

THE CONSERVATION STATUS OF GRASSLANDS HABITATS IDENTIFIED IN THE “HÂRTIBACIU-TÂRNAVA MARE-OLT” NATURA 2000 SITE

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Abstract: The study includes the results of research embodied in the identification and analysis of the conservation status of seven Natura 2000 habitat types: 62C0* Ponto-Sarmatic steppes, 6210* Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (*important orchid sites), 6240 Sub-Pannonic steppic grasslands, 6430 Hydrophilous tall-herb fringe communities of plains and of montane to alpine levels, 6440 Alluvial meadows of river valleys of the *Cnidion dubii*, 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*), 6520 Mountain hay meadows.

The investigation of the conservation status of these habitats was carried out by assessing their conservation status at EU level, namely by assigning them to one of the four categories – “favourable”, “unfavourable-inadequate”, “unfavourable-bad”, and “unknown” – according to the stated attributes for each habitat, to the threats of destruction and to the dangers that may lead to their destruction or disappearance.

From our investigations and using the assessment matrix of conservation status of habitats in terms of the occupied area, it has been found that: three of the seven habitat types identified in the grasslands in the study area have a favourable conservation status, with the current tendency of a stable surface of the habitat type; three habitats are in an unfavourable-inadequate conservation status – the current tendency of the area occupied by the type of habitat is shrinking; and one habitat type is characterized by the current tendency of a shrinking area, being in an unfavourable-bad conservation status.

Considering the assessment matrix of the conservation status of the habitat in terms of structure and specific functions of the habitat, six types of habitats have an unfavourable-inadequate conservation status – structure and functions of the habitat type, including its typical species, are not in good conservation conditions, much of the area occupied by the habitat is damaged regarding its structure and functions; and one type of habitat has an unfavourable-bad conservation status – the structure and functions of the habitat type, including its typical species, are not in good conservation condition, and much of the area occupied by the habitat is damaged regarding its structure and functions.

Keywords: Natura 2000, grasslands habitats, conservation status

Introduction

This study was funded within the SOP ENVIRONMENT project, No. 21/10.07.2011, “*FOR NATURE AND LOCAL COMMUNITIES – THE BASES FOR A NATURA 2000 INTEGRATED MANAGEMENT IN HÂRTIBACIU – TÂRNAVA MARE - OLT AREA*”, a project financed by the Government of Romania and co-financed by the European Regional Development Fund.

The Natura 2000 "Hârțibaciu - Târnava Mare - Olt" area is listed as a Site of Community interest of the Natura 2000 network. The object of the project, which was conducted from July 2012 to July 2013, was to prepare a scientific study required for the development of a management plan for this Natura 2000 site.

The area included in the Natura 2000 site and the subject of this study lies within the territory of 44 localities in three counties: Brașov, Sibiu and Mureș. In this area are extensive grasslands that are utilized for farming. As a result of our research we have identified seven types of Natura 2000 habitat, types of semi-natural grasslands of special value.

The area studied is characterized by a great diversity of landform (hills, plains) and by various aspects and gradients of slope, together with heterogeneity of soils and the anthropological and zoological activity of traditional type.

Consequently, the flora and vegetation of the Târnavă Plateau is characterized by a diversity and richness of higher plant taxa, representing approximately 25.62% of Romania's flora (3500 species, in Flora R.P.R.-R.S.R.) [15].

Material and Methods

The grassland habitats in the "Hârțibaciu-Târnava Mare-Olt" area were studied. The assessment of the conservation status considers the natural habitats of Annex I of the EU Habitats Directive identified in the investigated area.

The codes and the description of the habitat types correspond to the NATURA 2000 and Romanian system of classification [6, 7, 9].

In a natural habitat, the conservation status is derived from all the factors acting upon it and upon the characteristic species, which may affect long-term distribution, structure and functions, as well as the survival of the characteristic species.

Parameters used to calculate the conservation status of a habitat are: natural distribution area, area covered by the habitat, specific structure and functionality of the habitat, and future prospects which are associated with it [4].

