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AWF's Experience in the Management of Fisheries in Two Southern African Landscapes

AWF Conservation in
Practice Papers



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The AWF Conservation in Practice Paper Series has been designed to disseminate to partners and the conservation community, key lessons learnt and experiences from AWF's African Heartlands Program. This series aims to share current work, what lessons have been learnt in order to provide examples that can be adopted by other conservation organizations and players to improve conservation action world wide.

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Cover photo: The aquatic resources working group showing fish catch after a fishing expedition

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Introduction

The African Wildlife Foundation (AWF) is the leading international conservation organization focused solely on the African continent. For more than 40 years, AWF has concentrated its efforts on building the capacity of Africa's people and institutions to manage natural resources and to protect the unique and rich biodiversity of the African continent. From the day AWF was founded in 1961, it has recognized that Africa's wildlife resources and ecosystems are key to the future prosperity of Africa and its people. Over the past five years AWF has established the African Heartlands Program; an integrated approach to conservation and development in selected, large, wildlife-rich landscapes, or "Heartlands", which offer both ecological and economic viability for the long term.

Heartlands are large, cohesive conservation landscapes, which are biologically important and have the scope to maintain healthy populations of wild species and natural processes well into the future. AWF currently works in eight Heartlands covering parts of eleven countries in central, eastern and southern Africa (Botswana, Democratic Republic of Congo, Kenya, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe; see *African Wildlife Foundation Heartlands Map*—figure 1. Each Heartland forms a sizeable economic unit in which tourism and other natural resource-based activities can contribute significantly to local livelihoods. Most Heartlands include a combination of government lands (such as national parks), community-owned lands, and lands held privately. In these vast

conservation landscapes, which frequently cross national boundaries, AWF works with a broad range of local partners to improve natural resource management and conservation practices and mitigate threats to valuable resources. The number of Heartlands will increase with time and resources to encompass other geopolitical areas and ecosystems of Africa. (Muruthi, 2003).

As the Heartland Program has developed, aquatic resources – rivers, wetlands and fishes – have taken center stage as priority conservation targets. This comes as no surprise given for example that two of AWF's priority landscapes, the Four Corners Transboundary Natural Resources Management (TBNRM) area and Zambezi Heartland, are spread over 6 of the 8 countries that share the Zambezi River Basin, and the ecological cores of both Heartlands –

Figure 1: African Heartlands Map



the parks estates – are dependent on the waters of the Zambezi River and its tributaries. Waters of the Zambezi, Chobe, Kwando-Linyati system, Kafue, Okavango Delta, the Luangwa and numerous other small tributaries and the reservoirs along the Zambezi support a thriving tourism industry, commercial, subsistence and recreational fisheries, and important commercial crop cultivation under irrigation. All these activities have direct and indirect impacts affecting the health status of the aquatic resources in the area. On the basis of wide and extensive consultations with stakeholders in the sites, AWF is working with partners to identify and mitigate threats to water resources in the Zambezi Basin and to develop best practices that will enable local people to sustainably utilize and benefit from these aquatic resources.

This paper describes how AWF has applied its Heartland Conservation Process (HCP)¹ in identifying conservation targets and related threats in these two landscapes, and discusses experience gained in the management of fisheries resources.

Four Corners TBNRM Area and Zambezi Heartland

AWF promotes landscape level conservation in the Four Corners TBNRM area and Zambezi Heartland. A brief description of the two landscapes is given below:

