



AFRICAN WILDLIFE FOUNDATION

FOUR CORNERS TBNRM PROJECT

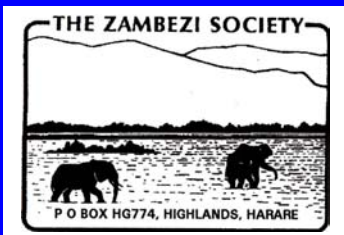
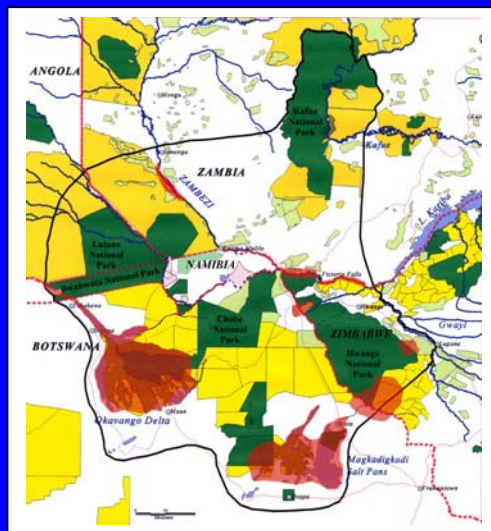
Funded by USAID through the Regional Center for Southern Africa



BIODIVERSITY PLANNING MANUAL

BIODIVERSITY INFORMATION PACKAGE

No: 3



Produced for
The African Wildlife Foundation
by
THE ZAMBEZI SOCIETY
and
BIODIVERSITY FOUNDATION FOR AFRICA



Published for
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The Zambezi Society and The Biodiversity Foundation for Africa are working as partners within the African Wildlife Foundation's Four Corners TBNRM project. The Biodiversity Foundation for Africa is responsible for acquiring technical information on the biodiversity of the project area. The Zambezi Society will be interpreting this information into user-friendly formats for stakeholders in the Four Corners area, and then disseminating it to these stakeholders.

THE BIODIVERSITY FOUNDATION FOR AFRICA (BFA) is a non-profit making Trust, formed in Bulawayo in 1992 by a group of concerned scientists and environmentalists. Individual BFA members have expertise in biological groups including plants, vegetation, mammals, birds, reptiles, fish, insects, aquatic invertebrates and ecosystems. The major objective of the BFA is to undertake biological research into the biodiversity of sub-Saharan Africa, and to make the resulting information more accessible. Towards this end it provides technical, ecological and biosystematic expertise.

THE ZAMBEZI SOCIETY was established in 1982. Its goals include the conservation of biological diversity and wilderness in the Zambezi Basin through the application of sustainable, scientifically sound natural resource management strategies. Through its skills and experience in advocacy and information dissemination, it interprets biodiversity information collected by specialists like the Biodiversity Foundation for Africa and uses it to provide a technically sound basis for the implementation of conservation projects within the Zambezi Basin.

THE PARTNERSHIP between these two agencies was formed in 1996 as a result of mutual recognition of their complementarity. They have previously worked together on several major projects, including the biodiversity component of IUCN's Zambezi Basin Wetland project and the evaluation of biodiversity in Tete province described in detail in the first Four Corners TBNRM Biodiversity Information package.

