places – that currently many times are the latest habitats of natural vegetation had been developed due to human activities.

After development of heavy industry in the Borsod Basin in the 1960's, a significant part of the inhabitants of villages moved to the mining and industrial centers, therefore the traditional small-parcel land use was abandoned in several areas and, because of decreasing animal stock, a part of the hayfields and pastures was also left. Abandoned arable lands are in different stages of succession, depending on the time passed since abandonment: forest edges are more and more covered with shrubs, some areas are being forested spontaneously. Regrettably, invasive weed species (mainly *Solidago* spp.) are spreading on some wet meadows along streams. Mosaic situation of arable lands and relatively intact habitats assisted the new expansion of natural vegetation on the abandoned lands and these secondary grasslands on slopes facilitate valuable plant species. Besides that, rare weed species of arable lands can also survive such as the herbicide sensitive archaeophyton *Agrostemma githago*. In some of the Quercetum petraeae–*Quercus cerris* forests *Quercus cerris*, and in some Quercetum petraeae–Carpinetum forests *Carpinus betulus* became almost the sole tree species. Also regrettably, *Pinus sylvestris*, *P. nigra* and *Quercus rubra* were planted into some forests and *Robinia pseudo-acacia* invades natural and semi-natural habitats spontaneously.

The following habitat types occur in the Putnok Hills area and are currently sustained by traditional agricultural land use methods that serve their maintenance and preservation of nature protected or rare plant species.

Mowed wetlands

Some decades ago one could have seen nice wet meadows along streams Szuha and Csörgös, the two main watercourses of the Putnok Hills. Humans cultivated (mowed regularly) the wet meadows and nature acknowledged this with good hay production. Digging ditches and breaking grasslands in some places, however, broke this century-old harmony. Mainly small-parcel arable lands, some of them cultivated also currently, others already abandoned, are represented in part of this area. Representatives of mowed wetland ecosystem in Putnok Hills are the following habitats.

Large sedge communities (*Magnocaricion elatae* Koch 1926 association groups): the most important tasks in order to preserve them are ensuring optimal water supply, ignoring grazing and regular mowing (preferably two times a year). Rare species of this habitat type in the area are *Carex cespitosa* L. and *Carex buekii* Wimm.

Tall herb fringe communities (stands of associations belonging to *Filipendulo–Petasition* Br.–Bl. 1949 association group) (HD code 6430): reconstruction of optimal water supply and ensuring undisturbance is needed for their preservation. Nature protected species occurring in stands of this habitat is *Inula helenium* L.

Molinia meadows on peaty soils, alluvial meadows and lowland hay meadows (*Molinion coeruleae* Koch 1926 and *Leucanthemo–Agrostenion stoloniferae* (Soó 1933) Borhidi 2003 and *Alopecuro–Arrhenatheretum* (Máthé & Kovács 1960) Soó 1971 association groups) (HD codes 6410, 6440 and 6510): their protection along the stream Szuha can be reached also by ensuring water supply, and forbid grazing or breaking grasslands. *Molinia coerulea* dominated marsh patches are rare treasures of the territory, with several nature protected species. Regular mowing (or occasional burning as natural disturbance) of these habitats and transporting the mowed hay away has got high importance. Their rare species are *Iris sibirica* L., *Orchis laxiflora* Lam. subsp. *elegans* (Heuff.) Soó, *Dactylorhiza incarnata* (L.) Soó, *Dactylorhiza majalis* (Rchb.) Hunt et Summerh, *Eriophorum angustifolium* Honckeny and *Eriophorum latifolium* Hoppe.

In case of abandoning regular mowing, these wet meadows would be reforested spontaneously through a few decades, this way they would lose their main nature protected values. Other endangering factors are trampling, grazing, breaking the grasslands, draining, fertilization and pollution. Besides meadows, mowing should affect also adjacent degraded areas dominated by *Urtica dioica* and *Solidago* spp. Mowed hay may not be stored on the meadow, but has to be transported away, otherwise it causes further dominance of weeds.

Pastures

Several grasslands of the Putnok Hills were and, fortunately, in many areas still are sustained by regular grazing, particularly by sheep. After leaving these areas, penetrating of shrubs has been accelerated. Primarily *Carpinus betulus* and several shrub species (*Crataegus* spp., *Rosa* spp., *Prunus spinosa*) take part in the reforestation of hill slopes. As a result of this process, diverse mosaics of grassland–shrub–tree complexes are developing. Thus, regular grazing is inevitable for sustaining pastures. It is not the same, however, that which animal species and how many of that, when and for how long time are grazing — method of grazing should be determined on the basis of old practice (not of large-scale times, but of the early 20th century), carefully designing the route of animals towards the pastures and calculating with the impacts of trampling, fertilizing and selective grazing. Gnawing plants off by animals, picking stinger weeds off by the shepherd's stick (and regular „pasture cleaning” every spring, when the farmers cut down shrubs growing on the pastures) and occasional burning have sustained these grasslands through several centuries.

