MAJOR THREATS FOR AMPHIBIAN AND REPTILES SPECIES IN THE TRANSYLVANIAN RIVERS' BASINS. RECOMMENDED MONITORING METHODS

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Abstract

The author tries to identify the major threats for amphibian and reptile species in the Transylvanian rivers' basins. The herpetological investigations were performed during summertime in the hydrographic basins of Crişul Negru, Someş and Olt rivers, in the period 1997-1999. Two monitoring methods were used, occasional findings and information from local people. The most important factor in the decline of herpetofauna from Transylvanian river's basins seems to be the loss of natural habitats. But the author considers that it is the time for quantitative field research, for a better study of herpetofauna conservation status. Finally, a few monitoring methods are proposed.

Keywords: Transylvanian rivers, reptile, monitoring methods.

Introduction

The loss of amphibian and reptiles species is a worldwidely well-known phenomenon. The freshwater organisms, as well as the amphibians, seem to disappear faster than other vertebrate classes (Griffiths & Beebee, 1992). Local and global changes in environmental factors appear to contribute to the decline of amphibians, such as: global climate change, UV radiation, intensive agriculture (use of pesticides), infections (viruses, fungi, parasites), habitat destruction, water pollution, introduction of other species, introduction of fish (managing fishponds). However, it is becoming clear that not all the species are declining and that not one 'global' factor, but various complexes of factors are responsible for the decline in different parts of the world (Vos & Chardin, 1998).

In Romania the national Nature Conservation Law (462/2001) and the Bern Convention (International Convention on the Conservation of European Wildlife) protect the amphibians and reptiles. Unfortunately, in spite of legislation numerous habitats of herpetological importance are threatened or even destroyed. The wetlands are among the most threatened ones. The reduction of these habitats is a worldwide

problem, it causes habitat fragmentation and significantly reduces the population's viability.

Material and methods

The herpetological investigations were performed during summertime in the hydrographic basins of Crişul Negru, Someş and Olt rivers, in the period 1997-1999. The distribution of amphibian and reptile species is better and better investigated in Transylvania (Ghira et al. in press), but we have a significant knowledge deficit regarding population fluctuations. Amphibians are characterized by considerable population size fluctuations during the years that emphasize the importance of long-term studies.

The best period for amphibian and reptile species monitoring is springtime, the reproducing season, when they can be observed in mass. In other periods of the year, amphibian species can be observed sporadically. That's why, two additional monitoring methods were used: occasional findings and information from local people.

The river's basins were divided into three main zones: mountainous, between 800-1800 m; hilly, between 400-800 m; and hillock/plain, between 200-400 m altitude.

Results

The highest diversity of herpetofauna was observed in the hilly region, closely related to the wide variety of habitats. The number of observed amphibian and reptile species in the mountain zone is decreased in contrast with the hilly region (Ghira, 1997; Mara et al., 1999). The low diversity of herpetofauna in the plain areas is explained by the ecosystem's monotony due to the intensive agriculture. We notice the dominance of *Rana esculenta complex*, *Lacerta agilis* and *Natrix natrix* in every region, while *Bombina variegata* and *Anguis fragilis* appear to be common species of the hilly region. The other amphibian and reptile species seem to be vulnerable, rare or endangered.

We identified the major threats for amphibian and reptile species in the investigated river's basins as follows:

1. Destruction of wetland habitats (the amphibians, due their biphasic life cycle, at least during the breeding season and larval development are closely related to these habitats):
   - Desiccation works, drainage of wetlands (river regularisation works);
   - Transforming backwaters in fishponds, introducing non-native fish species;
   - Intensive agriculture (use of fertilizers and pesticides, mowing)
   - Scorching of reeds, well vegetated adjacent areas.
2. Water pollution, eutrophication.
3. Destruction of rocky ecosystems.
4. Deforestation, forest fires (damaging hibernation sites).

