SETTING CONSERVATION MEASURES FOR HABITATS WITHIN THE SITE OF COMMUNITY IMPORTANCE ROSCI0031 – A HARD EFFORT TO ACCOMMODATE ECONOMIC INTERESTS TO ECOLOGICAL REQUIREMENTS FOR AN EFFECTIVE CONSERVATION

Alma-Lioara NICOLIN, G.-G. ARSENE*, Ilinca-Merima IMBREA, F. V. PRUNAR, I. BĂNĂȚEAN-DUNEA, Alina Georgeta NEACȘU, Silvia PRUNAR

Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" – Timișoara;
*Corresponding author:**botanix.timagro@gmail.com***

Abstract. *The site of community importance Nera Gorges-Beușnița (ROSCI0031) covers 37.719 ha within the county of Caraș-Severin, a Romanian region defined by a noticeable biodiversity (Anina Mountains). In spite of its relatively low altitude (max. 1.162 m), the site is diverse by its abiotic conditions and biogeographic influences. This site is at the same time a national park (the territory of the park do not encompasses the course of the Nera river downstream Sasca village). Habitat forests covers the majority of the national park area, with as the main owner the Romanian state, and administrator - the National Forestry Régie – Romsilva. The administration of the Nera Gorges-Beușnița National Park (NG-BNP) came into service in 2004, but repeated delays (national law system deficiencies) in having a management plan as well as the lack of technical forestry norms in protected areas (ABRAN, 2012) resulted in a treatment of forests inside the NG-BNP mainly as production ones. Because of a Sectoral Operational Programme – Environment (SOP-Env) project, we have mapped (2012-2015) the main habitats and recorded the pressures and threats to habitats. When the main impact affecting and threatening forest habitats (e.g. 9110, 9130, 91Y0, 91K0, 91M0), is the unappropriated system of forest exploitation, there is a need in changing sylvo-cultural practices. In terms of meadows conservation, the imbalanced use (overgrazing in some meadows, abandon of pastoral use on a significant part of meadows) constitutes the main impact on meadow habitats (6110*, 6210*, 6190, 6240*); giving the orchid diversity, we set in same situations more restrictive measures than those established under Agri-Environmental Schemes (AES). Riverine and water habitats (3220, 3260, 6430, 7220*) are under various anthropic pressures in the lower part of Nera river. Shrubs and rocky habitats (40A0*, 5130, 8160*, 8210) are in a relative good conservation status. We set conservation measures for habitats taking into consideration: the reports and recommendations made by other experts working in the same SOP-Env grant, the European Commission guidance documents and notes under the Art. 6.1, IUCN (DUDLEY, 2008) and WWF recommendations for protected areas management, the measures from some Prioritized Action Frameworks = PAFs (e.g. Hungarian PAF), Romanian documents (scientific papers, recommendations for forest management - Forestry Code, High Conservation Values Forests network, etc., AES proposals for 2014-2020), and various scientific references (BASTIAN, 2013; BATTISTI & FANELLI, 2015; KONING et al. (2014); VELÁZQUEZ et al., 2010; ZEHETMAIR et al. (2015) etc.). No matter the foundation and the accuracy of conservation measures we proposed, there is an urgent need to convince local authorities, entrepreneurs, farmers, stakeholders, all inhabitants about the high value of the site and the development opportunities offered by the sustainable use of its resources. Accepting and embracing the management measures to be included in the first Management Plan of the Cheile Nerei-Beușnița National Park is the key of preserving this consistent sample of Romanian still wild nature.*

Key-words: *Natura 2000, Cheile Nerei-Beușnița, National Park, conservation objectives, conservation measures, habitats.*

INTRODUCTION

Under the Communist rule and until 1990, nature conservation in Romania consisted in establishing protected area regimes (scientific and nature reserves of botanical, zoological,

paleontological, and mixed type – categories I and IV IUCN, nature monuments – particularly the category III IUCN) with no national strategy, custodians/administrators, or action plans. Practically, it was only in 2004 that they established most administrations of national and natural parks. Until Romania's accession to the EU on January 1, 2007, the management of these parks was based on environmental legislation that did not contain enough references to national parks and their biodiversity management. The Ministry of Environment trusted through contract, in 2004, the administration of natural and national parks to the National Forestry Régie – Romsilva; one of the stipulations of the contract was that park administrations directly subordinated to Romsilva and made up mostly of forestry trained personnel to develop management plans within two years (in 2006). The 2004 Commission of the European Communities Report[1] recommended, among others, that Romania enhance the administrative capacity in the field of nature conservation as a pre-requisite for the Natura 2000 network implementation; another report, the one from 2006[2], mentions the delay in compilating the list of Natura 2000 sites and the tight schedule for public consultations prior to designating the sites. For different reasons, among which the ongoing legislation changes and the need to change plan content (which involved the replay of the procedures – public consultation, licensing and approvals), these management plans have not yet been approved (except for a few national and natural parks). Even after Romania's admission to the EU, there have been delays in the fulfilment of obligations regarding the Natura 2000 network stipulated in the pre-accession and accession treaties (MAREŞ *et al*., 2012; STĂNCIOIU *et al*., 2010).

