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## **COMPARATIVE STUDIES ON EPHEMERAL SAVANNA WATERS AND THEIR SIGNIFICANCE FOR DIVERSITY AND PRODUCTIVITY OF FISH COMMUNITIES IN NATURAL AND ANTHROPOGENICALLY DISTURBED RIVERS**

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### **Key Words:**

Comoé National Park, ephemeral waters, fish communities, lateral migration, local processes, spatial-temporal utilization patterns

### **Abstract:**

*Freshwaters in tropical savanna biomes are currently subject to massive changes. Deterioration of water quality, elimination of whole spectra of habitats and profound alterations in the basic hydrological conditions are especially serious consequences of human activities. In order to understand the natural organization of local fish assemblages and to assess the effects of anthropogenic influences on the composition and functional characteristics of fish communities, the fish fauna of undisturbed savanna waters in Comoé National Park, Ivory Coast, and in disturbed adjacent areas is investigated. The aim is to describe the spatial and temporal use patterns of savanna waters by age classes, species and assemblages of fish and to understand the factors that are causing these use patterns. In the first year of the project, the main emphasis is put on surveying the composition of fish communities that use ephemeral savanna waters temporarily connected to Comoé river, the only permanent water in the region. 65 species of fish have been caught in these waters so far, among them some new to the fish community hitherto reported for Comoé river. The general composition of fish assemblages of ephemeral waters is comparable to the fish community of Comoé river. However, analyzing parameters of distribution more precisely, a species specific, fine grained use pattern becomes evident. It points to the important role ephemeral waters can play for many species of fish as feeding, growing or spawning sites.*

### **Results:**

Our first results indicate that ephemeral savanna waters are an important fish habitat although they are useable only for a limited time of the year. A comparison of the fish fauna of the great river systems of Ivory Coast (Sassandra, Bandama, Comoé) and the fish assemblages of our study area shows that most fish locally occurring in permanent waters can also be found in ephemeral waters. While 91 species of fish are reported for the whole Comoé river system (length: 1,160 km; drainage area: 72,000 km<sup>2</sup>) [1,2], 65 species of fish could already be recorded in the extremely limited savanna waters studied so far (three 200 m sections of two ephemeral savanna rivers and fifteen ponds with a total surface area of less than 1 km<sup>2</sup>).

An analysis of assemblage composition indicates that use of ephemeral habitats is not restricted to certain groups but is to be found in a wide range of taxonomic groups of fish (Fig.1). Simply the Cyprinodontidae seem to be relatively rare in ephemeral savanna waters in comparison to the total fish fauna of Comoé river [3]. This might be caused by the existence of many species in estuarine or rainforest waters which contribute to the total Comoé fish fauna. On the other hand, we have recorded one annual cyprinodontid as a characteristic

inhabitant of ephemeral savanna ponds which previously has not been reported for Comoé river. Another group of fish, the Cyprinidae, appear, however, especially species-rich in ephemeral savanna ponds and streams. With the documentation of three species, new to the Comoé fish fauna, more species of cyprinids are known from the ephemeral as compared to the river community. This finding stresses the great importance of ephemeral savanna waters to these fishes. It also points to gaps in the current knowledge of the distribution of many fish species in the region. As all fish - with the exception of annual cyprinodontids and *Protopterus*-lungfish which can survive dry seasons without permanent water as eggs or buried in mud holes - have to newly re-colonize ephemeral savanna waters from permanent waters, i.e. from the Comoé river in our case, they have to occur also in the river itself.

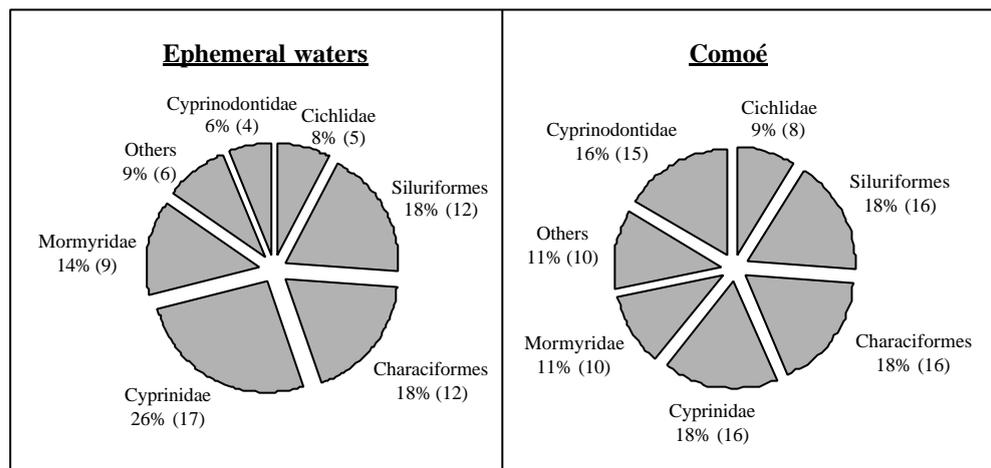


Fig.1: Taxonomic composition of fish assemblages of ephemeral savanna waters (our study) and a great West African river, the Comoé (published data). Total species number for each group mentioned is given in brackets. "Others" comprise: Anabantidae, Centropomidae, Channidae, Mastacembelidae, Polypteridae, Protopterae (for ephemeral waters) and Anabantidae, Centropomidae, Channidae, Clupeidae, Eleotridae, Mastacembelidae, Notopterae, Polypteridae, Protopterae (for Comoé river).

Analyzing parameters of distribution and habitat characteristics more precisely (in cooperation with W01, W02, W04), a species specific, fine grained use pattern of ephemeral waters is becoming evident. In dependence of water availability, the composition of fish assemblages in savanna waters changed. On the one hand, species of *Barbus*, *Aplocheilichthys* and *Hemichromis* re-colonized ephemeral waters directly after first rains. They may either try to migrate in savanna ponds far away from Comoé river or to take advantage of low predation pressure by predatory fish in newly developing waters. On the other hand, fish like *Brycinus nurse*, *Labeo parvus* or *Schilbe spec.* started lateral migration much later, entering savanna waters at a time when water level remained high and rather predictable and stable food sources had been established. The different patterns in utilization of ephemeral savanna waters by a species-rich fish community point to the important role these waters can play for fishes as feeding, growing or spawning sites.

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