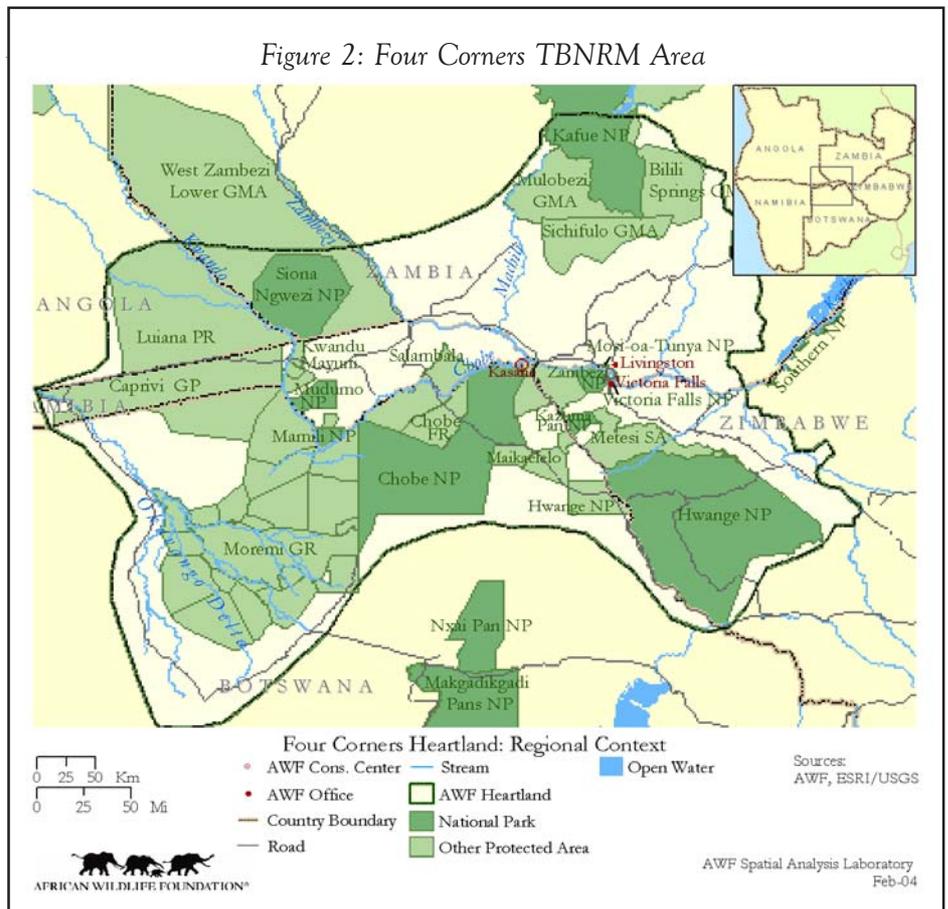
Four Corners TBNRM

The Four Corners TBNRM area covers approximately 220,000 km² including the eastern Caprivi Strip in Namibia, Ngamiland in Botswana, Hwange District in Zimbabwe and parts of southern and western Provinces in Zambia (See figure 2). The Zambezi River is the

major drainage system and forms the core of the Four Corners TBNRM area ecosystem. National Parks and Wildlife Reserve in the area include Chobe and Moremi in Botswana; Mamili, Mudumo and Bwabwata in Namibia; Mosi-Oa-Tunya and Sioma Ngwezi in Zambia; and, Hwange and Zambezi in Zimbabwe. National Parks and other protected areas (Safari Areas, Game Management Areas, Forest Reserves, Conservancies and Moremi Wildlife Reserve) constitute about 50% of the total area. The Four Corners TBNRM area is a prime wildlife and tourism area and is one of the most important terrestrial and fresh water ecosystems in Africa.

Zambezi Heartland

The Zambezi Heartland covers an area of approximately 39,000 km², consisting of 6,500 km² National Parks, 4,900 km² Game Management Areas (GMAs), 11,000 km² Safari Areas, and the rest are open communal areas (See *The Zambezi Heartland Map* – Figure 3). In addition to the biologically diverse



terrestrial wildlife and plant resources, the Zambezi River and its tributaries are an important habitat for freshwater fish resources including the tigerfish (*Hydrocynus vittatus*), lungfish (*Protopterus annectens brienii*), and a wide variety of cichlid (tilapias) and cyprinid species, some of which are local endemics and rare species.