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AFRICAN WILDLIFE FOUNDATION
FOUR CORNERS TBNRMA INITIATIVE

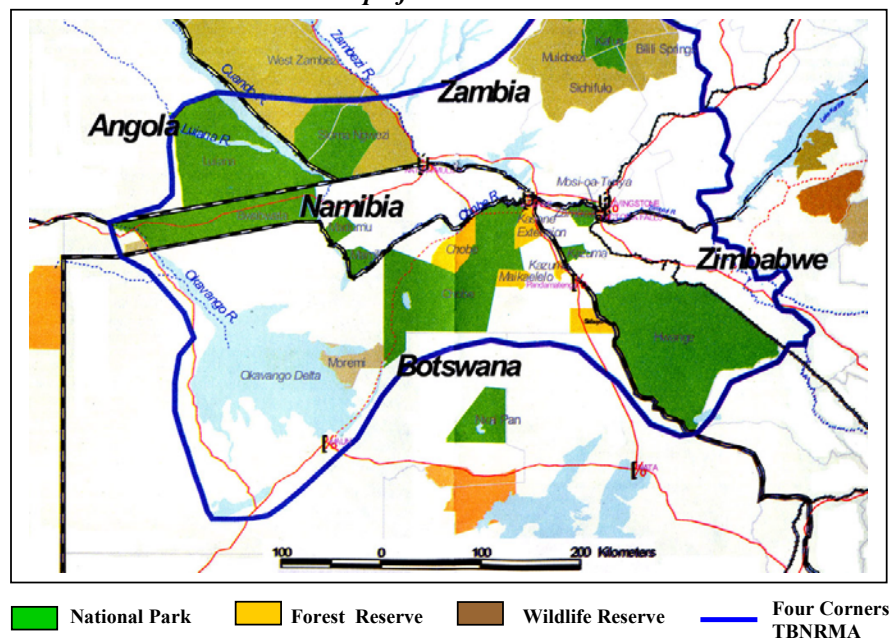
funded by



The **Four Corners Transboundary Natural Resources Management Area (TBNRMA) Initiative** is being implemented by the **African Wildlife Foundation (AWF)** in collaboration with various regional partners in the area defined as Chobe-Hwange-Mosi-Oa-Tunya-Caprivi-Kafue. The initiative is supported by the United States Agency for International Development (USAID) Regional Center for Southern Africa (RCSA).

The Four Corners area covers some 220,000 km². Protected lands within it include the Hwange and Zambezi National Parks in Zimbabwe; the southern part of Kafue National Park, the Mosi-Oa-Tunya and Sioma Ngwezi National Parks in Zambia; and the Chobe National Park and Moremi Wildlife Reserve in Botswana, the Mudumo, Mamili and Bwabwata National Parks in Namibia. These cover an estimated 115,953 km² or just over 52% of the area.

Illustrative map of the Four Corners Area



The “Four Corners” initiative aims to provide the enabling environment (opportunities and mechanisms) for increased cooperation among the four constituent country interests in the management of the natural resources that are shared among them, particularly water, migratory wildlife and critical ecosystems.

AWF has packaged the Four Corners TBNRMA Initiative into a set of interrelated four key results that when achieved, should contribute to a significant increase in the adoption of sustainable natural resource management practices in shared water and wildlife resources. Such practices include natural resource management plans, ecological monitoring systems and conservation business ventures. The adoption of these viable practices in the four countries will only be made possible through the enabling environment that the initiative should provide. The four sets of results also form the four components of the project.

INTRODUCING....



AFRICAN WILDLIFE FOUNDATION

The **AFRICAN WILDLIFE FOUNDATION** is an international conservation organization that has been working solely in Africa since 1961. Most of AWF's work has been in East and Central Africa but it has now expanded to include Southern Africa.

The mission of AWF is as follows: *The African Wildlife Foundation, together with the people of Africa, works to ensure that the wildlife and wild lands of Africa will endure for ever.* To effect this mission across the continent, AWF has condensed its program operations into two essential themes, which are synergistic in application:

Landscape-level conservation through the AWF-African Heartlands Program: African Heartlands are large African landscapes of exceptional wildlife and natural value extending across state, private, and community lands. Heartlands are further defined in ecological, economical, socio-political, cultural and institutional terms. AWF works with landholders, governments, and others in the African Heartlands to conserve wild species, communities, and natural processes. A key tool for landscape conservation work is the heartlands planning process that prioritises what needs to be conserved in a particular landscape and rallies stakeholders to craft management strategies for conservation.

Several heartlands initiatives are currently being implemented with partners throughout Africa:

- East and Central Africa: Maasai Steppe; Kilimanjaro; Samburu; and Greater Virunga.
- Southern Africa: Lower Zambezi; Upper Zambezi; Limpopo.

