ISSUES REGARDING THE FLOOD IMPACT ON THE HERPETOFAUNA HABITATS FROM RIPARIAN AREAS FROM BARCĂU BASIN

V. NEMES[1], C. SERAC[2], A. CAPONY[3], W. KLOK[4]

ABSTRACT. –issues regarding the flood impact on the herpetofauna habitats from riparian areas. Flood risk management measures have a major effect on biodiversity conservation of wetlands and riparians areas. Therefore, understanding the need for cooperation and collaboration of all stakeholders (governmental and non-government) in planning and flood risk management in line with European requirements, respectively Habitat directive in association with the domestic law.

This paper aims to highlight the importance of riparian areas developed at the interface between terrestrial and aquatic systems, who besides his role in the delineation of ecosystems and the complex functions they perform: loading / discharging groundwater, flood control,protection against erosion, retention of nutrients and export of biomass, protection, microclimate stabilization has a major role in the conservation of specific habitats of these environments, being the least affected by anthropogenic activity,so that relations found between the "living world" and natural support are the most solid.

Because the decline of amphibians has direct and visible effects on ecosystem structure, there is an acute need for optimization of the local reproductive populations of amphibians is required for appropriate management of habitats such as breeding and feeding habitats. Only protection of aquatic habitats (breeding) has little value if terrestrial habitats used for feeding amphibians are destroyed.

Keywords: habitat, conservation, flood, herpetofauna, riparian area.

1. INTRODUCTION

The Barcău river hydrographic basin is located in the northern part of the Criş river basin, at the contact between the mountains Plopiş and Silvaniei Hills.It drains on the Romanian territory an area of 2005 km^2, the length of its course being 134 km (Ujvari, 1972). From spring until the the border with Hungary, the river passes through various forms of terrain - mountains, hills, plains - highlighting the physico-geographical complexity of its basin. Stemmed from the limestone plateau

[1] University of Oradea, Faculty of History, Geography and International Relations, Oradea, e-mail: nemes_vali@yahoo.com

[2] University of Oradea, Faculty of History, Geography and International Relations, Oradea, e-mail: corinaserac@yahoo.com

[3] Laboratoire Centrale des Ponts et Chaussées, Nantes, adriencapony@lcpc.fr

[4] Radboud University, School of Management, European Spatial and Environmental Planning, e-mail: wytzeklok@student.ru.nl

under Ponor, near the village of Tusa (977 m). After crossing the erosion depression of Nuşfalăului enter in the gorge of Marca and after a detour to the north resumes its general course to the west. Its main tributaries are: Topliţa, Comăneasa, Înot, Bistra, Făncica, Valea Fânaţelor, Fâneaţa Mare and Ierul (fig. 2).

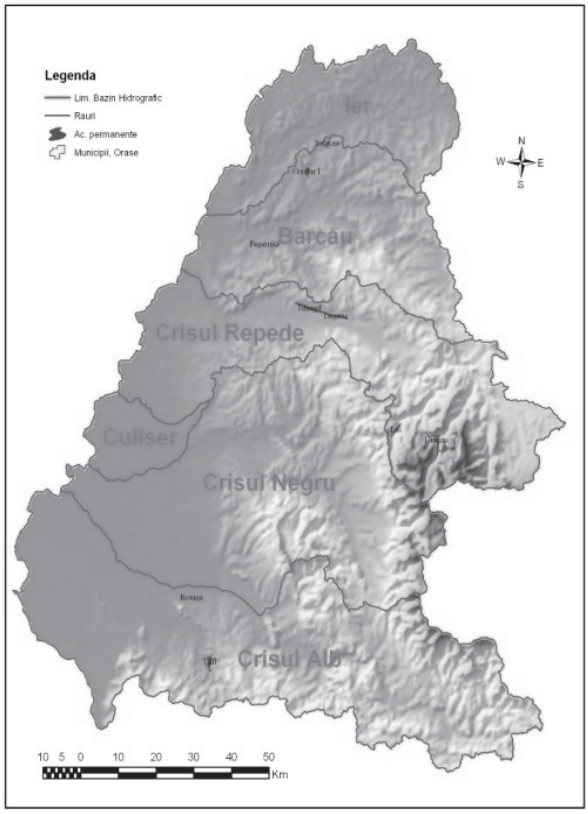

Figure 1. ***Cris basin subunits in Romania***

2. MORPHOMETRIC DATA

Barcău, the northernmost of the main rivers of Cris River Basin, has a length of 134 km (in Romania). Stems from Meses Mountains, has a direction of flow in east-west orientation with some variations on certain sections, the average slope is 4 ‰ for the whole river, there are sectors where the average slope exceeds 20 ‰ and sectors where the average slope decreases to 1 ‰.

