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Conservation status of protected or rare invertebrates from the border area Romania – Republic of Moldova

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Abstract. We present the conservation status for 80 protected or rare invertebrate species located on the border area Romania – Republic of Moldova. We present also the situations of the protection of some important habitats were these rare species can be found.

Key Words: Invertebrate rare species, habitats, natural reserves, Romania – Moldova, Prut River.

Rezumat. Prezentăm starea de protecție pentru 80 de specii rare de nevertebrate întâlnite în zona transfrontalieră România – Republica Moldova. Prezentăm și starea de conservare pentru câteva habitate mai importante unde pot fi întâlnite aceste specii.

Cuvinte cheie: Specii rare de nevertebrate, habitate, rezervații naturale, România - Moldova, râul Prut.

Introduction. This paper represents a short presentation concerning the status of conservation of protected and rare invertebrate species encountered on the border area Romania – Republic of Moldova. This study was made with the opportunity of the project "Mutual management Romania – Republic of Moldova for biodiversity conservation on the border between the two countries" (PHARE PERSSEUS code: RO 2004/016.941.01.02, funded through Neighborhood Programme Romania – Moldova 2004-2006).

Some of the protected species are found on the European lists of protection such as Natura 2000 (the Habitats Directive 92/43/EEC) or the Annexes of the Bern Convention, or the red lists drawn up for different systematic groups, such as the European red list for Lepidoptera (Swaay & Warren 1999). Another part of the species can be found on the list of national protection, such as the Annexes to Order No. 1198 from 25.11.2005 and the Annexes of the Ordinance 57/2007 of the Romanian Government, or the national red lists drawn up for different systematic groups, such as the red list of butterflies from Romania (Rákosy 1988, 2002), the red list of Buprestidae (Coleoptera) from Romania (Ruicănescu 2002), list of rare Apoidea (Hymenoptera) of Republic of Moldova (Stratan 1995). We mention also the synthesis works like the Red Book of Moldova (second edition, 2002), the book of Neculiseanu et al (1992) about the rare insects from Republic of Moldova, the book of Nicoară & Bomher (2004) about protected areas from Iasi county or the book of Rednită et al (2004) about the middle area of the Prut River. We used also various papers and books of local interest for some areas (Davideanu 1999; Iorgu & Pisică 2006, 2008; Mîndru 1980; Popescu 2001; Popescu et al 2002). There are species about which we know from personal research that are rare in the study area of the project and we considered necessary to integrating them in this list.

Material and Method. All the data presented represents a synthesis of the information about the presence of protected and rare invertebrate species from the border area Romania – Republic of Moldova, especially along the Prut River meadow, which has been the subject of investigations in this research. Data were collected mostly through direct

field observations during the study of the project but were used also data from literature and from personal communication of various persons who made personal investigations in this area and not published yet. Extremely short duration for collecting data in the field, a single period of vegetation, made very difficult to cover such complex information on a territory as large as the surface of the project and also the habitats diversity. For these reasons the data were based in part on knowledge of previous research on the presence of rare invertebrate species in the area of study and about the situation of their habitats or natural reserves where they are encountered.



Figure 1. "Pruteţul Bălătau" natural reserve and Natura 2000 site.

Results and Discussion. Were considered a total of 80 species for the studied area, even the list can be easily increased: Gastropoda: Helix pomatia; Malacostraca: Astacus astacus, Paramysis baeri bispinosa, Clitellata: Hirudo medicinalis; Bivalvia: Unio crassus; Insecta: Aglia tau, Apatura ilia, Aphelocheirus aestivalis, Argynnis pandora, Aromia moschata, Ascalaphus macaronius, Bolbelasmus unicornis, Bombus argillaceus, Bombus fragrands, Bombus paradoxus, Bradyporus dasypus, Calambus bipustulatus, Callimenus macrogaster longicollis, Callimorpha quadripunctaria, Calosoma sycophanta, Carabus bessarabicus, Carabus clathratus, Carabus hungaricus, Carabus variolosus, Cerambyx cerdo, Cercion lindeni (Coenagrion lindeni), Cerophytum elateroides, Corixa punctata, Dolbina elegans, Drapetes biguttatus, Elater ferrugineus, Emus hirtus, Eridontomerus arrabonicus, Eudia pavonia, Evergestis ostrogevichi, Gerris argentatus, Gerris lateralis, Gerris rufoscutellatus, Hebrus pusillus, Hydrometra stagnorum, Idiomacromerus phlomidis, Iphiclides podalirius, Ischnoides sanquinicollis, Porthmidius austriacus, Liocola lugubris, Liometopum microcephalum, Lucanus cervus, Manduca (Acherontia) atropos, Mantis religiosa, Marumba quercus, Megachile rotundata, Mesovelia furcata, Morimus funereus, Naucoris cimicoides, Nepa cinerea, Notonecta viridis, Onconotus servillei, Oryctes nasicornis, Osmoderma eremita, Papilio machaon, Parnassius mnemosyne,

