

## **Habitat structure and tropical freshwater fish communities in a rapidly changing environment: the River Gambia floodplain**

Seasonal flooding of rivers has been shown to modify food availability, species interactions, reproduction and fish movement (Lowe-McConnell, 1975). Fish move into the flooded areas to feed and/or reproduce depending on the timings of their reproductive cycle. During the dry season, flooded areas become increasingly isolated and together with the decreasing dissolved oxygen levels tend to force the juvenile fish to return to the main channel.

The Gambia River, has a catchment area of 78,000 km<sup>2</sup> and originates in the Fouta Djallon plateau of Guinea. It flows 1,130 km through Senegal and The Gambia. Tidal effects are perceptible up to the border with Senegal (Ecoutin *et al* 2005). Rains occur from June to October with the highest precipitation in August. Peak river discharge occurs during September, declining to almost nil from December to July. The floodplain is quite narrow, inundated for 4-5 months per year, except for the bolongs (creeks) that remain connected to the river and may act as important routes of access for fish on and off the floodplain.

The Gambia River is currently the last 'classical' non-impacted system in West Africa. In the region of the tidal limit, the River Gambia floodplain represents a habitat in which typical floodplain processes are modified by the tidal saline influence and salt tolerant primary freshwater species and salt intolerant species occur. However, this is about to change as a US\$3 million dam project funded by the African Development Fund is underway further upstream on the River Gambia in Senegal and is planned to be completed in the next few years. The aim of my project is to examine how fish communities use inundated floodplain in a semi-arid region. But, my project also could produce timely data on the current fish communities in a sensitive zone that is likely to change after the dam is completed.

This three-year project started in 2005 and the Hugh Cary Gilson Memorial Award helped fund part of the travel expenses for the 2006 sampling season and contributed to the costs of extending the sampling for 2 months before and after the rainy season.

The fieldwork was based near Farafenni, a small Medical Research Council research station approximately 180 km from the river mouth and at the tidal limit of the River Gambia. Sampling took place monthly from May to December 2006 along two transects, each from the river channel to the edge of the floodplain. Fish community structure was quantified using cast nets at 150 m intervals along the transects. Also, two bolongs were sampled every month within the same study areas using two-way fyke nets. The traps were checked early morning and late afternoon in order to gain an understanding into the daily patterns of fish movement. Diet analysis was carried out on samples caught with cast nets in order to determine the different feeding guilds present on the floodplains. On each sampling occasion, data on water conductivity, pH, oxygen content and turbidity were also collected.

I also hoped to examine the role of nutrient availability on the floodplains and how that is linked with the structure of the fish communities. Unfortunately, I had not reckoned on the difficulties involved in doing this kind of lab-work in areas where there are not well-established field structures. I hope to rectify that this year.

A list of the fish species sampled is shown on Table 1.

Table 1. List of all the fish species caught from sample sites of the River Gambia floodplain near Farafenni from May-Dec 2006. The commonest species are denoted with an asterisk

Family		Species
Elopidae	West African ladyfish	<i>Elops lacerta</i>
Clupeidae	Smalltoothed pellonula	<i>Pellonulla leonensis</i> *
	Madeiran sardinella	<i>Sardinella maderensis</i>
	Bonga shad	<i>Ethmalosa fimbriata</i>
Hepsetidae	Kafue pike	<i>Hepsetus odoe</i>
Characidae		<i>Rhambdalestes septentrionalis</i>
	Nurse tetra	<i>Brycinus nurse</i>
		<i>Alestes dentex</i>
Cyprinidae	Blackstripe barb	<i>Barbus macrops</i>
Bagridae	Bagrid catfish	<i>Chrysichthys nigrodigitatus</i> *
		<i>Chrysichthys johneli</i>
Schilbeidae		<i>Shilbe intermedius</i>
Clariidae	Mudfish	<i>Clarias anquillaris</i>
Mochokidae	Wahrindi	<i>Synodontis schall</i> *
	Upsidedown catfish	<i>Synodontis batensoda</i>
Cyprinodontidae	Banded lampeye	<i>Poropanchax normanii</i> *
		<i>Epiplatys spilargyreus</i> *
		<i>Epiplatys bifasciatus</i>
		<i>Aplocheilichthys spilauchen</i>
		<i>Eucinostomus melanopterus</i>
Gerreidae		<i>Eucinostomus melanopterus</i>
Sciaenidae	Cassava croaker	<i>Pseudotolithus senegalensis</i>
Monodactylidae	African moony	<i>Monodactylus sebae</i>
Cichlidae	Guinea Tilapia	<i>Tilapia guineensis</i> *
		<i>Tylochromis jentinki</i>
	Nile tilapia	<i>Oreochromis niloticus</i>
		<i>Tilapia zilli</i>
		<i>Tylochromis intermedius</i>
		<i>Hemichromis bimaculatus</i> *
		<i>Hemichromis fasciatus</i> *
		<i>Liza grandisquamis</i> *
Mugilidae	Largescaled mullet	<i>Liza grandisquamis</i> *
	Sicklefin mullet	<i>Liza falcipinnis</i> *
	Flathead mullet	<i>Mugil cephalus</i>
Polynemidae	Giant African threadfin	<i>Polydactylus quadrifilis</i>
Gobiidae		<i>Gobionellus occidentalis</i>
		<i>Nematogobius maindronii</i>
		<i>Porogobius schlegelli</i>
	Atlantic mudskipper	<i>Periophthalmus barbarus</i>
Anabantidae		<i>Ctenopoma kingsleyae</i>
Cynoglossidae	Senegalese tonguesole	<i>Cynoglossus senegalensis</i>

Although I am still in the process of analysing the data collected from 2006, preliminary analysis indicates that the results are broadly similar to that have found in 2005. Detritus is the commonest food item in the fish diet and the fish communities on the floodplains are dominated by *Tilapia guineensis*. The diversity of fish utilising the floodplains reaches a peak in the middle of the rainy season probably reflecting the occurrence of both estuarine and primarily freshwater species concurrently. The reproductive periodicity varies widely between the different species. While a few do not seem to have a definite reproductive period during the rainy season, other species such as *Chrysichthys nigrodigitatus* reproduce mostly at the beginning of the rains, whereas for *Synodontis schall* it seems to coincide with the peak of the rains at the middle of the rainy season.

Since data on the fish communities for most tropical river floodplains are only available after the river channels were impacted by a dam, an understanding of how the fish communities on the River Gambia are structured is of vital importance. By the end of the 2007 field season we hope to have comprehensive data on the fish communities in our sampling locations, which should provide valuable reference data for any future studies looking at the impact of the dam downstream on the River Gambia.

I have really enjoyed my fieldwork in The Gambia as evident from Fig.1 and I am grateful to the FBA for the support obtained from the Hugh Cary Gilson Memorial Award that has helped enable this.



Fig. 1. Vasilis Louca with Prof. Steve Lindsay, Balla Kandeh and Musa Drammeh sampling in the River Gambia floodplains near Farafenni.

### *References*

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- Lowe-McConnell, R.H. (1975) *Fish communities in Tropical Freshwaters*. Longman, New York: 337pp.