Most management decisions regarding national and natural parks have been made by park managers with the approval of scientific councils (made up of scientists and representatives of county and national administrative structures) and of a consultative council (made up of stakeholders and representatives of local administrations). During this entire period, there was no management plan as main tools adapted to each national or natural park. With the establishment of the network Natura 2000, Romanian national parks were included in Natura 2000 sites thus acquiring the status of Sites of Community Importance (SCI) and of Special Protection Areas (SPA); in the case of NG-BNP, they established ROSCI0031 Nera Gorges – Beuşniţa and ROSPA0020 Nera Gorges – Beuşniţa, both with larger areas than that of the national park. Likewise, in 2007, there came into force the Government Emergency Ordinance no. 57/2007 (GEO 57/2007) adopted subsequently by the Law no. 49/2011. The GEO 57/2007 is a first rate act for nature conservation in national and natural parks because it defines the types of areas a park can be divided into and, implicitly, the major features of a differentiated management; thus, for national parks, this act (adopted with minor changes as a law in 2011), defines gradually, from the most restrictive to the most permissive:

- *strictly protection zone* (SPZ - highly genuine ecosystems, with no or little anthropic influence, where only the research, education and eco-turism activities are permited);
- *integrally protection zone* (IPZ - zone dedicated mainly to conservation, but extensive and traditional use of natural resources is permited; interventions on forests are allowed only in special cases);
- *sustainable conservation zone* (SCZ – a less restrictive zone than the IPZ, especially for forestry activities);
- *sustainable development zone of human activities* (SDZHA – areas with anthropic

[1] *** 2004 - *2004 Regular Report on Romania's progress towards accession*, {COM(2004)657 final}, Commission of the European Communities, Brussels, 6.10.2004, SEC(2004) 1200, pp. 118, 119, at: http://ec.europa.eu/neighbourhood-enlargement/sites/near/files/archives/pdf/key_documents/2004/rr_ro_2004_en.pdf

[2] *** 2006 - *Monitoring report on the state of preparedness for EU membership of Bulgaria and Romania (Communication from the Commission)*, Commission of the European Communities, Brussels, 26.9.2006, COM(2006) 549 final, p. 50, at: http://ec.europa.eu/neighbourhood-enlargement/sites/near/files/pdf/key_documents/2006/sept/report_bg_ro_2006_en.pdf

facilities as villages, farms etc.).

The types of zones are defined differently from country to country[3] , but the Romanian typology of internal zoning of national and natural parks could engender confusion: integral conservation is more permissive than the strict one, sustainable conservation is aimed at outside core-zones, etc.

Since, until the start of SOP-Env (2012) in Romania, NG-BNP had no management plan, the development of such a plan with the *Axis 4 - Implementation of adequate management systems for nature protection* was considered opportune despite the difficulties of implementing such programmes for the first time in Romania (DAN *et al*.). The delays in approving parks' management strategies in Romania are considered by ERDELI & DINCĂ (2011) as a threat to "the sensitive protected resources making them vulnerable to human actions". Thus, a team of researchers, mainly from the Banat's University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timișoara, in partnership with NG-BNP Administration, started the project *Developing the management plan of the Nera Gorges-Beuşniţa National Park (ROSCI0031 and ROSPA0020 Nera Gorges-Beuşniţa)* (*=Elaborarea planului de management al Parcului Naţional Cheile Nerei-Beuşniţa (ROSCI 0031 şi ROSPA 0020 Cheile Nerei-Beuşniţa*). We present below the work style of the team of experts on habitats in the establishment of management measures and the results of this activity (objectives and measures).

MATERIAL AND METHODS

Starting with 2012, the experts of the project SOP-Env, code SMIS 36394, have worked aiming, as far as habitats were concerned:

- inventorying and mapping the habitats Natura 2000 within NG-BNP;
- identifying and mapping the impacts (current pressures ad future threats) on habitats, as well as the areas impacted or susceptible to be impacted;
- assessing conservation status (favourable, unfavourable-inadequate, or unfavourable-bad);
- suggesting management measures that maintain or improve the habitat conservation status.

Identifying habitats in the field relied mainly on recent Romanian phyto-sociological references such as COLDEA *et al*. (1997, 2012); SANDA *et al*. (2008), the Interpretation Manual of European Union Habitats - EUR27, Romanian Manual for Habitats Interpretation (Gafta & Mounford, 2008), the description of habitats from Romania (DONIȚĂ *et al*., 2005, 2006), BUNCE *et al*. (2012). BIȚĂ-NICOLAE (2011) points to discrepancies between the Romanian system of classifying habitats (Doniță *et al*., 2005, 2006) and the *Romanian Manual for Habitats Interpretation* (GAFTA & MOUNTFORD, 2008), which can cause difficulties of interpretation in some cases.

The field was crossed along transects, making vegetation relevés and developing lists of species; results extrapolation and limits establishment were done by corroborating photo-interpretation (satellite images and field photos) with data from forestry management plans. Some interpretation aspects have been taken over from scientific publications (e.g., MARINŠEK *et al*., 2013).