Pilemia tigrina, Podagrion pachymerum, Polyommatus daphnis, Potosia bessarabica, Protaetia (Netocia) hungarica, Ranatra linearis, Rophitoides canus, Rosalia alpina, Saga pedo, Satanas gigans, Saturnia pyri, Scolia hirta, Scolia maculata, Tetramesa scheppigi, Tomares nogeli, Velia caprai, Xylocopa valga, Xylocopa violacea, Zerynthia polyxena.

From all 80 species, 35 species were considered endangered, 31 species vulnerable and one is endemic (*Potosia bessarabica*).

Species that are considered endangered: Ascalaphus macaronius, Astacus astacus, Bolbelasmus unicornis, Bombus paradoxus, Bradyporus dasypus, Callimenus macrogaster Iongicollis, Callimorpha quadripunctaria, Carabus bessarabicus, Carabus hungaricus, Cerambyx cerdo, Cerophytum elateroides, Dolbina elegans, Drapetes biguttatus, Elater ferrugineus, Eridontomerus arrabonicus, Evergestis ostrogevichi, Idiomacromerus phlomidis, Ischnoides sanguinicollis, Porthmidius austriacus, Liocola lugubris, Liometopum microcephalum, Lucanus cervus, Morimus funereus, Onconotus servillei, Osmoderma eremita, Parnassius mnemosyne, Pilemia tigrina, Polyommatus daphnis, Rosalia alpina, Saga pedo, Scolia hirta, Scolia macutata, Tetramesa scheppigi, Tomares nogeli, Zerynthia polyxena.

Species that are considered vulnerable: *Aglia tau, Apatura ilia, Aphelocheirus aestivalis, Argynnis pandora, Aromia moschata, Bombus argillaceus, Bombus fragrands, Calambus bipustulatus, Calosoma sycophanta, Carabus clathratus, Carabus variolosus, Cercion lindeni (Coenagrion lindeni), Emus hirtus, Eudia pavonia, Iphiclides podalirius, Manduca (Acherontia) atropos, Mantis religiosa, Marumba quercus, Megachile rotundata, Oryctes nasicornis, Papilio machaon, Paramysis baeri bispinosa, Podagrion pachymerum, Protaetia (Netocia) hungarica, Rophitoides canus, Satanas gigans, Saturnia pyri, Unio crassus, Velia caprai, Xylocopa valga, Xylocopa violacea.*

13 Species require strict protection of habitats where they are found, in conformity with the European laws (Natura 2000: the Habitats Directive 92/43/EEC): *Bolbelasmus unicornis, Callimorpha quadripunctaria, Carabus hungaricus, Carabus variolosus, Cerambyx cerdo, Lucanus cervus, Morimus funereus, Osmoderma eremita, Parnassius mnemosyne, Pilemia tigrina, Rosalia alpina, Saga pedo, Zerynthia polyxena.*

7 Species are included in the Annexes of the Bern Convention, 6 of them being considered as strictly protected species: *Cerambyx cerdo, Osmoderma eremita, Parnassius mnemosyne, Rosalia alpine, Saga pedo, Zerynthia polyxena,* and one species as protected species: *Lucanus cervus*.

We believe that all 66 species listed above as endangered or vulnerable, can be considered for a red list of the species from the basin of the Prut River.



Figure 2. Astacus astacus (Linnaeus).