Heartland: river systems, wetlands, wildlife corridors, habitat complexes, native fishes, endangered and / or threatened species and species assemblages. The water-related conservation targets are described below:

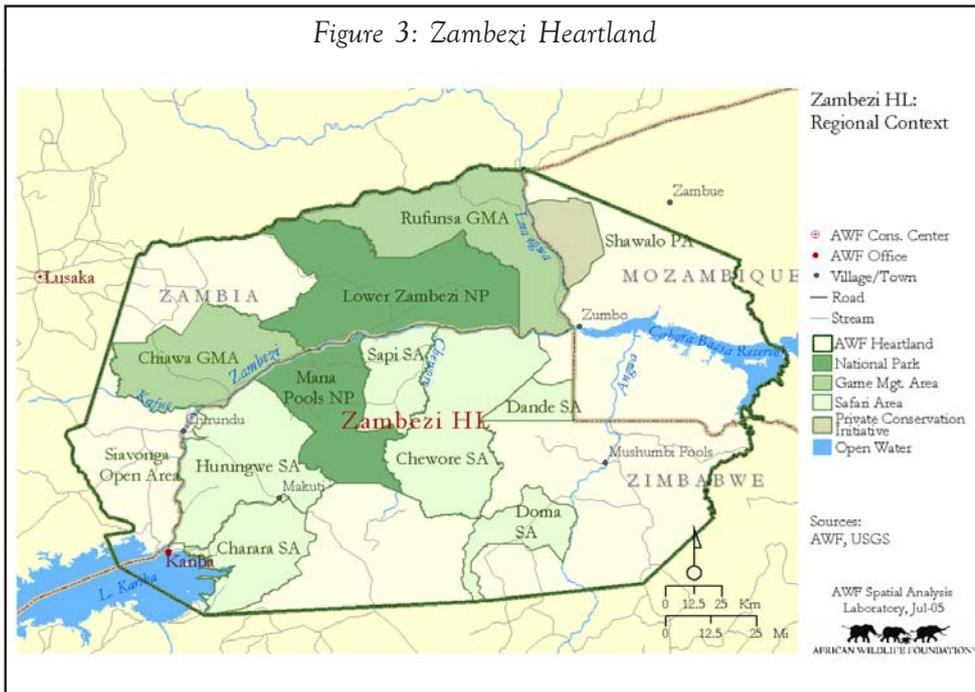
River Systems

The key conservation target is the Zambezi River and its tributaries. The Zambezi is one of Africa's great rivers with over 1.4 million km² of water catchment area. The river, its tributaries, wetlands and riparian habitats constitute the major natural resource component that drives the Four Corners TBNRM area ecosystem. Along its entire stretch, the river is naturally divided into three sections - the Upper Zambezi from the source to Victoria Falls, the Middle Zambezi downstream from

Victoria Falls to Cahora Bassa in Mozambique, and the Lower Zambezi from Cahora Bassa to the Delta at the Indian Ocean in Mozambique.

The Upper Zambezi is separated from the lower sections by a natural barrier -Victoria Falls - so fish species composition is different from those in the lower sections of the river. Likewise, the Middle Zambezi has been largely modified by the creation of artificial reservoirs at Kariba, Kafue and Cahora Bassa Gorges. The dams created artificial barriers that are permanent and the resultant river fragmentation prohibits migration of fishes along the river channel during breeding runs (World Resources Institute, 2003). The Lower Zambezi is subsequently affected by the altered flood regime from upstream damming which influences the viability of aquatic fauna and flora that utilize the fresh-brackish-seawater habitat continuum.

Figure 3: Zambezi Heartland



Heartland Conservation Planning

In April 2000 and June 2001, AWF held planning meetings for the Zambezi Heartland and Four Corners TBNRM area respectively. These meetings brought together different stakeholders representing local people, wildlife agencies, private sector and NGOs to come and identify conservation targets, the threats to these targets and the related threat abatement strategies. AWF considers this as a very crucial stage to conservation work in every Heartland (AWF, 2003).

Conservation Targets

Using this planning process, AWF and partners identified the following conservation targets for both the Four Corners TBNRM area and Zambezi

AWF and partners identified the following threats for this conservation target: altered flow regime, habitat loss, siltation, eutrophication and point source pollution.