The conservation status of the habitats was assessed according to:

[3] *** 2014 - *Analyse des modes de gestion forestière dans les parcs nationaux. Etude comparative à l'échelle européenne*. IUCN – Commité Français, Programme aires protégées – Efficacité de la gestion, 64 p. at: http://www.uicn.fr/IMG/pdf/UICN_France_-_Gestion_forestiere_dans_les_parcs_nationaux.pdf

- the guide SINCRON[4], developed for Romania as a result of the programme *Integrated management and awareness system in Romania of NATURA 2000*, carried out by the National Environmental Protection Agency;
- the European Commission explanatory notes and guidelines to the Article 17 in the Habitats Directive[5];
- other guides and publications (e.g., COMBROUX & SCHWOERER, 2007; MOUNTFORD *et al*., 2008).

The conservation status of habitats of Community interest was estimated at the level of the site.

In the case of forest habitats, the experts took into account the age of the forest (age map compiled from the information supplied by forestry management plans) and the amount of dead wood as defining criteria of the conservation status. For the other types of habitats, the most important criteria have been floristic composition and quantitative share of characteristic species. Experts took into account that non-intervention management cannot be prescribed in the cases of habitats linked to traditional land-uses (e.g. hay meadows, pastures).

In all habitats, a major factor in assessing conservation status was impact intensity. FICHTNER *et al*. (2012) show the importance of old trees in beech forests from the perspective of maintaining high biodiversity. Though, at present, certain forest areas are no longer significantly impacted, younger forests have visibly a lower ability of fulfilling all ecosystem functions, particularly as far as feed supply, shelter, and reproduction conditions for numerous characteristic species are concerned.

The list of impacts is the result of the observation of anthropic influences in the field, of the talks with the park administration staff and with the stakeholders. The codes for impacts are in accordance with Natura 2000 EIONET List of threats and pressures[6]. Judging the magnitude of future human impacts (threats) implies a certain degree of uncertainty based, according to OPDAM *et al*. (2009), on three factors: ignorance (inadequate understanding), unpredictability of ecological system behaviour and ambiguity in the science-policy interface. A general picture of the negative impacts on the main forest habitats in Romania is presented by LAZĂR *et al*. (2007).

In setting the conservation objectives and conservation measures, we used mainly the two European Commission's notes (2012, 2013), as well as SINCRON guidance lines and Romanian (2012) and Hungarian (2013) Prioritised Actions Frameworks (PAFs), the guidelines and best practice examples presented on the Natura 2000 portal[7], and other references (e.g. TUCKER *et al*., 2008; STĂNCIOIU *et al*., 2008). In interpreting, assessing the conservation status and establishing the directions and management measures for some habitats (e.g. 6210*, 9110), we used the specific EC publications (e.g. CALACIURA & SPINELLI, 2008; THAURONT & STALLEGGER, 2008).

The typology and hierarchy of conservation actions and conditions we use is: goals > objectives > measures. An example of goal common to all Natura 2000 sites is achieving and maintaining the FCS (Favourable Conservation Status), in spite of recognized defaults of the FCS as a major conceptual tool (MEHTÄLÄ & VUORISALO, 2007). Management goals provide targets and describe desired states, and are declined in management objectives, wich are "*clear description of a measurable standard, desired state, threshold value, amount of change, or*

[4] www.anpm.ro/ro/proiect-sincron/

[5] *** 2006 – *Assessment, Monitoring and Reporting under Article 17 of the Habitats Directive; Explanatory Notes & Guidelines*, European Commission, Final draft, 64 p.

[6] http://bd.eionet.europa.eu/activities/Natura_2000/Folder_Reference_Portal/Ref_threats_pressures_FINAL_20110330.xls

[7] http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm, http://ec.europa.eu/environment/nature/natura2000/management/best_practice_en.htm

trend that you are striving to achieve for a particular population or habitat characteristic; it may (ideally) also set a limit on the extent of an undesirable change[8]". Conservation measures are mechanisms and actions to be put in place with the aim of achieving the site's conservation objectives. Within Natura 2000 conservation frame, measures are linked to ecological requirements of significant habitats and species[9].

As main principles / goals in setting conservation measures, we set:

