SAPROXYLIC NATURA 2000 BEETLES IN THE NERA GORGES-BEUŞNIŢA NATIONAL PARK

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Abstract: *The current paper is dedicated only to saproxylic Coleoptera from Nera Gorges-Beuşniţa National Park. During 2012, by monthly observations in transects conducted from May to September we have identified areas with species of interest, their threats, risk factors and population abundance. This is the first record in the Nera Gorges-Beuşniţa National Park area of the Natura 2000 priority species of Osmoderma eremita Scopoli, 1763. The favourable habitats of this species require an increasing attention. Among the species studied, the specific abundance is highest for Lucanus cervus Linnaeus, 1758 for which were observed in May 19 specimens. The Morimus funereus Mulsant, 1863 species was found with a small number of individuals from May to August and in September was found only Morimus asper. The rarest species after Osmoderma eremita Scopoli, 1763 is Rosalia alpina Linnaeus, 1758 of which were found only three individuals. Conservation management of these species should prohibit removal of dead wood, trunks storage near habitats, the replacing of deciduous forest with conifers, felling of the isolated trees, changing the traditional way of land use, mainly cessation of the grazing in forest clearings. Saproxylic are the insects associated with dead wood or with the fungi and microorganisms that decompose it (SPEIGHT 1989). The saproxylic species are rare and have an insufficient known ecology due to their specific development and limited movement of adults. Some of them are very popular and even emblematic species (flagship species). All are very sensitive to forest exploitation and habitat fragmentation. At least during their development, the saproxylic beetles use dead or dying trees, most of the species preferring the sunny sides of wood. The long development cycle of 2-5 years increases the risk to death of offspring by the deadwood removal from the natural habitats. Many saproxylic species are indicators of forest habitat continuity (GROVE 1999). To develop sustainable strategies for inventory, monitoring and protection of the populations it is imperative a good knowledge of the biology of the species including specifics caused by climatic and geographical differences. The study area is part of Nera Gorges-Beuşniţa National Park, one of the most important protected areas in Caraş-Severin County in terms of settlement and covered area. Studies done so far in the Nera Gorges-Beuşniţa National Park are sporadic or focused only on small groups of wildlife. The literature on the U.E. Community interest beetles from this geographic area is almost absent.*

Key words: *Natura 2000, saproxylic beetles, threats, conservation, inventory*

INTRODUCTION

Nature protection in Romania

Despite natural its importance, Nera Gorges-Beuşniţa National Park has attracted over time only a few scientists (Bănărescu P. -fish, Konig F.- butterflies, Grossu A.V., Botoşăneanu L., Sîrbu I., Sârbu M.-malacofauna, Pârvulescu L.- crayfish, Dumbravă-Dodoacă M.- caddisfly, Efenoiu C.C.-mayfly) [BĂNĂRESCU *et al.* 1971, 2002, BALACI 1997, GROSSU 1955, BĂTĂŞĂNEANU *et al.* 1976, 1969, SÎRBU *et al.* 1998, 2010, PÂRVULESCU 2009,

PÂRVULESCU *et al.* 2010, DUMBRAVĂ-DODOACĂ *et al.* 2010, EFENOIU *et al.* 2011] literature citations being poor.

During communist period (1945-1989) the industrial developments with adverse environmental impacts have tended to concentrate around urban centres. Concomitantly, many rural areas were doomed to extinction. Due to this politics, the natural habitats located in areas with low agricultural value benefited from the natural conservation point of view. Excepting the developments in energy production, network transmission lines, forestry exploitations and tourism networks which affected certain areas of natural conservation interest, in Romania the natural environment has not undergone great changes. Thus, Romania is a country from the edge of Europe with the highest population of large carnivores and the largest areas of virgin forests in European Union. After 1990, the exploitations of the natural resources and the anthropogenic developments were made only in the interest of investors. The massive damages brought to the natural areas decreased after 2007 with enforcement of EU environmental directives and the establishment and operation of the Natura 2000 network in Romania. Unfortunately, the management of protected areas is still difficult and the applicability sometimes impossible in the absence of a national demanding legislation and of a Management Plan prepared based on the individual case of each protected area in part. The European funds available in Romania, among which the most important are POSMediu and LifeNatura programs, can support the protected areas managers to develop strategies for the protection and conservation of natural areas.

This paper presents preliminary observations made during 2012 on to the priority species that belong to *Coleoptera* and will be included in the Management Plan.

Emplacement of studied area

Caraș-Severin County is:

- the third largest county in the country, occupying 3,6% from Romanian territory with a surface of 8.514 $km^{2.}$

- the second county, considering the stretch of protected areas (1761,833 km^2).

Within this county are present:

-one Scientific Reservation cat. I IUCN (Peștera Rasuflatoarei),

-four National Parks cat. II IUCN (Semenic-Cheile Carașului, Cheile Nerei-Beușnița, Domogled-Valea Cernei, Retezat),

-15 Natural Monuments cat. III IUCN

-12 Natural Reservation cat. IV IUCN,

-one Natural Park cat. V IUCN

-nine Sites of Community Importance (SCI)

-nine Special Protection Areas (SPA).