Sinuosity coefficient is 1.72, comparable to that of other rivers in the basin rivers.Barcau river hydrographic Basin has an average elevation of 240 m, shows an asymmetry to the left, part of which reap 75% of the river tributaries of the order I.

The average density of river network is between 0.30 km/km^2 in the mountain and plains region and 0.80 km/km^2 and hilly region. Highest values (over 1.30 km/km^2) recorded in the upper sectors of the rivers in the hilly area. Due to the unique hydrological regime and how the river reacts in extreme conditions (heavy rains, concentrated in space and time) were necessary improuvement of the river basin by building standingt accumulation of, totaling 483 ha, which can store a volume of 7.80 thousand m^3 and succeed in large part, through good management and use, flood wave attenuation. Part of this work arrangement is also the dam constructed downstream of Sântimbreu, which borders the river before crossing the state border, with the aim to protect settlements and agricultural areas of possible floods in the riverbed. Here should be mentioned the 47,020 ha of forest with special role in retaining water from precipitation and fixation and soil protection against rainfall erosion.

3. HYDROLOGICAL REGIME

Hydrological measurements, especially those for determining the flow are very important in defense against flood.

To study the distribution in time, of the average annual flow have used annual average values determined from a number of four hydrometric stations, evenly arranged in the basin, which covers large parts of the upper, middle and lower basin. Analyzed data come from the years between 1968-2007. Annual flow variation depends on the amount of precipitation fallen during the year (fig. 2).

As regards the year was recorded maximum average annual flow, this coincides at the Nusfalau hydrometric station (4.17 m / s), Marghita hydrometric station (7.85 m / s) and Salard hydrometric station (13.2 m / s), that is the year 1980. At the Marca hydrometric station the record year with the maximum average annual flow was 2001 (5.57 m / s).

Distribution of monthly and seasonal average flow during the year in Barcău Basin reflect especially a variation within the year of the various climatic factors. A special remark should be made to the fact that, unlike the rest of the country, particularly in the west and in the Cris Basin, there is an appreciable influence of oceanic climate characterized by rain in winter. These rains landing on water soaked soil and overlapping, generally over large water produced by melting snow, give rise to major floods, both in terms of peak flow and volume of water drained (Josan *et al.*, 2004).