- ensuring the framework for adaptive management and flexibility in the measure's implementation (FLEURY *et al*., 2015); an example of need for flexibility is given by ERDELI & DINCĂ (2011): the development of tourism (rural, cultural) and ecotourism in Romanian protected areas and neighbourhood, based on natural attractions, but in zones with communities in economic decline in other sectors (industry) secondly, is an aspect with potential for conflicts and growing negative impacts;
- ensuring the framework for the continuation of traditional activities in the national park;
- ensuring inner connectivity and connectivity with neighbouring Natura 2000 sites;
- fulfilling ecological requirements of mammal species whose habitats are not strictly superposed over one ecosystem (*sensu* habitat Natura 2000). Conservation measures for protecting the horseshoe bat, for example, should be undertaken knowing that this species is sensitive to negative impacts on a circular area defined by a ray of 2.5 km around the nursery roost (REITER *et al*., 2013); preservation of other chiroptera species requires also a landscape-scale approach (e.g., PESTE *et al*., 2015). Plant communities, especially xeric grasslands, may be significantly influenced by neighbouring habitats trough effects on species pool and dispersal limitations, though the conservation measures should be differentiated accordingly (JANIŠOVÁ *et al*., 2013). The rural mosaic of habitats supports a bigger diversity in passerine bird communities (ZAKKAK *et al*., 2014). Consider the entire landscape mosaic when building conservation schemes is strongly recommended (e.g. LOOS *et al*., 2015), although the capacity for the assessment and the monitoring of biodiversity at coarser spatial scales in short time periods is still limited (GIORGINI *et al*., 2015). Concerning the Natura 2000 Romanian network, we disagree with the opinion expressed by STĂNCIOIU *et al*. (2010), according to which the administration of protected forests would be better to be assigned to the forestry districts (*ocoale silvice*, in Romanian); the absence, in the staff of forestry districts, of staff trained in nature conservation, the need for coordination of conservation actions, the establishment of administrations of natural and national parks, the allotment of more protected areas for custody are a few arguments against those recommended by STĂNCIOIU *et al*. (2010);
- taking into account as a starting point of conservation measures for the species and habitats that are already part of Agro-Environmental Schemes, water management plans (elaborated under Water Framework Directive), Forestry Code and forestry norms. Integrating all sectoral conservation measures and later removal of possible redundancies should take into account the fact that, according to law, the measures stipulated in the NG-BNP Management Plan prevail;
- taking into account the fact that NG-BNP Administration has already run raising awareness activities for almost 10 years with the stakeholders and has been an interface with the locals and other stakeholders, which is very important in increasing

[8] http://www.landscope.org/focus/plan_projects/goals_objectives/
[9] *** 2014 – *Establishing conservation measures for Natura 2000 Sites*, European Commission, p. 5.

the acceptance of the management plan, given that the negative attitude of local stakeholders and their lack of background conservation knowledge is one of the main factors of Natura 2000 network weakness (KATI *et al*., 2014; KOVÁCS *et al*., 2014);

- adopting a prospective flowing from the precautionary principle.

RESULTS AND DISCUTIONS

Interpreting habitats has been an issue for the experts particularly in the case of forest habitats because of the mixed composition per species and to anthropic interventions in the last decades. Compared to ROSCI0031 standard form[10], that mentions 21 habitats, on the territory of the site of community importance we inventoried and mapped 23 habitats; part of the results have already been published (NICOLIN *et al*., 2014; NICULESCU *et al.*, 2013a, 2013b). Their conservation status at the scale of the entire site, as well as the impacts and their intensity, is presented in Table 1 below.

Table 1.

Habitats indentified and mapped within the site of community importance ROSCI0031 between 2012 and 2015, their conservation status, and the negative impacts upon them.

	Habitat code and name (according to 42/92/CEE)	***Conservation status* within ROSCI 0031***	***Pressures – intensity*****	***Threats – intensity*****
1	3220 - Alpine rivers and the herbaceous vegetation along their banks	FV	C01.01 -S, G01 -S, J02.05 -S	H01.08 -S, G01 -S, C01.07 -S
2	3260 - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	FV	A08 -S, C01.01 -S, E03.01 -S	A08 -S, C01.01 -S, E03.03 -S, G01.01.01 -S, J02.05 -S
3	40A0* - Subcontinental peri-Pannonic scrub	FV	A04.02.05 -S, I01 -S, J01.01 -S, K02.01 -S	A04.02.05 -S, C03.03 -M, I01 -M, J01.01 -S, K02.01 -S.
4	5130 - Juniperus communis formations on heaths or calcareous grasslands	U1	A10.01 -R	A10.01 -M, K02.01 -S
5	6110* - Rupicolous calcareous or basophilic grasslands of the *Alysso-Sedion albi*	FV	G01.04.01 -S	C01.04.01 -S, G01.04.01 -S
6	6190 - Rupicolous pannonic grasslands *(Stipo-Festucetalia pallentis*)	FV	A04.01 -S, K02.01 -S	A03.01 -S, A04.01 -S, A04.03 -S, C03.03 -S, I01 -M, J01.01 -S, K02.01 -S
7	6210 - Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)	U1	A02.03 -S, A03.03 -S, A04.01 -M, A04.03 -S, A10.01 -S, I02 -R	A02.03 -S, A03.03 -S, A04.01 -M, A04.03 -S, A10.01 -S, A10.01 -S, I02 -R, J01.01 -S, K02.01 -S, M01 -S
8	6240* - Sub-pannonic steppic grasslands	U1	A02.03 -S, A03.03 -S, A04.01 -M, A04.03 -S-M, A10.01 -S, I02 -R, J01.01 -S, K02.01 -S	A02.03 -S, A03.03 -S, A04.01 -M, A04.03 -S-M, A10.01 -S, I02 -R, J01.01 -S, K02.021 -S
9	6430 - Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	FV	A04 -S, C01.01 -S, K01.04 -S	A04 -S, C01.01 -S, I01 -S
10	7220* - Petrifying springs with tufa formation (*Cratoneurion*)	FV	A01 -S, C01.01 -S, D02.02. -S, G01 -S, H05.01 -S, J02.06 -S	C01.01 -S, D02.02 -S, G01 -S, H05 -S, J02.06 -S
11	8160* - Medio-European calcareous scree of hill and montane levels	FV	G01 -S, I01 -S	G01 -S, I01 -S
12	8210 - Calcareous rocky slopes with chasmophytic vegetation	FV	B02 -S	C01.04.01 -S, D01 -S, D02 -S, F04 -S, G01.04.01 -S, I01 -S
13	8310 - Caves not open to the public	U1	A04.01.02 -M, B02.01.02 -S,B03 -S, B07 -S, D01.02 -S, E03.01 -S, G01.04.02 -M,	A04.01.02 -S, B07 -S, D01.02 -S, E03.01 -S, G01.04.02 -M, G01.04.03

