Invasive Alien Species in the Kafue Flats Zambia: *Mimosa pigra* infestation in Lochinvar National Park and the adjacent Game Management Areas (GMA's)

A BRIEF REPORT

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This document brings together information on the current status of the Kafue Flats in relation to the invasion by Mimosa pigra. The information was gathered through field data by the author currently doing her PhD at University College and hence only expresses the opinion of the author. This document also serves as a to the World Parks Congress session on Invasive Alien Species (IAS) and their impacts on wetland ecosystems globally.

The paper is also a contribution to institutions such as Zambia Wildlife Authority (ZAWA) under whose jurisdiction Lochinvar Nationl Park is; Zambia Electricity and Supply Corporation (ZESCO) who is responsible for the two dams in the catchment; WWF- the conservation organization – whose *Partners for Wetlands Initiative* will certainly benefit from this information and Environmental Council of Zambia (ECZ) who are the Administrative Authority for the Convention on Wetlands (Ramsar, 1971).

Photo Credits:

All pictures were taken during field study in the Kafue Flats by author (2002/2003).

Introduction:

The Protected Area- Lochinvar National Park:

The Kafue Flats are perhaps one of the worlds largest and most biologically diverse floodplain systems. Lying almost entirely in the Southern Province of Zambia, the floodplain flooded to an enormous extent of about 6,500km^2 at the peak of the flood period in March.

However, this has somehow been altered after the construction of two dams – one upstream of the area, Itezhi-tezhi reservoir and the other downstream of it – the Kafue Gorge dam.

The Kafue flats host two of the world-renowned protected areas, the Lochinvar and Blue Lagoon National Parks. Both are Ramsar sites, in short they have been selected by the Zambian government through Convention on Wetlands (Ramsar, 1971) based in Switzerland - as special areas of protection. Of course after having specific criteria two being the only area in the whole world that has the endemic lechwe, the Kafue lechwe antelope (*Kobus leche kafuensis*) and also a migratory and breeding site for over 400 bird species. They are also home to the endangered wattled crane.

The Kafue basin as a whole plays a central role in the economy of Zambia. To highlight a few points, the copper mining industry of Zambia lies within this catchment area. The Nakambala Sugar Plantations (11,000ha of sugar cane) are just downstream of the actual floodplain and national parks, and lie entirely within the Kafue basin catchment area. Fifty percent (50%) of Zambia's total population is concentrated within this catchment area.

In short the importance of this basin to Zambia cannot be overemphasized.

The Changes – Hydrology and vegetation

Since the operation of the two dams, Itezhi-tezhi and Kafue Gorge respectively, the flooding pattern of the flats has changed considerably (Minderhound, 1980). Under natural conditions the flats used to be emptied almost completely at the end of dry season (October/November), but now the two dams have created a permanently flooded area. And areas of the flats that are no longer seasonally inundated have been exposed to many of the adverse conditions and some of the wetland plant species have been replaced by more xeric-adapted plant species and herbaceous plans (see Fig. 1 & 2). Some parts of the floodplain proper are slowly being claimed by termite mounds – a clear indication that the area no longer gets flooded for a long period of time (Mumba, PhD study, 2002)

Fig. 1. Herbaceous plants growing in floodplain

The Chunga Lagoon (Chunga Lake henceforth) prior to the construction of the two dams in the basin was almost entirely emptied during the dry season but is now a permanent standing water body forming a rather shallow lake with an average depth of 4 meters (See Fig.2). Hence this situation has brought about several changes including changes in the vegetation structure of the wetland system.

Fig 2. Chunga Lake as seen from above.

The Invasion – *Mimosa pigra* in the Kafue Flats

The Plant:

A noxious shrubby weed, *Mimosa pigra* can grow up to 6m. Originally from Tropical America, this leguminous shrub favours moist, open sites particularly floodplains in the wet-dry tropics (Lonsdale et al, 1985). The pods are hirsute (have little "hairs") (see Fig.4) and break up into partially dehiscent segments, each containing a seed and can float for indefinite periods.

Fig. 3. *Mimosa pigra* infesting Chunga Lake

Some of the known areas in the world where the plant has invaded wetland ecosystems include Thailand, Vietnam and Australia.