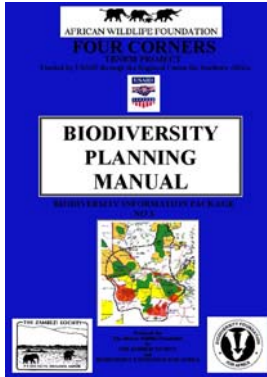
Livelihood impact through the AWF-Conservation Service Centers (CSCs) Program. CSCs are small, multi-disciplinary teams of professionals based in strategic locations. CSCs prepare, broker, and sustain conservation business ventures to bring about positive economic and conservation impact. CSCs typically service beneficiaries situated in heartlands by offering a suite of services such as business planning, legal and contractual services, fund management, community mobilization. CSCs are currently located in:

- Victoria Falls, Zimbabwe;
- Livingstone, Zambia;
- Arusha, Tanzania;
- White River, South Africa;
- Nairobi, Kenya.

The two programs are inter-related. The livelihoods program is tasked to leverage conservation as a land use in strategic parts of landscape where AWF is working. Connectivity between protected areas is often a challenging issue. AWF is concerned that the necessity for economic development is compatible with biodiversity conservation and strives to ensure that it is an asset and not a liability in conserving wildlife habitat. Therefore, human livelihoods and wildlife habitats are locked in a dialectic that could be characterized by conflict or mutual benefit. Consequently, AWF wants tourism and natural resource enterprise to become the optimal and preferred land use in selected priority landscapes in order that Africa's unique wildlife is conserved in perpetuity.

PART 1: INTRODUCTION

Welcome to the AWF FOUR CORNERS *Biodiversity Information Package No: 3*



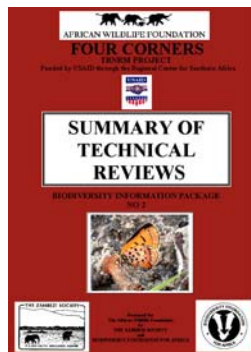
This is the last of three information packages about the biodiversity of the Four Corners Area published by The Zambezi Society and the Biodiversity Foundation for Africa for the African Wildlife Foundation's Four Corners TBNRM Initiative.

This **BIODIVERSITY PLANNING MANUAL** is a call to planners and other stakeholders in the Four Corners Area, to incorporate the biodiversity information gathered for this project into their work in the area. The package does not pretend to provide instant solutions to planning challenges, but aims to give some guiding pointers as to how sound scientific information can be used in developmental decision-making to the benefit of everyone.

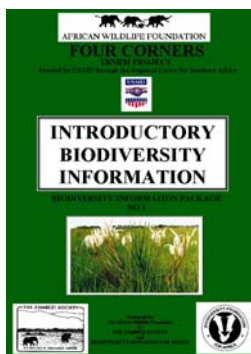
The Biodiversity Information Packages produced for this project are designed for key stakeholders in the Four Corners area, including policy-makers, planners, educators, academics, land managers, extension officers, consultants, donors, NGOs and media practitioners.

The packages aim to:

- present scientifically-sound information about biodiversity in a user-friendly format accessible to anyone involved in the development and planning of the Four Corners Area
- create awareness of how biodiversity information can be a useful tool in the decision-making process for sustainable development
- encourage key stakeholders in the Four Corners area to take scientifically-sound biodiversity information into consideration in all development decision-making
- provide a scientifically-sound biodiversity framework for the Four Corners area within which conservation actions can be better targeted for maximum effectiveness on the ground.



Biodiversity Information Package No 2 (left) provides a **SUMMARY OF TECHNICAL REVIEWS** undertaken by the Biodiversity Foundation for Africa/Zambezi Society partnership to assess the biodiversity of the AWF Four Corners TBNRM area. It outlines the main findings and the conclusions reached as a result of this assessment and makes recommendations for future research, planning and conservation action in this biologically important trans-boundary area.



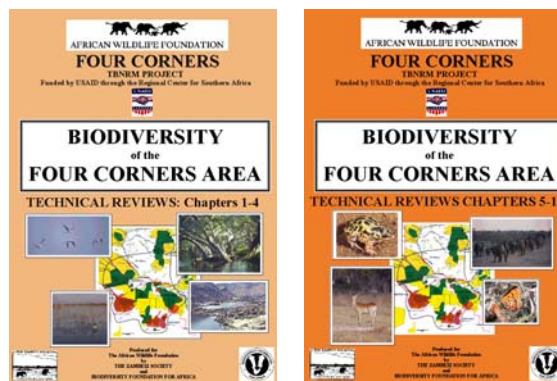
Biodiversity Information Package No 1 (left) was published and distributed to Four Corners stakeholders in 2003. It contains **INTRODUCTORY BIODIVERSITY INFORMATION** about the Four Corners area, a description of its geography and an outline of how the Biodiversity Foundation for Africa and The Zambezi Society intend to review Four Corners biodiversity and present the findings to planners and other stakeholders. It underlines the importance of biodiversity in decision-making and the need for this to be based on good science and provides case-studies to show how this approach has been effective elsewhere in the region.

