MEASUREMENTS OF PRESERVING AND IMPROVING GRASSLAND HABITATS WITHIN THE SITE NATURA 2000 - ROSCI0226 SEMENIC – CHEILE CARAȘULUI

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Abstract: *The site Natura 2000 ROSCI0226 Semenic-Cheile Carașului has been confirmed as a site of community importance in 2008, thereby contributing to the development of the network Natura 2000 in Romania. The site surface hosts types of natural habitats of national interest whose conservation require naming these areas and species, enumerated within annex II of Habitats Directive 92/43/CCE, as special. The aim of this paper is to maintain a favourable preservation state of species and habitats in the studied area, by proposing some general measures of improvement and conservation, but also by using special measurements for grassland habitats and shrubbery protected by community law. Our studies were carried out on the area of the administrative territory of Goruia, Caraș-Severin county, Romania, on grasslands situated on the hilly area – nemoral, totally or partially overlapping the site Natura 2000 ROSCI0226 Semenic – Cheile Carașului. Research is based on literature supplemented with data collected in the field. In the grasslands from U.A.T. Goruia, overlapping the site Natura 2000 - ROSCI0226 Semenic – Cheile Carașului, some habitats of community interest have been identified, such as: habitat 6210*, 6410, 6510, 6190, 5130. The permanent grassland analysed in our study are diverse in terms of flora, through specific methods of analysing the flora and the vegetation (phytosociological, linear, pratological). Based on station conditions, but also on the way these are managed, the following types of grasslands are encountered: mesophile, mesoxerophile and mesohigrophile. Through a complex analysis, abiotic factors have been identified and the human influence on the operating mode of the grasslands, therefore conservation and improvement measures have been proposed. The most important limiting factors identified in the meadows of the U.A.T. Goruia are: the presence of harmful species, soil erosion, land subsidence and fragmentation, heavy soil or soil water retaining proliferation acid indicator species, the parent rock to the surface, the absence of minimal maintenance work, grazing inefficiently (overgrazing or undergrazing).*

Keywords: *grassland habitats, site Natura 2000, measurements of preserving and improving.*

INTRODUCTION

To understand the relative biodiversity value of agricultural habitats and their associated species, and establish appropriate conservation priorities, it is necessary to consider their historical origins and relationships with natural habitats. This is because the habitats that we now have in Europe are primarily a result of thousands of years of human interactions with natural ecosystems. Despite this long period of human influence, some agricultural habitats can be considered to be natural habitats (POLÁKOVÁ J. ET AL., 2011).

In the past, biodiversity was often seen as a constraint to the economic development of rural areas. As a consequence, policies designed for economic growth in rural areas typically have not taken account of biodiversity. While conflicts between economic development and biodiversity conservation will undoubtedly remain in the future, there is growing scope to use

the concept of biodiversity as an asset. Applied at the sub-regional territorial scale and to whole rural economies rather than just to the farm sector, such policies have the potential to identify sustainable development trajectories that explicitly valorise biodiversity, thus contributing to 'green growth'. This implies using a wide range of rural development policy measures, in well-considered combinations, to achieve biodiversity aims alongside the development of green infrastructure and delivery of ecosystem services, moving away from a more traditional notion of aligning only specific instruments with specific goals (POLÁKOVÁ J. ET AL., 2011).

The existence of the vast majority of the semi-natural pasturelands in Europe depends to a large extent on human intervention (given their predominantly secondary origin), which prevents the spreading of shrubbery and forests in these habitats (HANSSON & FOGELFORS, 2000).

European farmland is dominated by a mix of semi-natural habitats (such as wooded pastures, shrublands, dry grasslands and grasslands), agriculturally improved grasslands, cultivated croplands and permanent crops. In addition, some open natural habitats (such as blanket bogs and salt steppes) remain that are extensively grazed by livestock, but these are not normally dependent on agriculture for their existence. Avoiding agricultural impacts on these natural habitats is therefore a high priority. In contrast, livestock farming has played a significant role in creating and sustaining semi-natural habitats and the continuation of beneficial farming practices is often crucial for their survival. Semi-natural agricultural habitats are often species-rich and now relatively scarce, having been much reduced over the last 50 years. Consequently, many of such habitats and their associated species are of Community interest (ie listed as such in the Birds and Habitats Directives). While relatively large proportions of semi-natural habitats now fall within Natura 2000 sites, significant areas also occur in the wider countryside outside protected areas and are dependent on the broad-scale maintenance of High Nature Value (HNV) farming systems (POLÁKOVÁ J. ET AL., 2011).

