Acta ZooBot Austria **155**, 2018, 187–190

Overview of the terrestrial animals of the Vjosa River, Albania: invertebrates, amphibians, reptiles and the European otter

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Only little is known about the terrestrial fauna of the highly dynamic riverine system of the Vjosa. It is particularly important to fill this gap because the Vjosa's dynamics are at risk of becoming destroyed by hydropower plants. Though the species described in the following chapters were only recorded during short-term, preliminary surveys, a high biodiversity comprising many characteristic species was already verified.

Frank T., 2018: Überblick über die terrestrischen Tiere der Vjosa, Albanien: Wirbellose, Amphibien, Reptilien und der Europäische Otter.
Es ist nur sehr wenig über die terrestrische Fauna des hoch dynamischen Flusssystems der Vjosa bekannt. Daher ist es besonders wichtig diese Wissenslücke zu füllen, weil die Dynamik des Flusses Gefahr läuft, durch Wasserkraftwersvorhaben zerstört zu werden. Auch wenn die in den folgenden Kapiteln beschriebenen Arten nur von kurzfristigen Erstaufnahmen stammen, konnte bereits eine hohe Diversität mit vielen charakteristischen Arten festgestellt werden.

Keywords: Vjosa, Albania, biogeography, conservation.

Overview

As there is only very little information on the terrestrial fauna of the highly dynamic Vjosa riverine system (see Schiemer et al. 2018 this volume) the following chapters contribute to fill the gap of this largely unknown area. To do so is particularly important because the Vjosa river runs the risk of becoming adversely affected by planned hydropower plants. The ecological value of the Vjosa river is evaluated based on the occurrence of specific rare and endangered organisms in order to document its uniqueness and conservation status. The described terrestrial animals inhabiting the riverine system of the Vjosa river comprise molluscs, spiders, harvestmen, insects (grasshoppers, true bugs, carabid beetles, staphylinid beetles, ants), amphibians, reptiles, and the European otter. The aforementioned animal groups, which include herbivorous, carnivorous and saprophagous feeding guilds, are crucial members of the food web of the Vjosa river and its floodplain. Moreover, they can act as sensitive indicators for the environmental state of a riverine system, e.g. carabids and staphylinids (Schatz 2007, Paetzold et al. 2008). Some of these animal groups are represented by many species in different European and national conservation schemes, i.e. the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979), the European Union Habitats Directive (1992), and the National Red List of Flora and Fauna of Albania (2013). The fact that some species are listed in the Albanian Red List is significant against the background of Albania's targeted European Union membership.

Natural disturbance caused by erosion, transport and deposition enables a high level of landscape diversity in river corridors (Ward et al. 2002). This creates a complex mosaic of various habitat types, i.e. bare ground areas from abundantly rearranged coarse granular gravel banks to fine sand areas, older silted-up floodplains, sparsely vegetated areas, short grasslands, or alluvial forests, which are inhabited by highly specialised animal species strictly adapted to various successional stages (Robinson et al. 2002). Such dynamic

floodplains have been severely altered in many parts of Europe, which leads to a distorted perception of patterns and processes in riverine landscapes (e.g. WARD & STANFORD 1995). Natural riverine systems with huge spatio-temporal heterogeneity have meanwhile become extremely rare as the majority of European rivers have largely lost their former highly natural state due to anthropogenic modifications, and have thus been converted into incised single-thread channels (TOCKNER et al. 2006). Braided rivers, in their pristine state, are known to be characterized by a shifting mosaic of channels, islands and various wetland types underlying fast turnover rates by flood pulses (TOCKNER et al. 2006). It is crucial to understand the structure and function of the few remaining European river systems which are nowadays among the most endangered ecosystems (SADLER et al. 2004). Such unaltered conditions still occur at the Vjosa river representing an appropriate natural laboratory – not only for scientists.

As ecosystem dynamics are usually not restricted to a certain type of habitat, local populations, assemblages and food web dynamics are essentially affected by the spatial flow of matter and organisms among different habitats (POLIS et al. 1979). At the land-water interface, the exchange of energy and nutrients between the river channel and its riparian zone significantly constitutes dynamic processes in braided river ecosystems (FISHER et al. 1998, HELFIELD & NAIMAN 2001). There is only little knowledge on the energy flow from aquatic to adjoining terrestrial systems. For terrestrial consumers, the flows of matter and organisms from the water body to the riparian zone can be significant energy sources (NAKANO & MURAKAMI 2001, NAIMAN et al. 2002, SABO & POWER 2002). Spatial interactions between productive (e.g. water body) and non-productive (e.g. gravel banks) habitats lead to high energy fluxes. This enables carnivorous riparian arthropods, primarily spiders, staphylinid beetles, carabid beetles, and ants to colonize gravel banks (MANDERBACH & HERING 2001, FRAMENAU et al. 2002, SADLER et al. 2004). Species of these arthropod groups inhabiting the riparian zone of the Vjosa are described in the following chapters.

Dynamic rivers produce masses of insects emerging from the water body. After oviposition, thousands of them can be observed lying dead on the riparian zone where they provide an enormously high load of energy for other arthropod consumers inhabiting the terrestrial zone. Carabids and spiders have been reported to feed upon aquatic insects revealing that predation by riparian arthropods is a quantitatively important process in the transfer of aquatic secondary production to the riparian food web (HERING & PLACHTER 1997, PAETZOLD et al. 2005).

Terrestrial species which are characteristic of highly dynamic riverine systems are exceptionally sensitive to hydromorphological changes regarding discharge, flow regime and sediment budget. Any impacts on these parameters may lead to a decrease or extinction of these highly vulnerable taxa observed at the Vjosa.

Within this study, 378 terrestrial invertebrates, 14 amphibian and reptile species and the European otter were recorded. A large number of them have been documented for the first time in Albania. They were hitherto exclusively found at the Vjosa. To underline the high conservation status of the Vjosa area, the newly described spider *Liocranoeca vjosensis* is a new species for science that has never been observed anywhere else, worldwide.

The species described in the following chapters were only recorded during short-term, preliminary surveys. Nevertheless, a high biodiversity comprising many characteristic species was verified. These species are appropriate indicators for highly dynamic processes because

they characterize the land-water interface. Therefore, they should be considered in future environmental impact assessments (EIA).

Conclusion

The Vjosa river and its surrounding habitats are most definitely of a remarkably high conservation status because i) they comprise a mosaic of various habitat types which forms a highly dynamic natural river ecosystem of a spatial extent which is absolutely unique in Europe outside of Russia; ii) they harbour viable communities of animals that have largely or completely disappeared from other European rivers; iii) the majority of these viable communities are expected to go irrecoverably extinct as a result of the projected hydropower dams, because they are well adapted to, and strictly dependent on, a highly dynamic river system. The construction of dams would disconnect the river from its surrounding (semi)-terrestrial habitats, thus preventing the natural river dynamics which are essential for the survival of most of the rare and endangered species inhabiting the studied areas. Therefore, the protection of the Vjosa river system in its present form is of pan-European importance.

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Received: 2018 06 21

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