Wetlands

Chobe/Kwando/Linyanti/Liambezi, Zambezi Floodplain (East Caprivi), Okavango Delta, Kazungula floodplains, Kazuma depressions, dambos and pans are critical to the maintenance and natural functioning of the river systems and constitute important habitats for aquatic and terrestrial biodiversity. These systems are critical as foci for specialized aquatic biodiversity, and also as watering points for wildlife in the entire landscape. Some of these unique vleis, pans and swamps are the only habitats for rare aquatic species like the lungfish (*Protopterus annectens brieni*). Recent scoping assessments revealed that these habitats are threatened by encroachment from agriculture and human settlements, in addition to general deforestation.

AWF and partners identified the following threats for this conservation target: falling water table, altered species composition and structure, habitat degradation, loss of aquatic species diversity and habitat destruction.

Native Fishes

Fish are a major aquatic resource in terms of their contribution to the biological diversity of the river system and their role in commercial, sport and subsistence fishing. The basin's riparian countries have a significant proportion of their freshwater fish catch coming from the Zambezi River and its tributaries. Fish provide a significant percentage of protein to the Zambezi Basin states with, for instance, the Barotse Floodplain fisheries in the Upper Zambezi supporting about 300,000 people (Chenje, 2000). Demand for fish has continued to rise as a result of population growth. Fisheries sectors of Botswana, Malawi, Mozambique, Zambia and

Zimbabwe rely on the Zambezi River and its tributaries contribute substantially to their national economies. For example, the commercial offshore pelagic fishery for the freshwater sardine (*Limnothrissa miodo* - locally called kapenta) on Lake Kariba yielded 30,000 tons of fish worth US\$55 million in 1993 (Chenje, 2000). AWF and partners have identified population decline and altered species composition and structure as threats to native fishes. There is subsistence fishing along the stretch of the Zambezi River from Upper Zambezi to the Delta. Most fishers are from communities settled along the riverbanks that, in addition to the traditional subsistence crop agriculture and market gardening, carry out fishing as a livelihood strategy. In the Middle Zambezi, this is prevalent along the Kafue, Luangwa and the Zambezi rivers on the Zambian and Mozambican sides, and to a lesser degree, on the Zimbabwean side. The proliferation of tourist lodges along the river has also seen an increase in recreational fishing by tourists.

The Chobe, Okavango, Caprivi and Barotse floodplain aquatic habitats support rich species diversity. The whole Zambezi River system is endowed with a rich fish fauna whose species are not all known. A basin-wide inventory of fishes of the Zambezi River and its tributaries (excluding Lake Malawi) totals 239 known species (Skelton, 1998). Recent surveys done by AWF and partners (Aquatic Resources Working Group - ARWG- and the South African Institute of Aquatic Biodiversity- SAIAB) suggest that there are possibly about 20 more species to be added mainly from the headwater streams in northwestern Zambia, most of which are not yet described. Research on these species is still ongoing (Denis Tweddle, pers. comm.).

Globally, 20% of all freshwater fish species are now threatened or endangered because of dams and water withdrawals that have destroyed or degraded free-flowing river ecosystems where they thrived (Ricciardi & Rasmussen, 1999). The mighty Zambezi River is no exception to this threat as it is impacted by two of

Southern Africa's largest hydrological schemes – Kariba and Cahora Bassa (see figure 3). Further threats to fisheries resources include poor land husbandry, erosion and deposition of silt in rivers and streams that destroy breeding grounds. Chemical pollution from agricultural activities and urban settlements cause eutrophication resulting in proliferation of invasive weeds, hence deoxygenating of bottom waters.

Intervention Strategies

In addition to identification of conservation targets and threats, AWF and partners identified intervention strategies (AWF, 2000; 2001). Two intervention strategies have proved to be very useful in strengthening collaboration in the management of fisheries resources: establishment of an Aquatic Resources Working Group and multi-institutional partnerships in the Four Corners TBNRM areas and Zambezi Heartland respectively. These strategies are discussed below:

Aquatic Resources Working Group

As part of the Four Corners TBNRM Initiative, AWF undertook a consultative process through which we identified partners and mechanisms for supporting projects aimed at joint and improved management of shared fisheries resources and to bolster shared water resources collaboration between fresh water fish scientists, government officials and conservation non-governmental organizations (NGOs). This culminated in the establishment of the Aquatic Resources Working Group (ARWG). Subsequently, the Southern African Development Community (SADC) formally recognized ARWG as the working group to address management of shared fisheries resources in the Four Corners TBNRM area.