Conservation status is considered "*favourable*" when the following conditions exist: the natural range of habitat and the areas it covers within that range are stable or increasing; the habitat has the specific structure and functions necessary for its long-term survival, and the probability of maintaining favourable conditions in the foreseeable future is high; the characteristic species of the habitat are in a state of favourable conservation.

The fact that a habitat type is not threatened does not mean that it has favourable conservation status.

Unfavourable conservation status is divided into two classes: "unfavourable-inadequate" for situations that require a change in policy or management to bring the type of habitat or species into a favourable conservation status, but there is no danger of extinction in the foreseeable future (e.g. 50–100 years); and "unfavourable-bad" for situations where the type of habitat or species is in danger of extinction in the foreseeable future (e.g. 50–100 years).

For all situations where insufficient information exists to make a proper assessment, conservation status is considered "*unknown*".

For graphical representation of the conservation status, a colour-coding system was adopted: red for "unfavourable-bad"; orange for "unfavourable-inadequate"; green for "favourable"; grey for "unknown".

The investigated area was divided into polygons corresponding to the use of the grasslands studied; 1414 polygons were analyzed.

Results and Discussions

In the grasslands studied, 7 types of Natura 2000 habitats were identified:

62C0* Ponto-Sarmatic steppes, a habitat identified in 5 localities within the site, in 29 polygons. In 72.41% of the polygons, the conservation status of the habitat is **good**, and in the remaining 27.58% of the polygons the habitat has a **medium** or **low** state of preservation, which requires management actions for the ecological restoration of the habitats studied.

Plant associations identified:

Carici humilis-Stipetum joannis Pop et Hodişan 1985. In the phytocoenosis of this association are various xero-thermophilic elements, such as: *Dictamnus albus*, *Helianthemum nummularium*, *Inula ensifolia*, *Galium verum*.

The representative species (*Stipa joannis*) is characterized by a high cover and constancy; its habit gives a unique aspect to these phytocenoses.

The association *Elytrigietum hispidi* (Dihoru 1970, Popescu et Sanda 1988) is frequently seen as extrazonal vegetation. *Elymus hispidus* phytocoenoses are very common in the studied site; they are mainly composed of steppic species characteristic of the *Festuco-Brometea* class. These phytocoenoses were encountered on strongly steep slopes (15–40°) facing south or southwest, at an altitude of 500–600 m.

The natural range of the habitat and areas it covers within this site are stable or slightly increasing. This habitat is characterized by a great wealth of orchids: *Gymnadenia conopsea*, *Orchis morio*, *Orchis ustulata* and species assigned to different zoological categories: *Cephalaria radiata*, *Adenophora liliifolia*, *Adonis vernalis*, *Dictamnus albus*, *Prunus tenella*.

6210* Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometea*) (*important orchid sites), identified in 13 localities of the site, in 642 polygons. In 6.85% of the polygons the conservation status of the habitat was **very good**, in 28.97% of the polygons the habitat has **good** conservation status, and in 64.17% of the polygons it has **medium or low** conservation status. Thus in more than half of the polygons the habitat has a **satisfactory** conservation status, a situation that requires a change in the existing management to rehabilitate pastures, so as to attain a specific floristic richness (c.75–150 cormophyte species) and a forage value range of 2000–8000 kg green mass/ha.

In this type of habitat the following plant associations were identified: *Rhinantho rumelici-Brometum erecti* Sanda et Popescu 1999 (syn.: *Brometum erecti* auct. rom.), *Salvio nutantis-nemorosae-Festucetum rupicolae* Zólyomi 1958, *Thymo comosi-Caricetum humilis* (Zólyomi 1931) Morariu et Danciu 1974, *Brachypodio pinnati-Festucetum rupicolae* Ghişa 1962, *Carici humilis-Brachypodietum pinnati* Soó 1947, *Danthonio-Brachypodietum pinnati* Soó 1946, *Polygalo majoris-Brachypodietum pinnati* Wagner 1941, *Festuco rupicolae-Danthonietum provincialis* Csűrös et al. 1961, *Thymo pannonic-Stipetum stenophyllae* Sanda et al. 1998

The aspect and gradient of slopes, as well as the insolation related to these factors, play a decisive role in establishing these phytocoenoses.