[10] http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSCI0031

	Habitat code and name (according to 42/92/CEE)	***Conservation status* within ROSCI 0031***	***Pressures – intensity*****	***Threats – intensity*****
			G01.04.03 -S, G01.08 -S, G05.04 -M, G05.07 -M, G05.08 -M, H02.06 -M, H02.07 -S, H05.01 -S, J01.01 -S, K01.01 -S-M, K01.02 -S, K01.04 -S-M), L05 -S, L06 -S, M01.03 -S	-S, G05.04 -M, H02.06 -S, H02.07 -S, K01.01 -S-M, K01.02 -S, K01.04 -S-M, L05 -S, L06 -S, M01.03 -S
14	9110 - *Luzulo-Fagetum* beech forests	U1	B02 -B02.01.01, B02.01.02, B02.04- -S, B07 -M, K02.04 -S	B07 -S, G01 -S
15	9130 - *Asperulo-Fagetum* beech forests	U1	B02.01.02 -M, B07 -M, B02.03 -M, B02.04 -M, B02.06 -M, D01 -M, D02 -S, G01 -S, I01 -S	B02.04 -S, B07 -M, B06 -S, D01 -S, G01 -S, I01 -S
16	9150 - Medio-European limestone beech forests of the *Cephalanthero-Fagion*	U1	B02.04 -M, B07 -M, B06 -S, D01 -S, G01 -S, I01 -S	B02.04 -S, B06 -S, B07 -S, D01 -S, F04 -S, G01 -S, I01 -S, J01.01 -S
17	9180* - *Tilio-Acerion* forests of slopes, screes and ravines	U1	B07 -M, B02.04 -M, G01 -S, I01 -S	B07 -M, B02.04 -M, G01 -S, I01 -S B07 -S, G01 -S, I01 -S, K02 -S, J01 -S
18	91E0* - Alluvial forests with *Alnus glutinosa* and Fraxinus excelsior *(Alno-Padion, Alnion incanae, Salicion albae)*	FV	B07 -S, B02.04 -M, B06 -S, C01.01 -M, E03 -S, G01 -M, I01 -S, J02.06 -S	B02.04 -S, B06 -S, C01.01 -S, E03 -S, G01 -S, I01 -M, J02.06 -S
19	91K0 - Illyrian *Fagus sylvatica* forests (*Aremonio-Fagion*)	FV	B07 -M, B02.04 -M, B06 -S, D01 -S, G01 -S, I01 -S, J03.02 -S	B02.04 -S, B06 -S, G01 -S, I01 -S, J01.01 -S
20	91L0 - Illyrian oak –hornbeam forests (*Erythronio-Carpinion*)	U1	B07 -M, B02.01 -S, B02.03 -M, B02.04 -M, B06 -S, D01 -S, G01 -S, I01 -S, J03.02 -S	B07 -S, B02.04 -M, B06 -S, D01 -S, G01 -S, I01 -S, J01 -S, J03.02 -S
21	91M0 - Pannonian-Balkanic turkey oak-sessile oak forests	U1	B07 -M, B02.01 -S, B02.03 -M, B02.04 -R, B06 -S, D01 -S, G01 -S, I01 -S, J03.02 -S	B07 -S, B02.04 -M, B06 -S, D01 -S, G01 -S, I01 -S, J01 -S, J03.02 -S
22	91V0 - Dacian Beech forests (*Symphyto-Fagion*)	U1	B07 -M, B -B02.01.01, B02.01.02, B02.04- -S	B07 -M, B -B02.01.01, B02.01.02, B02.04- -S, D01.01 -S, G01 -S
23	91Y0 - Dacian oak & hornbeam forests	U1	B07 -M, B02.04 -M, I01 -M	B07 -S, B02.04 -M, D01.01 -S, G01 -S, I01 -S

***** FV = Favourable; U1 = Unfavourable-Inadequate; ****** Codes for impacts according to EIONET List of threats and pressures[11]; S = low (intensity), M = medium (intensity), R = high (intensity).