The Nera Gorges-Beuşniţa National Park represents over 20% of all protected areas from Caraș Severin County.

Nature Protection in Nera Gorges-Beuşniţa National Park

The Scientific Reserve Beușnița, is the first protected area within Nera Gorges-Beuşniţa National Park and was declared by Ministers' Council Journal in 1943. The Nera Gorges-Beuşniţa National Park was established in 1990 by Environment Minister Order 7/1990 and actually comprises five areas of Nature Reserves (Nerei-Beușnița Gorges, Ciclovei-Ilidia Valley, Șușarei Gorges, Bigăr Source, Lisovacea, Ducin) and the longest gorges in Romania (25 km).

MATERIAL AND METHODS

This preliminary study was preformed within the Nera Gorges-Beuşniţa National Park, on a monthly basis from May to September 2012 by transects observations. Logs, dead trunks and stumps were examined at a maximum distance of 50 meters on the sides of the trail. The territory is mountainous with an altitude ranging between 90 and 1162 m. that is mostly covered by deciduous forest (83%), transition forest (6%), mixed forest (3%), and only 6% pastures and 2% meadows (Standard Formulary of SCI0031). Along each transect all decaying trees were examined until at 50 m. each side from the transect line.

RESULTS AND DISCUSSIONS

Morimus funereus Mulsant, 1863

Biology

Morimus funereus Mulsant, 1863 is a polyphagous flightless beetle with a distribution area spread from lowland to mountain forests of E and SE Europe. This species can be found from March to September. *M. funereus* is mainly nocturnal with an activity peak between 8 PM and 3 AM. The highest activity period lasts from beginning of May toward the end of June (VREZEC *et al.* 2010). The host plants of this beetle include species of the tree families *Tiliaceae, Fagaceae, Corylaceae, Salicaceae, Fabaceae* and *Pinaceae* . The larval development of this species occurs in diseased trees, stumps or trunks on ground (DOJNOV *et al.* 2012) more frequently in *Quercus* sp., and *Abies alba,* but also seldom in *Fagus sylvatica* and *Picea abies* (VREZEC *et al.* 2010).

Occurrence

Prunar found abundant populations of this species together with *Rosalia alpina* Linnaeus, 1758 in a nearby region within Vrsac Mountains (Serbia). They were located in a sunny deforested area with stumps left on the ground. Within the Nera Gorges-Beuşniţa National Park, during 2012, the beetle was found in 10 stations with no more than one individual per station and with a maximum of three specimens founds per month from May to August. In September, we found one specimen of *Morimus asper* Sulzer, 1776. This beetle species was collected by hand during transect observations, more frequently being observed in open areas with shrubs and mixed deciduous forest.

Conservation status

According to the IUCN, *Morimus funereus* Mulsant, 1863 is considered endangered from 1986 and its red list status was raised to vulnerable since 1996. The most important threat to the species is the low mobility of the insect combined with the continued loss of habitat resources (DOJNOV *et al.* 2012). Due to the inaccessibility and of a rough terrain, a significant part of the Nera Gorges-Beuşniţa National Park includes habitats favourable for this species. However, there are zones where the forestry exploitation may be a threat for this species. *M. funereus*, like other species with development that takes place in dead wood, are depended on extant of fallen or standing dead trunks. This type of wood is usually removed due to forest management.

Rosalia alpina Linnaeus, 1758

Biology

Being a well known and emblematic beetle in many Europeans countries this saproxylic species is much better studied than other species. It prefers sun-exposed wood of dead or alive *Fagus sylvatica* trees, but can also be found on other host species too (CIZEK *et*

al. 2009, MICHALCEWICZ *et al.* 2011, RUSSO *et al.* 2010). The adults have an annual activity from June to August. Their daily activity is between 10 AM and 6 PM with a peak between 12 AM and 2 PM. This species usually flies a distance up to 100 m, but also long-distance flights up to 3000 m were recorded (Lukas D *et al.* 2011). The developing cycle lasts 2-4 years (BENISCH C. 2007-2013)

Occurrence

The adults are difficult to find, in Soutok Game Park (Czech Republic) for example only 1-2 adults are found every year (CIZEK *et al.* 2009). Within Nera Gorges-Beuşniţa National Park we found three individuals, all in beech forest: two specimens near Nera River and one into exploited forest. In mapping and monitoring studies the larval emergence holes can be used. These are oval in shape (6-11 mm long and 4-8 mm. wide) disposed along longitudinal axe of trunk (ALBERTO *et al.* 2012).

Conservation status

The IUCN status of *Rosalia alpina* Linnaeus, 1758 is considered endangered from 1986 and was raised to vulnerable from 1996. According to the Directive 92/43/EEC, *Rosalia alpina* Linnaeus, 1758 is a priority species. The threats are due to its limited mobility, the dispersal range being up to 1 km (GATTER 1997, BENISCH 2013). At a low population density the limited mobility reduces the reproductive rate. The removal of dead wood and the temporary storage of wood at the edge of the forest also decreases the size of populations. The extracted wood attracts the laying females becoming a trap for the new generations. Many studies showed the preference of this species for the trees with high level of sun exposure (Russo 2010). This explains the presence of this species especially in low-density forests or at the edge of forest avoiding shaded microhabitates. The conservation status of this species within studied area is favourable, the major threat being only the forest exploitation with temporary wood storage near forest. Russo et al. 2010 recommends a traditional management form with shredding and sustainable livestock grazing to keep an optimal density of trees and eliminate the lower floor of vegetation.