In the interest area of the project (the counties of Botoşani, Iaşi, Vaslui, Galaţi and the Prut river districts of the Republic of Moldova), the species *Helix pomatia* is present, with a favorable conservation status, even if some local populations of the snails orchard are exploited, but without noticeable changes in their size of populations. On the both sides of the Prut river *Helix pomatia* is spread throughout the area, on the Republic of Moldova with a numerical concentration in the north and the central area, where conditions are suitable (study undertaken by Nadeja Andreev, in 2003-2004). Snails are not traditionally used for food, but every year a quantity of 1-200 tons of snails is collected and exported (Andreev 2006).

As regards the species *Hirudo medicinalis*, is present almost the whole area in the specific habitats (pools with clean water), without being numerically threatened.

Therefore, for *Helix pomatia* and *Hirudo medicinalis*, we consider that the conservation status is favorable on both sides of the Prut river and do not require their inclusion in the Red List of Prut.

Regarding *Astacus astacus* (Figure 2), the river crayfish, although by the end of the nineteenth century was a common species and very numerous both in Romania and Moldova, the species is now clearly in decline because of habitat degradation, the water pollution, the spread of deadly diseases (plague crayfish, brought from North America) and because of the economic exploitation. Also in the project area some local populations are overexploited because it's considered a culinary delicacy. We recommended a partial protection of the species, supplemented by active measures for the conservation of habitats in which it meets, and its inclusion in the red list of the Prut River.



Figure 3. Unio crassus (Philipsson).

Figure 4. Oryctes nasicornis (Linnaeus).

A special status has the species *Unio crassus* (Figure 3), that is included in Appendix 3 of the Ordinance 57/2007 of the Romanian Government, being included in the list of species whose conservation requires the designation of special areas of conservation. The river clam has been identified at present only on a few locations on the Prut River: Prut Lower Meadow National Park and Siret's everglades from the Bucecea area, this species being characteristic for biotopes of slow flowing and clean water. *Unio crassus* is threatened by reducing the number of populations (among species of aquatic invertebrates, is one of the few that has a low economic interest, being consumed by the locals) and by reducing the suitable biotopes through the pollution or because of the habitat destruction by the excavation work for schematization of the Course of the river. After those considerations we recommend the declaration of the Prut River as a special area of conservation, in order to maintain the populations of *Unio crassus* (along with many others mentioned in the

Ordinance 57/2007 of the Romanian Government), as well as the including of this species in the Red List of Prut River.

Paramysis baeri bispinosa it's a crustacean that lives in fresh water and at the limit between the salty and fresh water, in areas with sandy bottom, being mentioned in the Red Book of Moldova, present in the Cahul Lake. His number is reduced because of the water pollution with industrial waters and the intense deposition of sediments on the sandy biotopes. Although it has not been identified in the counties bordering the Prut on the Romanian part, its possible presence in the lakes with salt water from the county of Galati can be considered, and should be included in the Red Book of the Prut River because to its rarity.

The group of aquatic Heteroptera is well represented in the project area; most species are present in large numbers without significant changes on the populations number watched over the past 15 years. Of the 11 species taken in the discussion, we recommend inclusion in the Red List of the Prut River of the following two:

- *Velia caprai*: a rare species reported only on the right side of the Prut River, from the Nasta stream, Iaşi County, but can be located also in other areas.

- *Aphelocheirus aestivalis*: an extremely rare species, reported in the valley of Bârlad and Sitnei streams. This insect is usually localized on the benthos, on the stony water bottoms, in the clean and fast waters, but also among aquatic plants, being a characteristic species for very clean waters.

A special mention must be made for the species *Cercion lindeni* (*Coenagrion lindeni*), a species with southern area of spread, reported only in Moldova in the lower course of the Prut River, mentioned in the Red Book of Moldova. It requires inclusion in the Red List of the Prut River because of its rarity.

The aquatic invertebrate fauna of the Prut River basin, both in Moldova and Romania, is not directly threatened by anthropogenic impacts or habitat changes, with the exception of vulnerable species *Unio crassus* (throughout the basin, through to habitat alteration and water pollution) and *Astacus astacus* (local areas where is overexploited). For conserve the species *Astacus astacus* we recommended the introduction of accurate methods for monitoring and development of farms for this species, both for consumption and for restocking of natural waters.

For *Unio crassus*, among anthropogenic causes which led to reduced number of exemplars in the basin of Prut River, we mention the eutrophication, agricultural fertilizer used in excess, leakage of waste products, decrease of the amount of oxygen and increasing the quantity of nitrate in water. It's known that *Unio crassus* can become fertile just if the nitrate concentration of water remains below 10mg/l.