The management of forests in protected areas is not regulated by specific documents, as emphasised by GIURGIU (2011) and ABRAN (2012). ZEHETMAIR *et al.* (2015) point out the fact that this undifferentiated treatment of the forests in the Natura 2000 sites and outside them is not effective when it comes to conserving forest-dwelling bats in European beech forests of the 9130 type, clearly dominating in NG-BNP. The only differences of management between the forests in protected areas and those outside these areas consists in the application of the zoning established either through the Ministerial Ordinance No. 552/2003, or through management plans on the ground of GEO 57/2007 and L 49/2011 (we need to remind that only national and natural parks are inner zoning protected areas). Thus, in Romania, they have not defined yet, except for the inner areas of natural and national parks, finer instruments for forestry management in protected areas such as woodland key habitats (WKH) and retention patches, used, for example, in Fenoscandia (SVERDRUP-THYGESON *et al.*, 2014). In these conditions, conservation objectives and measures in management plans are, practically, the only instruments of regulation that can ensure effective protection particularly in forest outside strictly and integrally protected zones. The need for specific indications in the management of

[11] http://bd.eionet.europa.eu/activities/Natura_2000/Folder_Reference_Portal/Ref_threats_pressures_FINAL_20110330.xls

forests within Natura 2000 sites is underlined in the Natura 2000 interpretation manual *Natura 2000 and Forests* (European Commission, 2003, p. 27). It is known that unmanaged forest are favourable to species dependent on forest cover continuity, deadwood, and large trees (e.g., PAILLET *et al*., 2010) and can better fulfil their ecological functions, as well as the fact that an uneven age structure is beneficial to zoocenosis specific diversity (e.g., BULLUCK & BUEHLER, 2006, for example of birds community). Often, the thresholds of deadwood corresponding to FCS given in the management plans itself within Natura 2000 beech forests are lower than those considered within conservation science to be necessary in order to conserve typical beech forest biodiversity (WINTER *et al*., 2014). The plans on which forest are managed in Romania, called *forestry management plans* (*amenajamente silvice*, in Romanian), ignore the non-tree species, though ground vegetation (shrubs and herbs) has, for the biodiversity assessment, the same potential relevance as trees (CHIRICI *et al*., 2011). The forest management should introduce minimal perturbations, especially inside protected areas: a better alternative to cut stand by stand, and insure age heterogeneity at the scale of the protected area, appears to be the selective harvest of tree within each stand and promote age heterogeneity at the scale of the stand (e.g., PAFFETTI *et al*., 2012 – research carried out in a beech forest).

Studies carried out between 2012-2015 show that the forests of NG-BNP have the following features:

- forest strands and substrands have, mostly, even age structure because of the way they have been exploited;
- they share few secondary economically important deciduous species and few very important economically deciduous species (e.g., cherry tree);
- they have relatively small populations of saproxylic beetles (*Morimus funereus*, *Rosalia alpina*, *Lucanus cervus*, *Osmoderma eremita* – PRUNAR *et al*., 2013);
- they have been subjected to "gymnospermation" trials (the north and northeast part and sporadically in the rest of the national park). The detrimental character of this kind of forestry practices on biodiversity is shown by FEURDEAN & WILLIS (2008) in the Apuseni Natural Park, an area with comparable conditions;
- except for a few areas, tourism stress is, for the time being, rather low according to ZOTA (2012).

Even if most habitats are included in SPZ and/or IPZ (e.g., 91K0), some forest management apply to them too in force majeure situations stipulated by the law, and in cases of ecological restoration actions.

Meadow habitats in the national park, though covering much smaller areas than forests, are characterised by:

- a particular specific richness, as is the case of many mountain meadows in Romania (AKEROYD & PAGE, 2011), as shown previously by SCHRÖTT (1972 – for the area Nature Reserve Nera Gorges-Beuşniţa), COSTE (1974 – for the southern part of the park), PEIA (1978 – for the eastern part of the park). Thus, almost all meadow areas in NG-BNP meet the requirements (or they can meet them by applying a minimum set of maintenance/restoration works) to be classified as HNVF (High Nature Value Farmland – ANDERSEN, 2003, *in* HALADA *et al*., 2011);
- strands of meadows are generally bordered by hedgerows, which develops microhabitats favourable for Orchidaceous species (specific diversity of wild orchids in the area is remarkable – ARDELEAN *et al*., 2015);
- abandoning the use of large areas, both hay meadows and pastures. In numerous cases, meadow areas that appear on the maps of 1970-1980 are now covered by forests (in the eastern part of NG-BNP, particularly towards the Bozovici Depression).

The abandonment of marginally productive but High Nature Value Farmland is a major process responsible for creating biodiversity-related conflicts (HENLE *et al*., 2008). In Europe, the extensive farming cannot be replaced by conservation measures (requiring financial effort) of species-rich grasslands (BABAI & MOLNÁR, 2014). Changes in grazing regime has the potential to induce significant changes in calcareous grasslands floristic structure and consequently in invertebrate communities' structures (e.g., beetles – WOODCOCK *et al*., 2005);

- intensive exploitation of some meadows (close to localities, in Poiana Roșchii);
- using forest fires to clean, though this method is considered inappropriate to maintain the biodiversity (e.g., MILBERG *et al*., 2014);
- partial inclusion, as areas, under the regime of subsidies by AES (Agro-Environmental Schemes).

With no Natura 2000 or other subsidies for conservation, the subsidies under AES are the only ones in effect, but they are granted on a voluntary basis, while the entire site scale is more appropriated to implement measures flowing from AES (ARPONEN *et al*., 2013).

Riparian habitats have, generally, a favourable conservation status; the most important threat is the extension of invasive species (*Ailanthus altissima*, *Acer negundo*, *Parthenocissus inserta*) along the Nera River, close to the locality Sasca Română, and less along the Miniș River (second in size within the NG-BNP). Downstream Nera River (an area that is no longer part of the national park), anthropic impact increases because of illegal cutting of the trees that make up riparian habitats and because of agricultural activities (crossing the river with agricultural equipment, rinsing agricultural machines in the river water, contaminating the river water with pesticides leaked from the slopes around).