Given the continued pressures facing biodiversity, it is important that a basic level of protection is provided through EU directives, national legislation and standards of good practice to limit the impacts of these negative pressures. Where farmers apply practices favourable for biodiversity which go beyond this mandatory baseline to meet the demands of society, these actions usually need to be incentivised through public policy to ensure a reallocation of resources that provides the desired outcome for biodiversity. There is a range of management practices that can have beneficial impacts on biodiversity in all agricultural habitats and a range of policy instruments that can be used to promote these. (POLÁKOVÁ J. ET AL., 2011).

In what regards Romania, there are methodologies and regulations for compliance with proper agricultural and environmental conditions (GAEC), as well as with the APIA Guidelines, which require, through different measures, the special management of the grasslands that are under the APIA - Ongoing Agro-environment 214/1, 214/2, 214 / 3.1 214 / 3.2) respectively Measure 10 "Agro-environment and Climate Payments", Package 2, 3, 4, 6, referring to grasslands), which entered into force in the year 2015.

Recent work carried out by the Institute of Grassland and Environmental Research and collaborating organizations that addresses some of the impacts of grazing management on both species-rich and species-poor lowland neutral grassland indicate that for species-rich grassland, lenient grazing pressure maintained botanical diversity and the abundance of positive indicator species of nature conservation value over a 5-year period and also enhanced faunal diversity and abundance reflecting improvements in spatial, architectural and temporal structure. However, there was no enhancement in positive indicator species and there was also an increase in pernicious weeds suggesting that grazing alone may not suffice to deliver all the

biodiversity goals for these grasslands and that additional management interventions may be required. For species-poor grassland, results indicate that distinctive differences in structure can lead to differences in faunal diversity. There is also some tentative evidence that livestock breed may affect invertebrate species assemblages (TALLOWIN J.R. BET AL., 2005)

Grazing studies carried out in some protected areas in Romania provided a useful database for the practice of a rational pasture. For example, the grazing study conducted for the Piatra Craiului National Park (MARUŞCA ET AL., 2003) was the basis for some management actions included in the Park Management Plan.

The area investigated/interrogated in this study partially overlaps with the Natura 2000 ROSCI0226 Semenic-Cheile Caraşului site, designated as a site of community importance in 2008, thus contributing to the extension of the Natura 2000 network in Romania.

Natura 2000 network has been designed to cover the most representative areas of the natural range of species and habitats of community importance, being a network of well-defined areas spread throughout the European Union, hosting species and habitats that are intended to be preserved. The legal framework for the implementation of the Natura 2000 network is represented by two European directives: The Habitats Directive 92/43 / EEC - concerning the conservation of natural habitats, wild flora and fauna and the Birds Directive 79/409 / EEC - on the conservation of wild birds.

In Romanian legislation, the provisions of the directives were transposed by G.D. no. 1284/2007 (regarding the declaration of the special protection areas of avifauna as an integral part of the European ecological network Natura 2000 in Romania), modified and completed by G.D. No. 971/2011, and Order no. 1964/2007 (concerning the establishment of the protected natural habitat regime of sites of community importance, as an integral part of the European ecological network Natura 2000 in Romania), amended and supplemented by G.D. No. 2387/2011. Also, provisions regarding the establishment of the Natura 2000 network and the management of the sites are also found in GEO no. 57/2007 - on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna.

On the studied site surface there are types of natural habitats of community interest whose conservation requires the designation of such special areas as well as species listed in Annex II of the Habitats Directive 92/43 / EEC.

The purpose of the paper is to maintain a favorable conservation status of the species and habitats in the area analyzed, by proposing general improvement and conservation measures and specific measures for grassland and shrubbery habitat protected at community level, and achieving general improvement of permanent grasslands. Our studies were carried out on the territory of the administrative unit of Goruia, Caraş-Severin County, Romania, on grasslands located in the hilly area – nemoral.