The overall state of conservation of the habitat is relatively good or satisfactory, confirmed by the great variety of species, with potential to improve by the application of management measures. The habitat is characterized by a great wealth in orchids: *Gymnadenia conopsea*, *Dactylorhiza sambucina*, *Epipactis palustris*, *Orchis coriophora*, *Orchis morio*, *Orchis ustulata*, *Traunsteinera globosa* and species assigned to different zoological categories: *Cephalaria radiata*, *Crambe tatarica*, *Adonis vernalis*, *Dictamnus albus*, *Iris aphylla*, *Gypsophila collina*, *Onobrychis arenaria*, *Salvia nutans*.

The **6240 Sub-pannonic steppic grasslands** habitat was identified in 11 localities of the site, in 214 polygons. In 65.88% of the polygons, the conservation status of the habitat was **good**, in 1.40% of the polygons it was **very good**; but in 32.71% of the polygons the conservation status was **medium** or **low**, which indicates a need for urgent ecological restoration actions, considering that these grasslands should have a green mass forage value of 2000–5000 kg.

Plant associations identified: *Medicagini minimae-Festucetum valesiaca* Wagner 1941, *Botriochloëtum ischaemi* (Krist. 1937) Pop 1977, *Agrostio-Festucetum valesiaca* Borisavljevič et al. 1955, *Thymo pannonici-Chrysopogonetum grylli* Doniță et al. 1992, *Danthonio-Chrysopogonetum grylli* Boșcaiu (1970) 1972, *Stipetum capillatae* (Hueck 1931) Krausch 1961, *Festuco rupicolae-Caricetum humilis* Soó (1930) 1947, *Festucetum valesiaco-rupicolae* Csűrös et Kovács 1962.

Habitat 6240 is characterized by a great wealth of orchids, such as: *Gymnadenia conopsea*, *G. odoratissima*, *Epipactis palustris*, *Limodorum abortivum*, *Orchis coriophora* and also species assigned to different zoological categories: *Cephalaria radiata*, *Adonis vernalis*, *Onobrychis arenaria*, *Salvia nutans*.

The general state of conservation of the site is relatively good, confirmed by the great variety of species contained in phytocoenoses, with a tendency to improve by the application of management measures (habitat present in 141 polygons).

The natural range of habitat and the areas it covers within this site are stable or slightly decreasing due to abandonment of grasslands. This habitat has specific structure and functions necessary for its long-term conservation, and a high probability of maintaining them in the foreseeable future.

6430 Hydrophilous tall-herb fringe communities of plains and of the mountain to alpine levels, identified in 5 localities of the site, in 12 polygons. In 91.66% an overwhelming percentage of the polygons, the habitat conservation status is **medium** or **low**, and only in 8.33% of the polygons is it **good**. In order to secure their ecological restoration, it is necessary to take urgent and adequate management measures for these habitats. These types of phytocoenoses are important because they exploit a swampy ecotope, quite different to other useful plant formations, having a role in maintaining the ecological balance.

Hydrophilic tall herb communities were identified in the studied area along water courses, with excess moisture, located mostly in hilly regions across the site, where they form strips of varying widths.

The plant associations identified in this habitat type are *Angelico-Cirsietum oleracei* Tüxen 1937 and *Scirpetum sylvatici* Ralski 1931 em. Schwich 1944.

The natural range of habitat and areas it covers within this site are stable or decreasing slightly due to conversion into agricultural land or to their abandonment.

6440 Alluvial meadows of river valleys of the *Cnidion dubii*, identified in 7 localities of the site, in 47 polygons. It is a transitional habitat between hydrophilic meadows and semi-natural dry grasslands.

Areas covered on the site are quite large, but decreasing slightly due to abandonment of meadows or intensive grazing or sheepfolds.

The general conservation of the habitat is **medium** or **low** (65.95%, representing more than half of the polygons), so it requires immediate ecological restoration actions by changing management policies. The policies must take into account that the grasslands should have a specific high floristic richness (about 75–125 cormophyte species) and a green mass fodder value of 7000–15000 kg/ha.