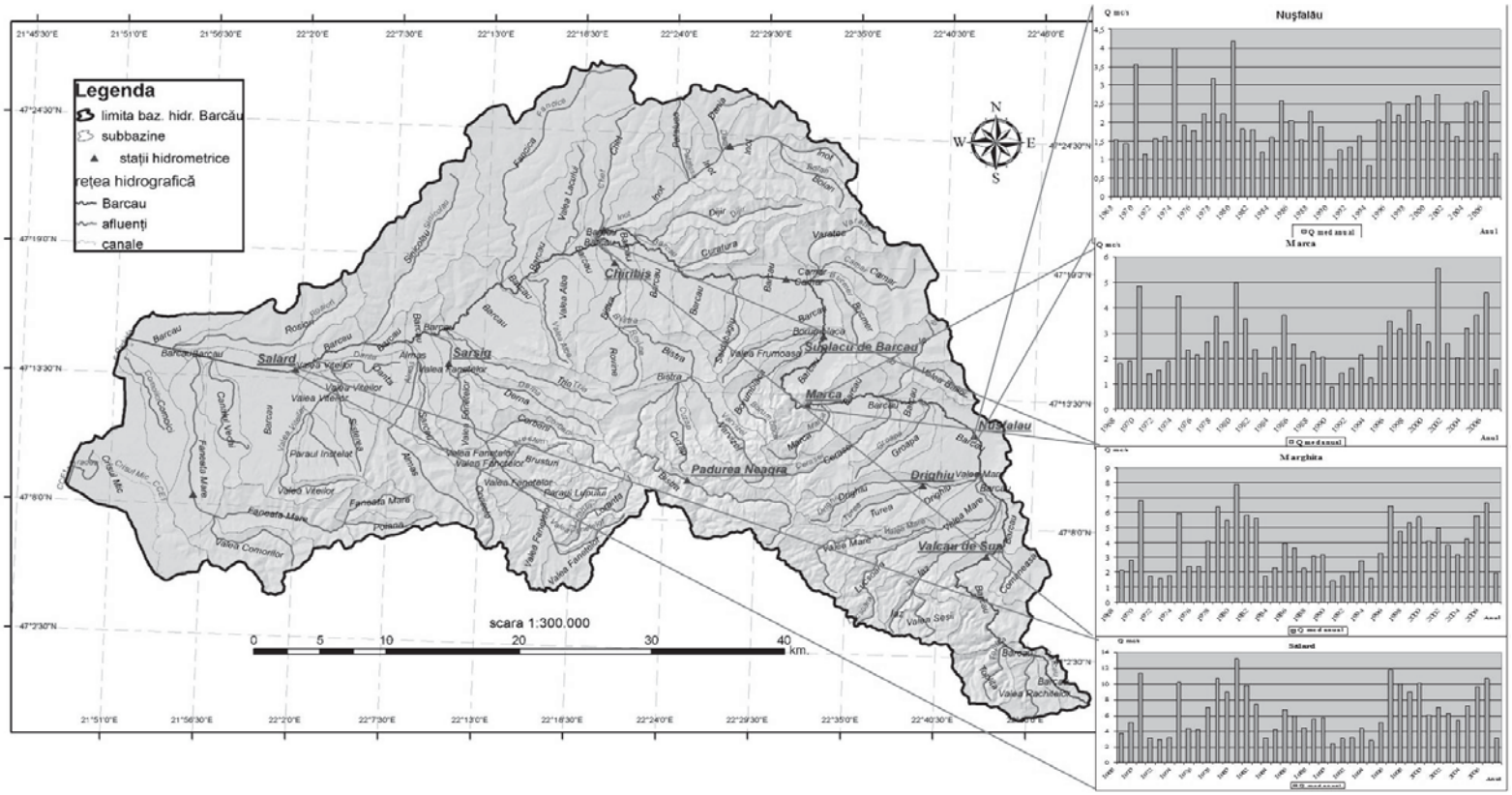

Figure 2. ***Barcău Basin. Annual average flows at the hydrometric stations of Nuşfalău, Marca, Marghita si Sălard (1968–2007)***

4. FRAGILITY OF THE HERPETOFAUNA HABITAT

Rivers are recognized as sites with microhabitat with heterogeneous and complex conditions. Understanding the conditions of riparian areas habitat, that transitional conditions from streams to dry environment represented by the banks of rivers.

Temperature of stream has often been treated in literature (Sinokrot and Stefan, 1993, Beschta, 1997, Mohseni and Stefan, 1999) but very few studies deal with riparian microclimate.

Variation of microclimate values is insignificant, it is determined either by topography or the existing vegetation (forest edge topoclimate).

Regarding the herpetofauna habitat management it is necessary to achieve a design that would minimize the effects of fragmentation appearing on the waterway, preservation of large areas as possible and maintain connectivity of fragmented habitats creating habitat contiguous to each other (Richards et al., 2002).

Habitat fragmentation is considered to be one of the major causes of contemporary loss of biodiversity (Soulé 1987; Blaustein et al., 1994). Fragmentation acts to increase local extinction risks by reducing local population size (Shaffer 1987), which may in turn reduce a species geographical distribution. However, rescue effects due to dispersal between local populations (Brown and Kodric-Brown 1977; Hanski et al. 1996) may ameliorate extinction risks. This process depends on the availability of propagules for dispersal (individuals which leave a donor population to join a receptor population), the geographical distance between donor and receptor populations and the permeability of the habitat matrix to movement by these migrating propagules (Dunning et al. 1992; Taylor et al. 1993; Wiens 1997; Villalba et al., 1998; Brooker et al., 1999; Wiens 2001). Dispersal distance can be increased by habitat destruction whereas matrix permeability can become altered by changes in land uses (Ray et al., 2002).

Food is the primary link between an animal and its surrounding environment. Prior to optimize the conditions for local reproductive populations of amphibians, we need appropriate management of habitats such as breeding and feeding habitats. Protection of aquatic habitats only (breeding) has little value if terrestrial habitats used for feeding amphibians are destroyed.

Thus research of Semlitsch (2000) show the role of the creation of buffer distances in wet areas of reproduction of amphibians. Considering the results of research on amphibian habitats can see certain trends in the distribution of them on a geographic unit related to the components of a river basin, so there are a number of buffer zone models that can be created: in the longitudinal hydrographic network (Hayes et al., 2006), outlining a continuity between two adjacent buffer zones (Sheridan and Olson, 2003), Bury and Corn (1988) proposed the creation of patches axes.