Scrub habitats, except for the areas of the habitat 5130 (*Juniperus communis* formations on heaths or calcareous grasslands) on the Zăbăl Hill (that have been deforested in the previous years), have a favourable conservation status; thus, the dominating habitat 40A0* (Subcontinental peri-Pannonic scrub) covers large areas in the areas of calcareous steeps and are subjected only to low intensity pressure, in general (higher pressures in patches situated in the villages vicinities). In this case, there is a need for anthropic influences prevention measures.

There have been different pressures on *Cave habitat not open to the public* (8310) (the widest range of negative impacts of all habitats). Many impacts are indirect and they derive from the karst area sensitivity.

Experts on habitats have structured management measures subjected to public debate with the stakeholders given the similar type and intensity impacts:

- measures for the conservation and management of forest habitats (9110, 9130, 9150, 9180*, 91E0*, 91K0, 91L0, 91M0, 91V0, 91Y0);
- measures for the conservation and management of meadow habitats (6110*, 6190, 6210*, 6240*);
- measures for the conservation and management of underwood and rock habitats (40A0*, 5130, 8160*, 8210);
- measures for the conservation of riparian habitats (3220, 3260, 6430, 7220*);
- measures for the conservation of habitat 8310.

According to the SINCRON model, conserving diversity and national park management have been suggested as conservation measures intended for reaching specific conservation objectives that in their turn, were grouped into general conservation objectives. The hierarchical relationships between them are shown in table 2 below.

Table 2.

General and specific objectives of biodiversity conservation and management of Nera Gorges-Beușnița National Park.

General conservation objectives	***Specific conservation objectives***	***Conservation measures specifically addressed to habitats (direct actions)***	***Conservation measures indirectly addressed to habitats (indirect actions)***
Diversity conservation and management – species, habitats, landscape, ecological restoration	Maintaining the major features of the landscape	Yes	Yes
	Maintaining a favourable conservation status and improving conservation status of species and habitats in a state of unfavourable-inadequate or unfavourable-bad conservation status	Yes	-
	Ecological restoration	Yes	-
Fine/detailed species and habitats census, survey and monitoring	Continuing and detailing ecological research on conservative importance species	-	Yes
	Monitoring habitats and their conservation status	-	Yes
	Monitoring the efficacy of biodiversity management measures	-	Yes
	Carrying out volunteer and scientific research activities	-	Yes
Administration of National Park	Maintaining, developing and modernising the infrastructure/facilities available for the administration	-	Yes
	Improving personnel and volunteer infrastructure	-	Yes
	Enhancing the administration/management activities efficiency	-	Yes
Communication, ecological education, raising awareness	Carrying out raising awareness activities with stakeholders and public	-	Yes
	Carrying out communication, ecological education, and raising awareness activities in virtual media	-	Yes
Natural resources sustainable use	Harmonising forestry activities and conservation objectives	Yes	-
	Harmonising agricultural activities and conservation objectives	Yes	-
	Rational exploitation of mineral resources	Yes	-
	Limiting and controlling pollution	-	Yes
Organizing touristic activities compatible with nature conservation	Maintaining and developing tourism facilities depending on the NG-BNP Administration	-	Yes
	Supporting tourism activities	-	Yes
	Monitoring the visitor flow and tourism activities in protected areas	-	Yes
	Encouraging ecotourism	-	Yes

Each conservation measure received a priority degree, on an SINCRON conventional scale from "1" (high priority measure) to "3" (desirable measure, but to be applied if enough resources remains after applying 1st and 2nd priority degree measures). Each measure established by the expert team was assigned an indicator to make the implementation result measurable and reportable.

In the case of forest habitats, GEO no. 57/2007 and L. no. 49/2011 define the general forest management depending on zoning; these legislative documents contain mainly references to interdictions of public access and anthropic activities as well as types of forestry exploitations admitted. Starting from this general framework, each developer of management

plans establishes conservation objectives and measures dictated by each protected area. In the case of the 10 forest habitats (including the habitat 91E0*, which is also a riparian habitat), of which the largest areas are covered by forests of the type 9130, conservation measures consist in interdictions (non-intervention) and limitations of certain exploitation actions given the intervention degree in the last decades and the current conservation status – in general, unfavourable-inadequate. The main difficulty in the case of the forest in the national park, where exploitation is allowed (the sustainable conservation area), there is lack of forestry exploitation norms for the forests of protected areas; we remind that forestry exploitation in Romania is done based on technical norms assimilated to laws. Thus, the project team suggested the following measures:

- guiding the forest to build up a structure per tree species with as many tree species characteristic for the habitat as possible;
- developing an uneven age structure on each exploited stands: passing from stand by stand exploitation to tree by tree exploitation (gardened wood regime = *codru grădinărit*, in Romanian) is the measure ensuring the success of forest conservation on certain areas of the national park;
- avoiding the lowering of tree layer consistency below 75% per exploitation;
- resuming tree cutting on the same stand / parcel after at least 10 years (minimum interval between successive cuttings);
- maintaining at least 5 tall dead trees per ha on exploited stands / parcel;
- decommissioning exploitation roads after exploitation was done;
- excluding from exploitation the forests of the 91E0* type, even when the trees are 20 m far from the limit of the minor bed of a river (legal requirement in force in Romania);
- limiting dramatically tree exploitation in areas representing surface projections of caves included in habitat 8310;
- maintaining senescence islands on exploited parcels;
- defending the removal of dead wood from exploited parcels;
- carrying out prevention and control actions of illegal tree cutting;
- establishing an agenda of reduction of coniferous plantations area.