The great variety of species forming the coenosis confirms that in 14 polygons the habitat is in a relatively **good** state of conservation, and in 2 polygons the habitat is in a **very good** state of conservation. For this habitat we identified also a great wealth of orchids, such as: *Dactylorhiza incarnata*, *Epipactis palustris*, *Gymnadenia conopsea*, *G. odoratissima*.

Plant associations identified: *Poëtum pratensis* Răvăruț et al. 1956, *Ranunculo repentis-Alopecuretum pratensis* Ellmauer 1933, *Agrostio-Festucetum pratensis* Soó 1949, *Agrostietum stoloniferae* (Ujvárosi 1941) Burduja et al. 1956, *Agrostio-Deschampsietum caespitosae* Ujvárosi 1947, *Cirsio cani-Festucetum pratensis* Májovsky ex Ruzicková 1975.

6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) were identified in 7 localities, in 35 polygons.

This habitat includes grasslands rich in species, developed on mild-moderate fertilized soils, belonging to *Arrhenatherion* alliances. Mesophilic secondary grasslands are used as hayfields and others as pastures or both combined, being extensively exploited.

In 60% of the polygons studied, the habitat is in a **medium** or **low** state of conservation, otherwise meadows are in good condition and very well preserved (40% of polygons). In this case, management measures for ecological restoration of grasslands should be proposed, as they normally should have a high specific floristic richness (about 100–150 cormophyte species), a green mass forage value of 15000–25000 kg/ha, values not found in 60% of the polygons where habitat 6510 has been identified.

In the grasslands belonging to this habitat one plant association (*Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925) was identified. The habitat is characterized by the presence of the endangered species *Adenophora liliifolia* (Habitats Directive Annex 2).

Areas covered by this habitat type on the site are quite large but decreasing slightly. The phytocoenoses belonging to this habitat type provide forage of good and very good quality, but if agricultural practices become intensive, along with the abundant use of fertilizers, species diversity will decrease rapidly. The abandonment of grasslands (by cessation of pastoral activities) leads to the establishment of scrub of the *Prunion spinosae* alliance.

6520 Mountain hay meadows, identified in 9 localities of the site, in 198 of the polygons.

This habitat includes secondary mesophilic grassland established on less steep slopes of the hills, at altitudes of c.300–600 m. The grasslands are rich in valuable species and are used as hayfields, pastures or both combined.

In about 35% of the polygons, the habitat is in **good** and **very good** state of conservation, but in 66.66% of the polygons, the habitat was in **medium** or **low** conservation status, which implies taking urgent management reconstruction measures for habitats. The habitats in good conservation status have a high floristic composition: about 100–150 cormophyte species with medium or good forage value.

The following plant associations: *Poo-Trisetetum flavescentis* (Knapp 1951) Oberd. 1957, *Trisetetum flavescentis* (Schröter) Brockmann 1907, *Festuco rubrae-Agrostietum capillaris* Horvat 1951 and *Anthoxantho-Agrostietum capillaris* Silinger 1933 were identified in this habitat type. Also several species belonging to different zoological categories were identified within the habitat: e.g. *Onobrychis arenaria*, *Salvia nutans*.

We also wish to mention the habitat **40A0* Subcontinental peri-Pannonic scrub (variant with *Prunus tenella* (*Amygdalus nana*) and *Prunus fruticosa* (*Cerasus fruticosa*))**, which was identified in 3 localities of the site, in 77 polygons (Figs 1,2).

In most of the polygons, the conservation status of the habitat was **very good** and **good** (98,5%, in Birghiș, Rupea, Bunești). A degradation of habitat was found in only one polygon (Rupea).



Figs 1,2: Habitat 40A0* Subcontinental peri-Pannonic scrub (*Prunetum tenellae* Association)

The main risk factors/threats for these habitats are:

- conversion into arable land,
- abandonment of grasslands (cessation of mowing) leading to establishment of scrub of the *Prunion spinosae* alliance,
- agricultural practices becoming intensive,
- the abundant use of fertilizers, resulting in rapidly decreasing species diversity,
- over-grazing around sheepfolds, which determines the replacement of grassland communities with other plant communities,
- the ruderalisation of the habitat, and
- the intrusion of invasive species.