Figure 5. Protaetia (Netocia) hungarica (Herbst).

Potosia bessarabica is endemic for the project area, but unfortunately it has not been reported for a very long time and not in these researches. *Carabus bessarabicus* has been described from exemplars collected on the territory of Moldova, but this species has not been reported for a very long time, now being questionable even the fact that the species living actually in Moldova, but it was reported from the steppe zone of the east of Ukraine, Kazakhstan, Northern Caucasus and Crimea.



Figure 6. *Scolia maculata* (Drury).

A very important group of insects listed in the list represent those whose existence is linked to the presence of habitats of steppe vegetation. Although the study area is part of the forest-steppe region, however there are areas that have vegetation with a steppe characteristic, such as reservations "Valea lui David" (David's Valley) or "Valea Ilenei" (Ilenei Valley) and other areas with similar vegetation. The primary steppe in Romania is now considered missing, as this one was mainly a steppe with grasses (Gramineae). From the secondary steppe, which contains also many dicotyledonous, still exists in the southern part of Romania only isolated patches under a major anthropogenic pressure. Noteworthy is that in the European Union only in Romania the steppe region is present. In this context, in the study area, there are areas with steppe vegetation that was treated with the utmost responsibility to identify and preserve undiscovered, rare or unique species for the European Union. The major threat to these areas is to plough them and replacing with crops, in which case the specific biodiversity of these areas is carried out practically all. For areas which have been declared as natural reserves, the situation is not unfortunately very good. There are natural reservations that have a large number of owners, often on small areas. We believe that this aspect has a negative effect on the protection of these areas and were a sad mistake of taking such decisions, for example, at David's Valley. For the general public, the situation of these natural reservations that have many owners, seem satisfactory, but for the eye of the specialist who examine carefully these areas, it's obvious the negative influence of man on these natural reservations. Even the banal mowing can have disastrous effects on some species, which until yesterday could be considered banal, but today they are even deprived of the trophic basis necessary for their existence, such as various species of hymenoptera that prefer the steppe region and need for food the leguminous plants. Thus, even the mowing of the clover species leads to lack of trophic basis for many species of bumble bees that live in these areas, such as Bombus paradoxus, Bombus argillaceus, Bombus fragrands or others who are endangered or vulnerable species, including the area of the study. The situation becomes even more dramatic, some species of bumble bees such as Bombus paradoxus, build their nest on the ground in these steppe areas, the mowing becoming a real disaster for its existence in these areas. If we add to this the tracks of the hooves of sheep, goats or cows, often entering into these natural reserves, even the existence of these extremely useful bumble bees become a probabilistic game with a very small chance of success. Many species of bumble bees build their nests in abandoned galleries of rodents from the steppe areas; such examples being Bombus argillaceus or Bombus fragrands, the negative effect of anthropogenic activities on these rodents cause also a negative effect on the bumble bees. The scarabaeid beetle Protaetia (Netocia) hungarica (Figure 5) is met as adult on flower heads of Asteraceae from the steppe regions, and its larva develops in the galleries of Spermophilus citellus, the existence of this beetle being also influenced by the good sustentation of these areas. The cerambycid beetle Pilemia tigrina (which requires a strict protection of habitats where it's met, in conformity with Habitats Directive 92/43/EEC), develops as larva in the stems of some Boraginaceae plants from the steppe regions, the mowing interrupting brutally the development of these larvae, leading to decline of this rare species in these areas. The mowing of some specific steppe grasses, such as Stipa lessingiana, Stipa capillata or Stipa pulcherrima, lead to the extinction of some rare insects which grows only in the stems and grains of these species, like many Chalcidoidea (Hymenoptera) species, for example *Tetramesa scheppiqi* and *Eridontomerus* arrabonicus (Figure 7). Such examples are numerous and only a close view on the trophic and ecological requirements of each species can give us a real picture of the factors leading to the extinction of these species, and to find ways to maintain these species on the biodiversity of the planet.



Figure 7. Eridontomerus arrabonicus Erdös.



Figure 8. Zerynthia polyxena Denis & Schiffermüller.