Several studies of *Mimosa pigra* have been done in Australia where the plant has invaded vast areas of wetlands especially in northern Australia (Braithwaite *et.al*., 1989). This plant a native of Mexico, is an opportunistic plant and those areas subject to disturbance are most vulnerable to weed invasion especially floodplain areas. A study done by Braithwaite *et al*. (1989) showed how mimosa has negative effects on both flora and fauna of wetland ecosystems. The study showed that the severity of impact of this plant results from the high dominance of the invading species; the gross change in vegetation structure and the conversion of a wide range of

Fig. 4. *Mimosa pigra* seeds and flowers

vegetation to a homogeneous tall shrub land. Such habitat changes are likely to be catastrophic for animals, water bird populations and local communities alike. *Mimosa pigra* has also been

known to reduce seedling recruitment in indigenous species by forming dense monospecific stands that suppress existing plants and prevent recruitment (Braithwaite *et al*., 1989; Frankel *et al*., 1995)

Invasion in the Kafue Flats:

Thompson (1986), in her study reported that mimosa was spreading in Lochinvar and showed signs of becoming a weed, which might require control. In fact it was observed that prior to about 1980, one large population of this plant occupied approximately two hectares, at the head of the Nampongwe River in the Chunga Lagoon. Surveys undertaken later indicated that the weed had spread downstream onto the floodplain and by 1986 occupied an area approximately 100 hectares and this infestation covered stretches more or less continuously for three kilometers along the edge of Chunga Lake (Thompson, 1986).

The plant has now spread tremendously occupying a stretch of over 18 kilometers from the east of the park and adjacent GMA, with heavier infestation in the east of the park (Mumba, PhD study, 2002). *Mimosa pigra* is encroaching feeding grounds for the lechwe and nesting sites for aquatic birds, i.e. along the banks of the now Chunga Lake (see Fig. 3 & 5) and on the Kafue River floodplain proper along small seasonal streams. It has also been observed to grow with other opportunistic aquatic invasive species such as *Salvinia molesta* (See Fig 5.) when growing in the flooded portions of the lagoon. Small infestations of water hyacinth (*Eichhornia crassipes*), another problematic aquatic weed has also been observed in the area.

Fig.5

Fig. 6

Impacts of the invasion in the flats

The invasion certainly poses major threats to the biodiversity of the floodplain. And not only this but also to the communities that are highly dependent on the area for their livelihood (Fig.7).

The flats are important grazing grounds for the pastoral tribes that have been dependent on them for hundreds of year feeding area for cattle for the Tonga and Ila tribes. These tribes have from time immemorial been dependant on the varied functions, products and attributes of the Kafue Flats wetland system. A historically rich area, Lochinvar National Park is site to the infamous Sebanzi Hill that dates back as a Stone Age site. Though not in the actual floodplain, this hill overlooks a part of the floodplain used for grazing by lechwe, zebra, wildebeest to mention but a few of the species present in the area.

There is also no doubt that the flats are a significant source of protein for Zambia. The fish caught in the area is actually "exported" to other areas within the country. The fishing community is also under threat from the changes that have taken place in the flats.

Fig.7. Fishermen at Chunga Lake

Conclusion - The future of the floodplain

There is still much to e learnt about invasion dynamics in wetland ecosystems in Zambia. Clearly the native vegetation in the flats is being out-competed and the whole wetland has been subject to relatively rapid change.

Quite clearly Mimosa pigra in not only a major environmental threat but also an economic one. Management of this weed will certainly be expensive. The need to manage this invasion cannot be overemphasized.

It is quite clear that the Kafue River Basin has in the last few decades been under intense developmental pressure. The water demand in the area has grown rapidly with possible future irrigation projects underway in the river basin. There is need to view the whole river basin as a wide complex of resources that need to be managed.

Recommendations:

Need for a Management Strategy

The Kafue Flats need a proper management strategy at this point in time. There will be need for the relevant authorities to set priorities to effective weed control. And the first should be to safeguard those areas that have the most to lose rather than trying to control weeds in those areas that already have large stand. Such a strategy should help prevent large weed infestations from ever establishing in new areas.

Bearing in mind that most of the infestation is actually in the national park, it would bold to state that perhaps the parks authority would have to possibly consider changes in the park boundary.

It is also important that they start considering monitoring of the biodiversity status in the designated parks. This, at least, will serve as a guide to the actual status of these protected area, whether they are deteriorating or not.

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