Table 1: Evaluation matrix for conservation status of habitats on basis of occupied area, and structure and specific functions of the habitat

Habitat type	Conservation status	
	in terms of occupied area	in terms of structure and specific functions of the habitat
62C0* Ponto-Sarmatic steppes	F	U-I
6210* Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometea</i>)	U-I	U-I
6240 Sub-pannonic steppic grasslands	F	U-I
6430 Hydrophilous tall-herb fringe communities of plains and of the montane to alpine levels	U-B	U-B
6440 Alluvial meadows of river valleys of the <i>Cnidion dubii</i>	U-I	U-I
6510 Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	U-I	U-I
6520 Mountain hay meadows	F	U-I

Legend: Conservation status of habitats in terms of structure and specific functions of the habitat: F (Favourable) - The current trend of the area of the habitat type is stable; U-I (Unfavourable – Inadequate) - The current trend of the area of the habitat type is decreasing (less than 25% of habitats' area); U-B (Unfavourable – Bad) - The current trend of the area of habitat type is decreasing (more than 25% of area).

Conservation status of habitats in terms of structure and specific functions of the habitat: F (Favourable) - Structure and functions of the habitat type, including its typical species, are in good condition; U-I (Unfavourable – Inadequate) - Structure and functions of the habitat type, including its typical species, are not in good condition, in less than 25% of area habitats are damaged in terms of their structure and functions; U-B (Unfavourable – Bad) - Structure and functions of the habitat type, including its typical species, are not in good condition, in more than 25% of area habitats are damaged in terms of their structure and functions.

Proposed management measures

1. Traditional grazing consistent with local practices:
 - maintaining a traditional use of grasslands where it has enabled the emergence of high conservation value grasslands;
 - grazing intensity will be controlled so as to be within acceptable limits established for defining favourable conservation status;
 - a subset of options may be defined within this measure:
 - a. communal grazing;
 - b. grazing throughout the growing season;
 - c. grazing after mowing.
2. Habitat restoration by grazing as a temporary measure designed to counteract the effects of overgrazing or under-grazing, which applies:
 - to restore habitat to a favourable conservation status.

- options according to the particularities of each habitat:
 - a. flock or herd growth in under-grazed meadows;
 - b. decreased livestock in overgrazed grasslands;
 - c. change of grazing species (e.g. replacing cattle with sheep) in accordance with the habitat needs.
- 3. Carrying out reconstruction activities for the soil for degraded and abandoned lands.
- 4. Manual mowing, a measure that maintains a traditional practice in the sites where such land use has generated features with great importance for conservation. Measures recommended for the different features, such as:
 - mowing 2–3 times per year;
 - mowing after fruiting and dissemination of most species (provides natural regeneration by seeds which do not affect the specific composition and proportion of species);
 - mowing before fruiting and dissemination of species (for preventing natural multiplication of invasive species).
- 5. Mechanical mowing and removal of plant material. This is a measure that can be applied in some cases of abandonment or under-grazing.
- 6. Restricting the use of fertilizers, especially of those chemicals that can induce succession to another type of habitat.
- 7. Controlling herbicide pollution that affects groundwater, soil and vegetation.
- 8. Controlling invasive species, including woody plants: inhibiting the expansion of invasive adventive or woody species by removing them manually or mechanically. This is recommended especially for abandoned or under-grazed grasslands.
- 9. Controlled burning of dry material. This measure will apply only with the approval of the environmental authorities and only in special cases, as a last resort and under strict control.
- 10. Preserving genetic diversity of plants *in situ*, as this is a potential gene-pool that must be managed with great care, because it provides genetic resources for future use to improve forage and other plants.
- 11. Monitoring populations of endangered plant species.
- 12. Increasing or maintaining at least the current level of plant populations, and maintaining the natural status of the habitats within the full protection area, or as close to it as possible.
- 13. Avoid harvesting plants of economic value, particularly medicinal and melliferous species.
- 14. Further endangered species biology research at European and national level (pollination, dissemination, and especially germination and juvenile phase);
- 15. Continuing education and raising awareness on the need to preserve species and habitats where people live.