The measures for the conservation of meadow habitats consist mainly in:

- maintaining exploitation through grazing by livestock adapted to habitat type (between 0.3 LU(Livestock Unit)/ha and 0.7 LU/ha);
- defending or limiting (depending on the case) vegetation fires;
- defending fertilisation in areas with large populations of Orchidaceous;
- encouraging farmers to apply for admission to AES.

To maintain and improve the conservation status of areas with riparian habitats, we suggest:

- defending the exploitation of travertine (habitat 7220*);
- limiting the exploitation of sand and gravel from riverbeds;
- monitoring the values of water physical and chemical parameters;
- controlling fertilisation on the areas in the close vicinity of watercourses;
- limiting the period of hydro-ameliorative interventions in riverbeds to avoid overlapping with spawning.

The measures for the protection and conservation of scrub and rocky habitats consist in:

- excluding rocky habitat areas from commercial stone exploitation (defending quarry establishment);

- eliminating invasive plant populations;
- establishing on a yearly basis by the NG-BNP administration of tourism activity regime in the park;
- controlling and preventing vegetation fires.

Conserving and improving conservation status of the habitat 8310 shall be done by applying mainly limiting measures of agricultural and forestry activities in the karst area:

- limiting grazing livestock load per ha;
- using sinkholes as haymaking fields (not as pastures) and avoiding using organic fertilisers on these areas;
- limiting tree-cutting areas to 0.25 ha in hydric protection areas (karst areas supplying most infiltration waters);
- defending forestry exploitation on slopes above 25°.

Common suggested measures are:

- eliminating/limiting invasive plant species populations;
- limiting natives and tourists' access during certain periods and in certain areas;
- monitoring (invasive plant populations, impacted areas, species structures, efficacy of conservation measures);
- defending the implementing of industrial facilities (e.g., wind mills) and transport infrastructure elements;
- implementing a programme for the collection of wastes all over the NG-BNP.

CONCLUSIONS

1. NG-BNP hosts a wide variety of habitats and intermediary phytocoenoses.
2. Prior to public consultation with the stakeholders, we reached the conclusion that the best way of presenting management measures is to group them per habitat type.
3. The main impacts on forest habitats are of the B type (caused by the exploitation of the forest and that is still stipulated in forestry management documents); meadow habitats may continue to be impacted negatively because of uneven exploitation (over-exploited and under-exploited areas with succession towards woody vegetation); riparian habitats are affected by the proliferation of invasive plants and mainly by future economic development (tourism, water intakes, etc.); rocky and scrub habitats (except for 5130) are in a favourable conservation status. Habitat 8310 has been often impacted both underground and at surface.
4. Management measures subjected to consultation are mainly restrictions.
5. Prior to public consultation proper, we suggested inner zoning of the NG-BNP and part of the management measures were presented to the Scientific Council of the NG-BNP and to the Administration of the NG-BNP, as well as in virtual media. The response to our management measure suggestions prior to public consultation came almost exclusively from the National Forestry Régie – Romsilva, partially extremely critical and resentful. Reaching the societal consensus on the necessity for conservation (e.g., HOCHKIRCH *et al*., 2012) seems to be, in our case yet from this phase, a hard task. We appreciate that in the NG-BNP case, the pressure for commercial use of natural resources are growing, as JONES-WALTERS & ČIVIĆ (2013) predict for the protected areas in all Europe.
6. The existence of a forest management guide for protected areas and of proper forestry norms could have made easier the mission of the experts working on the management plan and, at the same time, would have contributed to avoiding the difficulties the foresters are confronted with: they are still compelled by the current Forestry Code

and current technical regulations to focus more on exploitation and less on conservation. A first contact of the expert team with NG-BNP Administration and with representatives of the National Forestry Régie shows that they consider main instruments of conservation and management general legal instruments at national level (GEO 57/2007, L. 49/2011, etc.), not the specific ones resulted from the actual condition of the national park.

7. It seems that the conservation of the NG-BNP is one of the cases where, besides scientific applied ecology-based conservation, "[...] it would be far more constructive to focus on the battle to win the hearts and minds of those currently outside the conservation tent" (MARVIER, 2014). During the implementation of the management plan, there is a need to evaluate economically the biodiversity, within the sustainable conservation zone especially, and to estimate the quantum of ecosystem services so that the future management plan can rely more on the stakeholders; a multi-level evaluation of conservation efforts, in terms of processes, social outcomes and biodiversity outcomes is essential (MAES *et al*., 2012; YOUNG *et al*.; 2013, BASTIAN, 2013). To involve the stakeholders in the participative processes requires a higher level of commitment from the part of the NG-BNP Administration staff.

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