5. Road mortality (killing amphibians on their spring migration and reptiles by traffic).

6. Human consume (springtime, in some places frogs are traditionally consumed and collected in mass by local people).

7. Tourism, human brutality (killing snake and lizard species, such as *Anguis fragilis*).

Discussion

The most important factor in the decline of herpetofauna from Transylvanian river's basins is the loss of natural habitats. The amphibian species are affected by the destruction of reproducing/breeding sites (freshwater ecosystems) and hibernation sites as well (terrestrial ecosystems). The lack of important reptile fauna elements is due to the destruction of rocky ecosystems and deforestation.

The breeding sites (pools, puddles, ponds) of newt species are polluted or even destroyed. In mountain regions the alpine (*Triturus alpestris*) and Carpathian newt (*Triturus montandoni*) is threatened mainly by deforestation and destruction of small temporary pools by the wood-exploitation works (Necas et al. 1997). Anthropogenic effects, as pollution and destruction of springs and streams, cause the low number of spotted salamander (*Salamandra salamandra*). The reduction of suitable habitats causes habitat fragmentation and the isolation of populations. When extinction can no longer be compensated by recolonisation, the population becomes weaker and even extinct.

The same factors cause the reduction of anuran populations. For the fire-bellied toads (*Bombina bombina*) the most important factor is the loss of habitat (Briggs, 1997) as a consequence of river regularisation works. *Bombina bombina, Pelobates fuscus, Hyla arborea* and *Bufo viridis* are declining rapidly in Denmark due to disappearance of ponds (33%), water pollution/eutrophication (30-40%) and fish introduction (Fog, K., 2000).

The common toad (*Bufo bufo*) is threatened mainly by destruction of suitable freshwater and terrestrial habitats, and losses can also be caused by habitat fragmentation by roads. The most run over amphibian corpses belong to this species, because it is the slowest one.

The brown frog species (*Rana arvalis, R. temporaria, R. dalmatina*) - beside the common threats - are consumed by local people. In springtime hundreds of frogs, sometimes common toads are butchered. The populational fluctuation of *Rana dalmatina* in Aeroe (Denmark) was caused partly by intensification of agriculture and partly by climate changes (Briggs, 1997). The intensive agricultural practices, using pesticides and fertilizers, cause water pollution, and in the same time lead to the accumulation of pollutans in the organisms of the whole food chain.

The swamp turtle (*Emys orbicularis*) is threatened mainly by habitat reduction and other anthropogenic interventions. The lizard and snake species are also threatened by habitat destruction (the reduction of rocky ecosystems and deforestation). In the same time, the human brutality and the road traffic cause losses in their populations.

Humans kill adder species (*Vipera berus, Vipera ammodytes*) and *Coronela austriaca* often misidentified as common adder. The slow worm (*Anguis fragilis*) is the only snake-shaped lizard species in the Romanian herpetofauna that is victim of human brutality. Habitat fragmentation and the negative effect of roads also have to be mentioned.

Conclusions and proposals

During the investigation two additional monitoring methods were used, occasional findings/visual observation and obtaining information from local people. The last method may give information on particular species that were previously recorded in the study area. We consider that it is the time for quantitative field research, for a better study of herpetofauna conservation status.

We propose the following monitoring methods:

1. Line counting method.

It can be performed in habitats or on road by visual observation, and the counting lines always have a fixed length (Masing, 1997). The road transect method is optimal if environmental conditions are optimal, even a single night can provide reliable data on the presence of amphibian species. Besides the breeding migration in spring, the summer migration of juveniles, or autumn migration can be effectively studied (Puky, 2001).

2. Road counting call method.

It was first used as monitoring method in Canada. A relatively straight route consisting of 10 sample points (with 0.5 km distance one from another) without extraneous noise has to be chosen, and is preferably to reflect a variety of good amphibian habitats such as pons, marshes or swamps (Anthony & Puky, 2001).

3. Square counting method.

Is a modification of the quadrate sampling method, described by Jaeger & Inger in 1994, and the counters choose the squares in suitable habitats, where it is expected to find a large number of amphibians and reptiles. The counts are calculated per hectare (Masing, 1997)

4. Trapping methods.

The point counting method (man-made holes) and the cone counting method (digging metal or plastic cones into the ground) also can be used for monitoring actions. Both are in fact close to the pitfall traps method, and can be used selectively for certain species (Masing, 1997).

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