Conclusions

Most of the grasslands of the site have a **medium** or **low** conservation status (in **892** polygons), and the conservation status of habitats in **456** polygons is **good**. The conservation status of habitats in 66 polygons is **very good**.

These grasslands are mainly related to traditional agricultural practices, which are disappearing throughout the EU, and the conservation status of all habitat types associated with

agriculture is much worse than that of other habitat types. This is caused by the shift to more intensive agriculture, abandonment of land and poor management.

Therefore, it is recommended to know the risk factors/threats that lead to habitat degradation, and compliance with the management measures proposed.

The most important risk factors/threats are: overgrazing, land abandonment and intrusion of invasive species.

Regarding the impact of short-term risk factors in the absence of management interventions they will have the effect of restricting the characteristic plant communities in favour of ruderal assemblages, a sharp decrease in the number of rare species, and changes in vegetation structure and composition due to the proliferation of invasive species.

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**STAREA DE CONSERVARE A HABITATELOR DE PAJIȘTI DIN SITUL NATURA 2000
“HÂRTIBACIU-TÂRNAVA MARE-OLT”**

(Rezumat)

Studiul cuprinde rezultatele cercetărilor concretizate în identificarea și analiza stării de conservare a 7 tipuri de habitate: 62C0 * Stepe ponto-sarmatice, 6210* Pajiști xerofile seminaturale și facies cu tufișuri pe substrate calcaroase (*Festuco-Brometalia*) (*situri importante pentru orhidee), 6240 Pajiști stepice subpanonice, 6430 Comunități de lizieră cu ierburi înalte higrofile de la câmpie și din etajul montan până în cel alpin, 6440 Pajiști aluviale ale văilor râurilor din *Cnidion dubii*, 6510 Fânețe de joasă altitudine (*Alopecurus pratensis*, *Sanguisorba officinalis*), 6520 Fânețe montane.

Evaluarea statutului de conservare a habitatelor s-a realizat prin aprecierea stării de conservare la nivelul UE, și anume, prin încadrarea lor în una din cele patru categorii: „favorabilă”, „nefavorabilă inadecvată”, „nefavorabilă rea” și „necunoscută”, în funcție de atributele anunțate pentru fiecare, de amenințările de distrugere și de pericolele ce pot provoca distrugerea sau dispariția lor.

În urma cercetărilor efectuate s-a constatat că în conformitate cu matricea de evaluare a stării de conservare a habitatelor din punct de vedere al suprafeței ocupate, trei din cele 7 tipuri de habitate identificate în pajiștile din acest areal se află într-o stare de conservare favorabilă, cu tendința actuală a suprafeței tipului de habitat stabilă, 3 habitate se află în stare de conservare nefavorabilă inadecvată - tendința actuală a suprafețelor ocupate de tipul de habitat este în scădere și un tip de habitat se caracterizează prin tendința actuală a suprafeței ocupate în scădere, fiind în stare de conservare nefavorabilă rea.

Luând în considerare matricea de evaluare a stării de conservare a habitatului din punct de vedere al structurii și funcțiilor specifice habitatului 6 tipuri de habitate sunt în stare de conservare nefavorabilă inadecvată - structura și funcțiile tipului de habitat, incluzând și speciile sale tipice nu se află în condiții bune de conservare, o bună parte din suprafețele ocupate de habitat sunt deteriorate în ceea ce privește structura și funcțiile sale, iar un tip de habitat se află în stare de conservare nefavorabilă rea - structura și funcțiile tipului de habitat, incluzând și speciile sale tipice, nu se află în condiții bune de conservare, o bună parte din suprafețele ocupate de habitat sunt deteriorate în ceea ce privește structura și funcțiile sale.

Received:1.07.2014; Accepted:11.08.2014.