From the MADR data presented in the "National program for rehabilitation of grasslands 2005-2008", the limitation factors for production in Romania are: soil acidity, erosion, excess moisture, salinity and alkalinity, soil texture and others that influence 60% of the area of permanent grasslands (Oliviu G. Pop, Florentina Florescu, 2008).

International studies on various grassland management techniques on poor soils with a view to maintaining a high level of richness rank mowing on the first place (HANSSON & FOGELFORS 2000; JENSEN & MEYER 2001; KLIMES & KLIMESOVA 2001; KOTILUOTO 1998; KRAHULEC, (2001), LENNARTSSON & OOSTERMEIJER 2001, SIMAN & LENNARTSSON 1998, STAMMEL, KIEHL, & PFADENHAUER 2003, TAMM 1956, QUOTED BY OLIVIU G. POP AND FLORENTINA FLORESCU, 2008). Rational grazing is considered to be the second method of efficiency (HANSSON & AMP; FOGELFORS 2000, HELLSTROM ET AL 2003, KOTILUOTO 1998, KRAHULEC, SKALOVA, HERBEN, HADINCOVA, WILDOVA, & PECHACKOVA, 2001, PFADENHAUER

2003, QUOTED BY OLIVIU G. POP AND FLORENTINA FLORESCU, 2008). The third, less recommended way of intervention with a less beneficial effect on biodiversity is the elimination of wood vegetation by cutting or burning (HANSSON & FOGELFORS 2000; KOTILUOTO 1998; MOOG, POSCHLOD, KAHMEN, & SCHREIBER 2002, QUOTED BY OLIVIU G POP AND FLORENTINA FLORESCU, 2008).

Further recommendations for improvement and development of permanent grasslands as well as ecological production of grasslands feed can be obtained FROM MARUŞCA ET. AL., 2010 AND MARUŞCA ET. AL., 2014.

MATERIAL AND METHODS

For the proper management of a grassland it is necessary, first of all, to determine the vegetation that the grassland consists of. In this respect, by the methods of qualitative and quantitative analysis of grassland vegetation - phytosociological (geobotanic), the double (linear) meter have been identified the vegetal associations have been identified, respectively the types of grasslands in the analyzed area.

The data on the current state of grasslands, the organization, improvement, endowment and use of grasslands were obtained through successive visits and observations in the field.

The identification of habitats and shrubbery of community interest was made on the basis of bibliographic references, and their confirmation was made on the ground.

Territorial data processing was performed with the ArcGIS 10.1 software, according to the specific methodology.

For the realization of this study the following were used: data and information from U.A.T. Goruia City Hall; data from the Management Plan of Semenic-Cheile Caraş National Park (http://pnscc.ro/wp-content/uploads/2016/05/plan-management-apnscc2.pdf); the ortofotoplan of Goruia villagee taken from the Office for Cadastre and Real Estate Advertising Timis; the Digital Elevation Model available on the European Environment Agency website (http://www.eea.europa.eu/dataand-maps/data/eu-dem); vector data taken from the site (www.geospatial.org): the limit of the administrative-territorial units in Romania, the limit of the counties of Romania, etc .; the limits of the protected areas, in vector format, available on the website of the Ministry of Environment, Water and Forests (http://www.mmediu.ro/articol/date-gis/434); scientific data from the literature.

RESULTS AND DISCUSSIONS

The studies in the present work were made on an area of approx. 281 ha of permanent grasslands in Gîrlişte locality, on the administrative territory of Goruia village, located in the central-western part of Caraş-Severin County, Romania.

The surface of the analyzed grassland is included in the Natura 2000 ROSCI0226 Semenic - Cheile Caraşului site, which partially overlaps the Semenic-Cheile Caraşului National Park (Fig.1.).

The Semenic-Cheile Caraşului National Park is located in the south-west of Romania, Caraş-Severin County, Reşiţa Administrative-Territorial Unit, Caraşova, Goruia, Anina, Bozovici, Prigor, Teregova, Văliug (http://pnscc.ro/wp-content /uploads/2016/05/plan-management-apnscc2.pdf).

The authority responsible for the management of the Semenic National Park Cheile - Caraşului is RNP ROMSILVA - Administration of the Semenic National Park Cheile - Caraşului RA.