As regards the forestry areas, the situation is not very hopeful. Unfortunately, the forests become some kind of forest plantations, in which the old trees are removed because of false "toilet" requirements. Old trees are a shelter over the winter for many useful insects that destroy insects that cause damage to forest, an extremely simplistic, unilateral judgment on this problem, leading to serious errors on the environmental management. This situation led to the alarming decrease in the number of populations of insects which, until yesterday, was considered banal and today are protected by the European laws, like the case of some majestic species such Lucanus cervus or Cerambyx cerdo. If the first species can still be seen relatively easily in Romania and in the area of this research, the second species becomes rare, due to extinction of the old trees that's needed for the developing of the larvae of this gallant species. Even for Lucanus cervus, the long period of larvae development, 7-8 years, and more pronounced lack of the old trees, stumps or gnarled trees from the forests, could lead to a more pronounced decline of the species even in Romania, including the area of this research. The situation is similar for other species imposing species, the famous beetle Oryctes nasicornis (Figure 4), whose larvae develops also in the stumps from forest, these trophic niches becoming unfortunately rarities, which entail a similar situation for countless beings whose existence is linked to these microhabitats that are destroyed by the man of in his acts of ignorance and lack of responsibility. The picture becomes more complex, linked with the existence of the beetles mentioned above there is the biggest wasps in Europe, the species from the Scolia genus (Figure 6), such as Scolia maculata, whose larvae feeding as parasite on the larva of Oryctes nasicornis. Other large wasp species, such as those of the genus Xylocopa, digging their nests in the wood of the old trees, being in the natural degradation from the deciduous forests. Rotten wood is also a trophic niche for many rare insects, such as Liocola lugubris or Osmoderma eremita, situation which can be extended to many species of saproxylic coleoptera, for example many very beautiful species of Scarabaeidae or Cerambycidae.

The disappearance of the vegetation from the border zones of the forests causing a real genocide among many insects that have their trophic niche in these areas. The vegetation of the forest borders is a true ecological paradise, biodiversity is very high in these areas. Here come for feeding the adults of many rare species of insects, whose

larvae develop inside the forest, for example many species of Coleoptera and Hymenoptera mentioned above. In these areas are also encountered many species of butterflies that are becoming increasingly rare like Aglia tau, Argynnis pandora, Parnassius mnemosyne, Zerynthia polyxena (Figure 8) and Apatura ilia. Even relatively common species until yesterday, as *Iphiclides podalirius* or *Papilio machaon*, becoming increasingly rare due to extinction of the vegetation from the border area of the forests; the agricultural crops are unfortunately extended until to the base of the trees. Some species can survive inside the forest, in the glades, if these open areas still exist and if they are not adversely affected by the effect of the anthropogenic activities, especially mowing and grazing. A refuge for many rare insects can be any larger areas inside the forests, even the paths, especially the sunny places, with favorable conditions for the development of rich vegetation. Forest areas are very sensitive to chemical treatments that have a negative effect on all insects in the area, be it rare, protected or useful. Just keeping these trophic niches such as the old trees, the stumps, the fallen trees, not taking out the old trees from the forest, preservation of extended areas of vegetation on the forest borders and the protection of the glades from the inside the forests, is the key to a good management of the natural biodiversity and for maintaining a healthy forests, with many trophic relationships between species and an ecological solidity of the ecosystem as a whole.

Given the particular area of the study, the meadow of the Prut River, finally we underline the importance of maintaining the vegetation from the wetlands, including the riverside forests, which are a shelter for many rare species of insects such as the beetles *Carabus variolosus* and *Carabus clathratus*, which are hygrophilous species, found around water, in swampy areas and shaded. Unfortunately many rare species of insects that are linked for their existence with the old willows and poplars, such as the beautiful cerambycid beetle *Aromia moschata*, whose larvae develop in these old trees, also becoming increasingly rare.

Conclusions. For the purpose of conserving all these protected and rare invertebrate species, it's impetuosity necessary to declare the Prut River, throughout the course, as a natural reserve, extending the area of protected areas, natural reserves and Natura 2000 sites, and an active involvement of the custodians of protected areas in actions of a sustainable management of these areas.

A basic condition of conserving this natural reservoir of biodiversity, the Prut River, is the establishment of the Prut National Park, with its own organizational structure and a common management plan Romania – Republic of Moldova, for a long period of time.

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