***Lucanus cervus* Linnaeus, 1758**

Biology

Up to 50% of records of larval developments of this species occur in *Qercus* woods with a specific preference for *Quercus robur.* Other species that can host larvae of this beetle are *Salix ssp., Prunus, ssp., Populus ssp., Tilia ssp., Fraxinus spp., and rarely to the coniferous.* In Bulgaria, *Lucanus cervus* can be found from sea level up to 1700 m (HARVEY 2011 (2)). The life cycle length varies between three to five years (HARVEY 2011(2), PRATT 2000) and five to six years (Habitats Notebooks France) in relation to geographic region. The adult's emergence takes place in late May, but it was reported also earlier in March (SMITH M. 2011) with an one week advance for males (HARVEY D. 2011 (2), SMITH M. 2011). The mature stage occurs during early August, but it was also observed later in the year during early October (PRATT 2000). *L. cervus* has a crepuscular flight during warm evenings, generally in search for a mate. The flight distance is up to 1 km for the females and 3 km for the males (RINK et SINSCH 2007). Imagos feed on fruits and trees exudate. By testing different attractants, (HARVEY 2011(2)) observed that the ginger root is the most successful bait for adults.

Occurrence

By inspection of oak trunks and observation of evening flights we have found favourable habitats with activity of adults in the Southern part of the protected area. Adult's

flight and higher abundance (19 specimens) was observed in June at Stancilova and Miniș. We can confirm the activity of adults from May to September, but the records have yielded a limited number of specimens for the other months than June: one in May and two in each of the other months.

Conservation status

Lucanus cervus Linnaeus, 1758 has not yet been listed in the IUCN Red List. In the Standard Formulary of SCI Cheile Nerei-Beusnita the priority habitats with *Quercus* sp. are estimated only at 1,8 percentage of the surface of SCI area. Some specimens were found on oak trees from isolated meadow. Natural predators for adults are several bird species (*Corvus spp., Pica pica, Falco tinnunculus*) or mammals (*Vulpes vulpes, Sorex aranaeus, Felix ssp*) and for larvae are the mammals *Sus scrofa* and *Meles meles*. Conservation of forest shelter belts, old trees and interdiction of dead wood removal from the natural park can positively influence the *L. cervus* populations.

***Osmoderma eremita* Scopoli, 1763**

Biology

Both larva and adult stages of this species are developing in old trees trunks. Development cycle lasts 2-3 years depending on the temperature and humidity (TAUZIN 2005). Imago emergence takes place in July and they can be found until early September. The flight length of this beetle is quoted to be about 250 m, but by radio tracking techniques a displacement of up to 700 m was recorded in a number of specimens (DUBOIS 2008). It prefers open areas within forest or edges of the woods that can provide old oak sunny trunks with hollows and wood mould rich in nutrients from trees cavities. There are findings of species in beech or exceptionally coniferous trees (RANIUS *et al*. 1997).

Figure 1. *Osmoderma ermenita* (foto Dan STĂNESCU in Nera Gorges-Beuşniţa National Park

Occurrence This is the first record of the species in the Nera Gorges-Beuşniţa National Park. One living individual was found by prof. D. Stănescu and C. Uruci (fig. 1).

Conservation status

According to IUCN, *Osmoderma eremita* Scopoli, 1763 is considered endangered from 1986; its Red List status was raised to vulnerable in 1996 and again lowered to near threaded in 2010. According Directive 92/43/EEC, *Osmoderma eremita* Scopoli, 1763 is a priority species. The natural enemies of the preimaginal stages are *Hymenoptera* and *Acari* parasites or predator *Elateridae* larvae. This species requires the identification of favourable habitats by increasing the observations on the hollows with decaying rotten wood from moulds.

CONCLUSIONS

Saproxylic species require management measures which should protect them especially during their larval development. Without the use of baits or traps only a few adults were found except during the mating flight. The highest abundance was encountered for

Lucanus cervus Linnaeus, 1758 located mainly in the Southern part of the protected area. *Osmoderma eremita* Scopoli, 1763 is reported for the first time in the studied area and should be included in the standard from and protective measures should be provided. For *Osmoderma ermenita* and *Rosalia alpina* Linnaeus, 1758 the distribution map should be supplemented with observations of larval holes in stumps and rotten logs. Minimal management measures necessary for the conservation of these species are: prohibition of dead or diseased wood extraction from the natural habitats, preservation of open or half-open forest by traditional measures to prevent the closure of crowns or the increase of trees density, interdiction of the replacement of deciduous species with conifers and interdiction of temporary storage of harvested trees in natural habitats at least during the period when these species lay eggs. Current conservation status of these species within the study area is generally good, the highest pressure being given by the forestry exploitations made without taking into account biology and needs of the saproxylic species.

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