The location of the Natura 2000 site ROSCI0226 Semenic - Caraş Gorge is at

21.0066666 longitude and 45.009280 latitude, the administrative region V, the continental biogeographical region, with a total area of 37.458 ha (Natura 2000 Standard Form (2016)).

Currently, the site does not have a body responsible for its management and no management plan.

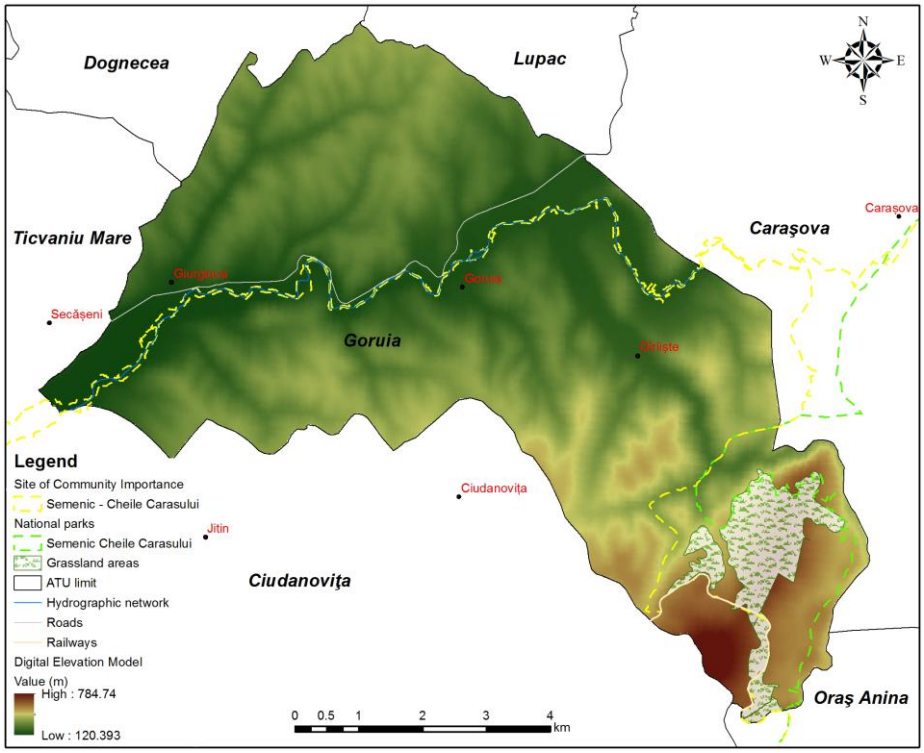

Fig.1. The overlapping of Natura 2000 ROSCI0226 Semenic – Cheile Caraşului Site over grasslands in Gîrlişte locality
(processed after http://www.eea.europa.eu/data-and-maps/data/eu-dem, http://www.mmediu.ro/articol/date-gis/434, www.geospatial.org)

Analysis of terrestrial ecosystems of grasslands and shrubbery present in the site

Among the ecosystems under which the protected natural area was declared, there are terrestrial grassland and hedge ecosystems: 6210 * Semi-natural dry grasslands and limestone faeces (*Festuco-Brometalia*); 6410 *Molinia* grasslands on limestone soli, turbot or clay (*Molinion caeruleae*); 6510 Low altitude grasslands (*Alopecurus pratensis-Sanguisorba officinalis*); 6190 Panonic rock grasslands (*Stipo-Festucetalia pallentis*); 5130 *Juniperus communi*s formations on hedges or limestone pastures.

The correspondence of these habitats with the Habitats in Romania (DONITA ET AL., 2005) is the following:

Habitat type (According to Habitats Directive)	***Habitat type (According to Doniță et al., 2005)***
6210* Semi-natural dry grasslands and shrubbery faeces on limestone substrate (*Festuco-Brometalia*)	R3413 Panic-Balkan grasslands of *Festuca rupicola* and *Cleistogens serotin.*
6410 Molinia grasslands on limestone, turbot or clay soil (Molinion caeruleae)	3710 Dacian grasslands of *Molinia caerulea*
6510 Low altitude grasslands (*Alopecurus pratensis-Sanguisorba officinalis*)	3716 Danubian-Pontic grasslands of *Poa pratensis, Festuca pratensis* and *Alopercurus pratensis*