ARWG membership consists of representatives of fisheries authorities in the four countries (Botswana, Namibia, Zambia and Zimbabwe) participating in the Four Corners TBNRM Initiative, as well as a representative of the SADC Inland Fisheries Sector

Technical Coordinating Unit (IFSTCU) and the South African Institute of Aquatic Biodiversity (SAIAB). The group members also sit on the SADC Inland Fisheries Technical Committee, which, under the auspices of the IFSTCU, plans and implements strategies for regional cooperation in the management of shared aquatic resources. The working group is comprised of seasoned and experienced fisheries biologists and ecologists, who, amongst themselves, have over 30 years experience in fisheries ecological monitoring.

The group's primary goal is to implement the provisions of the SADC Fisheries Protocol whose underlying values are to promote collaboration in the management of shared fisheries resources and information exchange in the region. To this effect, AWF and its partners are working towards standardization of monitoring systems, surveys of fish biodiversity and socio-economic aspects, and establishment of a GIS database. When fully underway the ARWG will contribute significantly to a more efficient planning of conservation interventions. (Please reference other AWF freshwater essay here)

Multi-institutional Partnerships

In recognition of the pool of expertise available in the sub-region, AWF sought to work with institutions that would extend and complement its conservation activities. AWF has established multi-institutional technical teams to implement its work on monitoring water resources in Zambezi Heartland. Key partners include:

- Lake Kariba Research Station (ULKRS), University of Zimbabwe
- Lake Kariba Fisheries Research Institute (LKFRRI), Zimbabwe Parks and Wildlife Management Authority
- Zambia Department of Fisheries (DoF)
- Environmental Council of Zambia (ECZ)
- Zambezi River Authority (ZRA), and

- Tchuma Tchato Community-based Natural Resource Management (CBNRM) Program Staff in Mozambique

AWF has been coordinating field activities of representatives from the above institutions. This strategy facilitated transboundary collaboration among institutions whose previous management activities were driven by national agendas. As the impacts of many management decisions within the Zambezi basin transcend national boundaries, the multi-institutional management of these shared waters offers the best opportunity to improve the viability of its resources for the benefit of wildlife and the people of the region. This strategy has proved to be very useful in bringing people with diverse expertise from different countries to work together in conserving the shared fisheries resources. Furthermore, smaller groups have emerged and are interacting in generating information necessary for formulating joint freshwater resources management strategies. For example, fisheries ecologists from ULKRS and DoF teamed up with the AWF Project Officer in August, 2003 to work on the following:

- Assess the variety of fish species present in different habitats through experimental gillnetting,
- Assess the relative abundance of the species, and
- Measure key water quality parameters to assess the nutrient status of the aquatic systems in the Luangwa River.

The team sampled species from three sites, 35 km away from the confluence with the Zambezi River and the Luangwa, a major tributary. A total of 14 fish species, representing eight families, were recorded. Catches were dominated by *Schilbe intermedius* (butter catfish), *Labeo altivelis*, *Hydrocynus vittatus* (tigerfish), *Brycinus imberi*, *Distichodus schenga* and *Synodontis zambezensis*. Such surveys improve understanding of the distribution and abundance of species within the Zambezi ecosystem which will contribute to more targeted management plans as will water quality results when they become available.

The pooled resources and expertise provided by the international collaboration extended the scope of the surveys and the sharing of results will extend their impact across borders. Such international collaboration represents a vital step towards transboundary conservation management.

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Endnotes

¹ HCP is a bespoke science-driven participatory conservation planning, implementation and monitoring process developed by AWF with help from The Nature Conservancy.

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