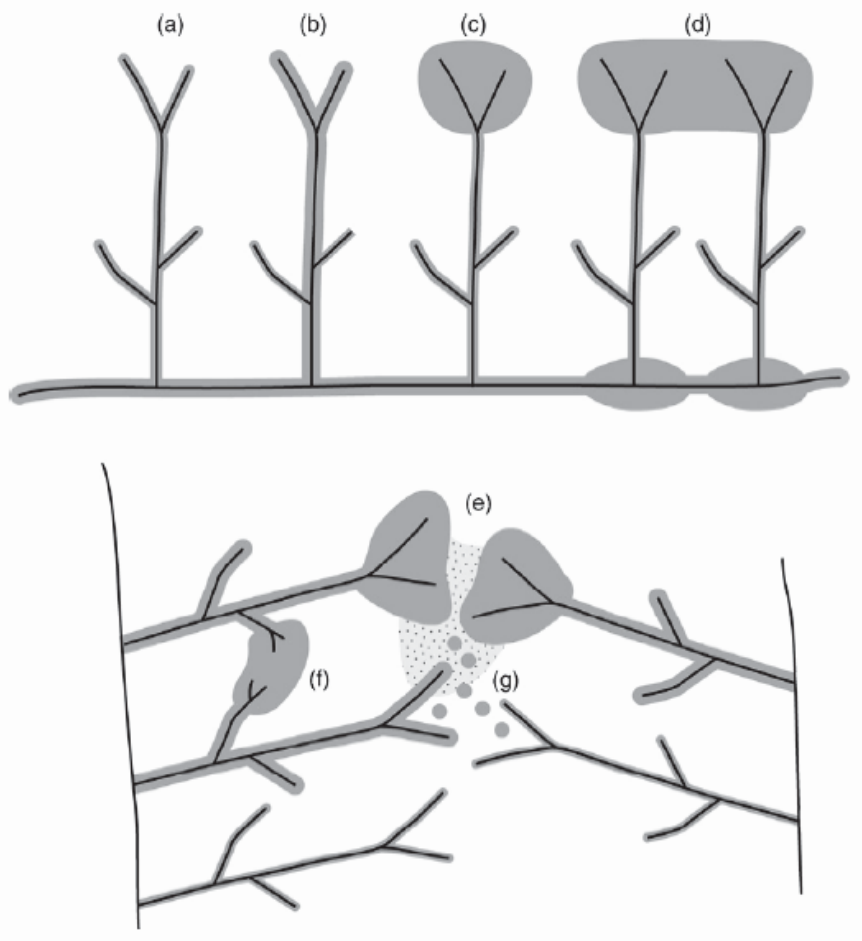

Figure 3. ***Riparian management considerations for retention of headwater amphibians: (a) narrow buffer zone; (b) wider buffer zone; (c) patch reserves at headwaters with functions contributing to downstream habitats, and to provide connectivity between joined headwater channels; (d and f) patch reserves can provide connectivity across ridgelines to adjacent drainages, and can be placed downstream to provide enhanced riparian habitat protection such as at tributary junctions; (e and g) partial harvest (shaded area) and/or leave islands (circles) may be used to provide connectivity functions between watersheds.(Olson, et al, 2007)***

Buffers which would lend the Barcau basin are difficult to establish since there are 13 species of *amphibians* (*Salamandra salamandra, Triturus cristatus, Triturus vulgaris, Bombina bombina, Bombina variegata, Pelobates fuscus, Bufo bufo, Bufo viridis, Rana ridibunda, Rana dalmatina, Rana temporaria* and *Rana arvalis*) and five species of *reptiles* (*Emys orbicularis, Lacerta agilis, Lacerta viridis, Zootoca vivipara* and *Natrix natrix*) (Covaciu et al., 2002).

CONCLUSIONS:

Habitats of amphibians and reptiles of Barcau river hydrographic basin are found in proximity to watercourses, and not only, so they present a high risk due to flooding. Thus even if these animals are favored by excess water, there is a risk (Sorocovschi *et al.*, 2002) when it comes to habitat for feeding and the aquatic habitat in times of egg laying. Floods often cause fragmentation of habitats, such hydroameliorative works are required in the rivers. To avoid herpetofauna habitat fragmentation it is essential to create buffer zones to allow normal development of relations between individus and environment.

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