The vegetal associations characteristic of the ecosystem type are: *Asplenio - Ceterachetum Vivies 1964*; *Ctenidion - Polypodietum Jko et Pec. 1963; Diantho petraei - Seslerietum rigidae Pop et Hodisan 1985; Erysimo comati - Stipetum eriocallis E. Schneider et al. 1970; Melicetum flavescentis banaticum Zolyomi 1939; Festucetum valesiacae-rupicolae Csuros et Kovacs 1962; Chrysopogonetum grylli Soo 1939; Asplenio - Syringetum vulgaris Jakucs et Vida 1959; Syringo - Carpinetum orientalis Jakucs 1959; Atropetum bella-donnae (Br. - Bl. 1930) Tx. 1931 emend. 1950; Senecioni - Chamaenerietum Tx. 1937 emend. 1950 corr. Soo 1961; Epilobio - Salicetum capreae (Schreiter 1955) Oberd. 1957* (http://pnscc.ro/wp-content/uploads/2016/05/plan-management-apnscc2.pdf).

The management of Natura 2000 sites must ensure the preservation of the structure and functions of ecosystems, the favorable conservation status of the species and habitats of Community importance that are the subject of conservation of the site, in correlation with the human activities in the area.

The purpose of the Natura 2000 network is not to prohibit human activities in protected areas but to ensure a harmonious coexistence between man and nature, allowing human activities, but to the extent that they hold favorable habitats and species of community importance.

Actions to protect and preserve the environment do not exclude "pastoral activities" with an old tradition in the area, but dictate how they can be carried out in such a way as not to cause direct damage by destroying or degrading environmental or indirect components by diminishing the socio-economic potential of the region concerned (COJOCARIU ET AL., 2016)

Therefore, the specific conservation measures for the grassland and shrubbery habitat that we propose and which can be correlated with other measures established by operational regulations, management plans or other documents aimed at concrete measures for conservation and protection of species and habitats, are: maintaining grassland areas; the extension of the built-up area will not be achieved within the grasslands; no foundation constructions will be built, only temporary shelters will be constructed which, once they lose their usefulness, will be abolished; energy crops will be located outside grassland habitats; active management of grassland habitats by grazing, mowing or mixed use; the grasslands and hedges shall not be burned; on the surface of the habitats of community interest, no bush cuttings will be carried out and, in particular, the juniper (*Juniperus communis*) will not be cut; will not fragment the surfaces through fences or other fixed or mobile buildings; the grazing capacity will be respected by assigning the optimum number of animals to the pasture and the grazing period imposed by the pastoral arrangements will be respected; avoid overgrazing and undergrazing; overseeding of grasslands will be done only with native species, with seed harvested from the meadow to be oversaturated or from another grassland in the site, and without land preparation work; removal of dry vegetation from the grasslands will be done only by mowing and gathering, no burning is allowed; the removal of sheep to movements during winter shall be carried out only on an appropriately delimited area and declared at the town hall, which shall not occupy more than 15% of the pasture land area and which will change

annually; the pens in which the animals are kept will be regularly moved so as not to degrade vegetation and lead to acidification of the soil; no construction waste or household waste will be stored on the grassland; ATV will not be used, winter snowmobiles will not be used if the snow layer is not thick enough; the use of fauna species warning devices during farm mowing; the spreading of grasslands with animals and the fertilization with organic and mineral fertilizers will be done after an approved fertilization plan that meets the requirements of good agricultural and environmental practice, as well as APIA requirements.

Identification and determination of the types of grasslands *in the studied area*

Through the study carried out in the area surveyed, correlated with the data from literature (Samoilă et al., 1979; Puşcaru-Soroceanu Evdochia et al., 1963; Ţucra et al., 1987) various associations have been identified between prairie grasses, respectively well-defined grasslands, distributed on altitudinal floors from 400 to 700 m (Fig.2.), with the layout of the relief steps (Fig.2.).

From the morphometric point of view, in the analyzed area, the grassland areas have slopes ranging from 0 to 50% (Fig.2.), which requires that on the high slopes special soil and plant protection measures are applied to prevent erosion and landslides, measures that are also in line with the principles of conservation of species and habitats of interest.