Juniperus communis formations on calcareous grasslands (*Festuco – Brometea* Br.–Bl. et R. Tx. ex Klika et Hadač 1944) (HD code 5130) ensure a picturesque landscape view around Alsószuha, Dövény, Ragály and Szuhafő villages. Grazing animals avoid *Juniperus* shrubs due to its unpleasant taste and stinger leaves, this way they appear on several pastures of hilltops and slopes in the territory. *Festuca rupicola* and, in dryer places, *Festuca valesiaca* dominate these grasslands. Nature protected species of the pastures are *Dianthus deltoides* L., *Ornithogalum pyramidale* L., *Platanthera bifolia* (L.) Rich. and *Orchis morio* L.

Extensively cultivated orchards and grape yards

Extended – and partly abandoned – orchards and grape yards lie around the villages of the Puntok Hills. Besides rare plant species occurring in their lawns, the value of these areas is increased by the fact that they preserved several old traditional fruit breeds (e.g. „necked plum of Gömör”, „yellow Beszterce”, „sugar plum” etc.). These breeds are very adaptive, resistant against diseases,

therefore they do not need any serious cultivation, and they may become the main stocks for ecological management and bio-production in the near future. Accordingly, their maintenance has got high importance. Although, their fruit production does not reach the production of modern breeds, their taste, however, surpasses the modern breeds. Presence of weeds and erosion are minimal in their stands.

The lawns of these orchards, planted mainly onto southern slopes, were mowed regularly, usually one or two times per year. Due to the shape of foliage and broad spacing of these trees, line-spaces are used as hayfields. Therefore, remarkable amount of grass forage for winter time was produced in parallel with fruits, and mowing assisted to the generation of a close-to-natural secondary habitat, giving home for several nature protected plant species and food plants of rare butterfly and grasshopper species. Hollows of the old trees give hiding and nesting place for several songbirds, sometimes owls.

Almost every settlement of the Putnok Hills had a hillside full of vineyards and orchards. This traditional cultivation method, originated from the 13th–15th centuries, has been sustained till recent times in some areas. Regrettably, as a consequence of decreasing livestock and population of villages, these types of areas are decreasing and become covered with shrubs, or become locations where old fruit breeds are changed for modern breeds by owners.

Nature protected species of traditionally cultivated orchards and abandoned grapeyards are *Pulsatilla grandis* Wender., *Prunus fruticosa* Pall., *Dictamnus albus* L., *Prunella grandiflora* (L.) Scholler, *Polygala major* Jacq., *Linum flavum* L., *Linum tenuifolium* L., *Orchis tridentata* Scop., *Orchis purpurea* Huds., *Orchis ustulata* L. *Stipa pennata* L. and *S. dasyphylla* Czern.

Alder groves

Most of the forested habitat types of the area suffer from intensive forest management and overpopulated game fauna. An exception is the habitat type of alder groves, that is alluvial forests with *Alnus glutinosa* (HD code 91E0). Most significant botanical value found in this habitat type is *Geum rivale* L., a new species for the Hungarian flora, found along stream Szuha north of Szuhafő village, in the vicinity of the Hungarian–Slovakian state border on 4 June 1999. Its coenological relations were discussed by Penksza & Somlyay (1999).

Other nature protected or rare plant species found in the alder groves of Putnok Hills are *Dryopteris carthusiana* (Vill.) H. P. Fuchs, *Dryopteris dilatata* (Hoffm.) A. Gray, *Cardamine amara* L., *Cardamine glanduligera* O. Schwartz., *Primula elatior* (L.) Grufbg., *Scilla kladnii* Schur, *Epipactis albensis* Nováková et Rydlo and *Listera ovata* (L.) R. Br.

Natura 2000 species

Plant species of the Putnok Hills listed in Annex I. of Habitat Directive are *Pulsatilla grandis* Wender. (occurring in steppe grasslands of hill slopes and edges of orchards with mowed lawns), *Echium maculatum* L. (from rock grasslands) and *Iris aphylla* subsp. *hungarica* (W. et K.) Hegi (to be found in abandoned orchards).

Conclusions

Thousand years old agricultural activities on diverse habitats of the Putnok Hills resulted in the generation of specially structured landscape mosaics. Besides biological and landscape diversity, adequate cultivation structure is important also in favor of preserving soil fertility and avoiding erosion. Land use of the territory is currently dominated by grassland and forest management methods. As a result of abandoning several cultivated areas after development of heavy industry in the nearby towns and move of inhabitants away from villages, arable lands currently realize an average of 10 percent of the total area, even less in some places. Determinant parts of the territory refer to natural or close-to-natural conditions. Nature protected plant species and only maintaining the traditional landscape management methods occurring in the area for centuries, however, can preserve picturesque landscape view. With the financial assistance of the National

Agri-Environmental Programme, it can be hopefully achieved to have these nice examples of humans living in harmony with nature visible also for the future generations.

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