Another element that influences the structure of vegetation and types of grassland is represented by the location of the slopes which is south-eastern and eastern, north-western and western, north-eastern and northern (Fig.2.).

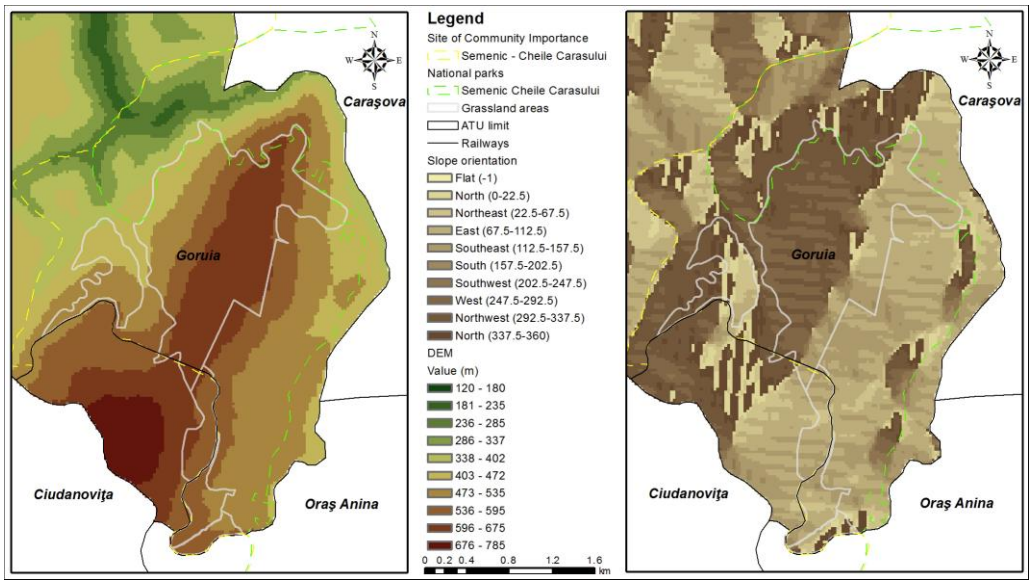

Fig.2. Geomorphological features of the Natura 2000 Site 2000 ROSCI0226 Semenic – Cheile Caraşului (processed after http://www.eea.europa.eu/data-and-maps/data/eu-dem, http://www.mmediu.ro/articol/date-gis/434, www.geospatial.org)

In the studied area, the analyzed grassland types fall into hills and high plateaus, in the nemoral area or floor, the sub-area of the holm, the passage towards the beech, the oak sub-area, the floor of the sky, being the result of the variation of the thermal, hydric and trophic factors.

Besides the natural factors, the human interventions have an important role in

differentiating the types of grasslands through the technological measures applied to the grassland surfaces, in the sense that the management of a permanent grassland area influences the direction of evolution of the floristic structure and its vegetation dynamics.

The diversity of these ecological conditions and the variability of the ecological factors in the studied area have determined the existence of several types of well-rounded and edifying permanent grasslands:

- Grasslands of *Agrostis tenuis-Festuca rupicola*, installed on mezoxerophilic biotopes;
- Grasslands of *Festuca rupicola-Brachypodium pinnatum*, especially on degraded slopes;
- Grasslands of *Botriochloa ischaemum*, on stepped and degraded slopes;
- Grasslands of *Chrysopogon gryllus-Agrostis tenuis*, on subtermophile biotopes;
- Grasslands of *Agrostis tenuis-Poa pratensis*, on mesophile biotopes;
- Grasslands of *Calamagrostis epigejos-Alopecurus pratensis*, in biotopes with excessive humidity.

On the site of Gîrlişte village, within the Natura 2000 site, depending on the natural capacity of the grassland production, the following types are distinguished:

- medium-productive hilly pastures, mesophile, with a mediocre to good fodder, where *Lolium perenne, Cynosurus cristatus* and different clover species predominate;
- less productive, mezo-xerophilous hilly pastures with a low to moderate fodder value, predominantly with *Festuca valesiaca*, *Botriochloa ischaemum*, crested species and other dried fescue;
- productive, mezotermophile medium hill grasslands with a medium-sized fodder, dominated by *Agrostis tenuis*, *Festuca* sp.;
- less productive hay grasslands, mezoxerophilous-xerophilus, of a low fodder value, dominated by *Chrysopogon gryllus, Danthonia sp.*, dry places fescue.

In relation to the dominant grasslands types, other subtypes, facies or groups of mesophilic and mezoxerophilic or mesohigrophilic species are distinguished.

The identification of the types of grasslands was based on several criteria: floristic composition; static conditions; the productivity of grasslands; technological measures; evolution of vegetation.

Along with the dominant grasslands, grassland and shrubbery habitats of community interest are also presented, as mentioned above, having a conservative value and protection status at national and community level.

Most of the grasslands taken under study are used both as grassland and as grasslands, or are used mixed, a system in which grazing with mowing alternates.

From the floral reveals, there is a floristic diversity that totalizes over one hundred species of plants, among which there is a nucleus of mesophilous species, which adds with abundance-dominance and constancy to different species that ecologically form local sub-associations and facies. The dominant species identified are: *Agrostis tenuis, Festuca rupicola, Chrysopogon gryllus, Botrichloa ischaemum, Calamagrostis epigejos, Cynosurus cristatus, Brachypodium pinnatum.*

In conditions of more pronounced aridation, the associations are made up of mezoxerophilic or xerophilic vegetation (*Chrysopogon gryllus, Botriochloa ischaemum, Festuca valesiaca*, etc.) built by several sub-associations, and on smaller portions also mesophilic associations of *Lolium perenne, Trifolium repens Poa pratensis* or mesohigrophiles erected by *Calamagrostis epigejos*.

In the analyzed areas, the vegetation is dominated by perennial grasses, alongside with the legumes with a lower percentage of participation and ultimately the species from other

botanical families, with a general coverage of 90 to 100%. The grazing physiognomy generally corresponds to a uniform graminee carpet over which the arbusic vegetation represented by *Rosa canina, Prunus spinosa, Rubus caesius, Crataegus monogyna*, spread in clusters or isolated individuals with varying coverage ranging from 5% to 10%.

The improvement works we propose for grassland areas that are not protected by community interest are the following: on high slopes, clusters of shrubs or trees are left on the pastures to fix the soil better and prevent erosion and landslides; mowers for cleaning vegetable residues not consumed by animals will be made; Removal of arbustive vegetation from the useful pasture surface; provide a source of water for animal welfare and roast the portion around the trough and the watering places so as to prevent the wilting; stopping fern extension; traditional use of manure to the equivalent of up to 40 kg nitrogen active substance / hectare; on surfaces with slopes higher than 20%, organic fertilizers will be applied once every 3-4 years by hand spreading; fertilization by animal penning once every 3-4 years. The duration of the harvest will be a maximum of 3 days. It is recommended to carry out sowing schemes covering the whole surface that can be fertilized by sowing in cycles of five years; the grazing capacity will be respected by assigning the optimum number of animals to the pasture and the grazing period imposed by the pastoral arrangements will be respected; avoid overpopulation and overlapping; overgrazing of grasslands will be done only with native species; the grazing capacity will be respected by assigning the optimum number of animals to the pasture and the grazing period imposed by the pastoral arrangements will be respected; avoid overgrazing and undergrazing; overseeding of grasslands will be done only with native species.

CONCLUSIONS

The analyzed grasslands overlap Natura 2000 ROSCI0226 Semenic - Cheile Caraşului site, which implies certain restrictions and obligations for users, but all of them can benefit in one way or another from the existence of the protected area, in the context of sustainable rural development associated with the conservation of some species and habitats, promoting the natural value of the site and generating income from ecotourism, labeling and selling organic products in the region such as cheese, sweet cheese and honey, as well as obtaining subsidies or compensations.

The presence of some habitats in Natura 2000 sites may also be due to the way pastures or grasslands are managed for hundreds of years.

The conservation measures proposed in the paper aim to protect natural resources, in the context of economic development that loses sight of the fact that there is no natural resource development and improvement works have been proposed with the aim of restoring and increasing the qualitative value of the more or less degraded grassland in the analyzed area.

ACKNOWLEDGEMENTS

The paper was financed by the Service Contract no. 6519 / 03.10.2015, "Consulting services for the elaboration of a pastoral arrangement for the grassland of Goruia, Caraş-Severin County".

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