The Four Corners “Biodiversity Technical Reviews”

More detailed scientific information gathered for the AWF Four Corners TBNRM Initiative by the Biodiversity Foundation for Africa (BFA) and The Zambezi Society is contained within a 500-page document entitled *Biodiversity of the Four Corners Area* (right).

This document contains an Overview and 14 “Technical Reviews” on the biological features, ecosystem processes and species groups of the Four Corners area (see below).

The technical reviews were researched by individual experts and discuss the current knowledge on each topic and the major gaps in it. They provide an assessment of what we know from a conservation perspective, and give an indication of the priority conservation issues for future study. Monitoring, the possible impacts of global climate change, and the value of a transfrontier approach to conservation for the area are also addressed.



Chapter 1: Introduction and Overview

Chapter 2: Landscape Evolution

Chapter 3: Ecological processes

Chapter 4: Vegetation/Woodland

Chapter 5: Plants

Chapter 6: Mammals

Chapter 7: Birds

Chapter 8: Herpetofauna (Reptiles/Amphibians)

Chapter 9: Fish

Chapter 10: Butterflies

Chapter 11: Soil Fauna

Chapter 12: Aquatic Invertebrates

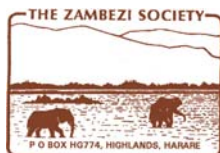
Chapter 13: Animal movement

Chapter 14: Elephant movement

Chapter 15: Elephant impacts

The purpose of this document is to assist the African Wildlife Foundation and other interested organisations and individuals by providing a sound technical base and rationale for future conservation interventions in the Four Corners TBNRM area.

Biodiversity of the Four Corners Area is available in hard-copy, on CD-ROM, or in PDF electronic format by individual chapter. If you wish to receive any of these, please contact:-



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E-mail: zambezi@mweb.co.zw
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PART 2: WHAT IS THIS DOCUMENT AND WHO IS IT FOR?

2.1 Introduction

This booklet, *Biodiversity Information Package No 3 – BIODIVERSITY PLANNING MANUAL* is an output of the “Four Corners” Trans-Boundary Natural Resources Management Initiative, funded by USAID and implemented by the African Wildlife Foundation (AWF), with a number of technical partners. Of these, The Zambezi Society has produced this booklet (and its two predecessors *Biodiversity Information Package No 1 – INTRODUCTORY BIODIVERSITY INFORMATION*, and *Biodiversity Information Package No 2 – SUMMARY OF TECHNICAL REVIEWS*) and the Biodiversity Foundation for Africa was responsible for providing the technical information. This manual is intended as a guide to developmental planners and other interested stakeholders who, as is hoped, wish to incorporate the maintenance of biological diversity - the area’s impressive range of ecosystems, habitats and species - into their activities.

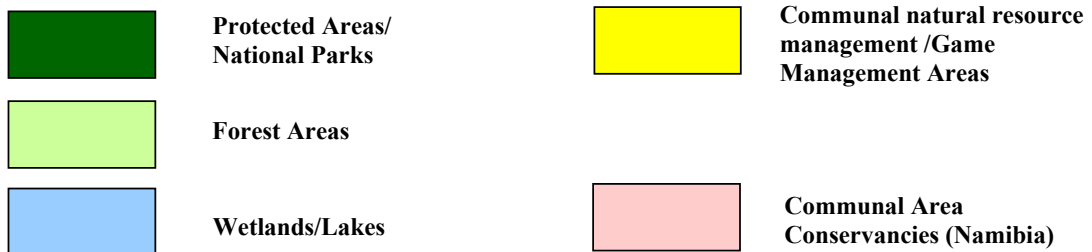
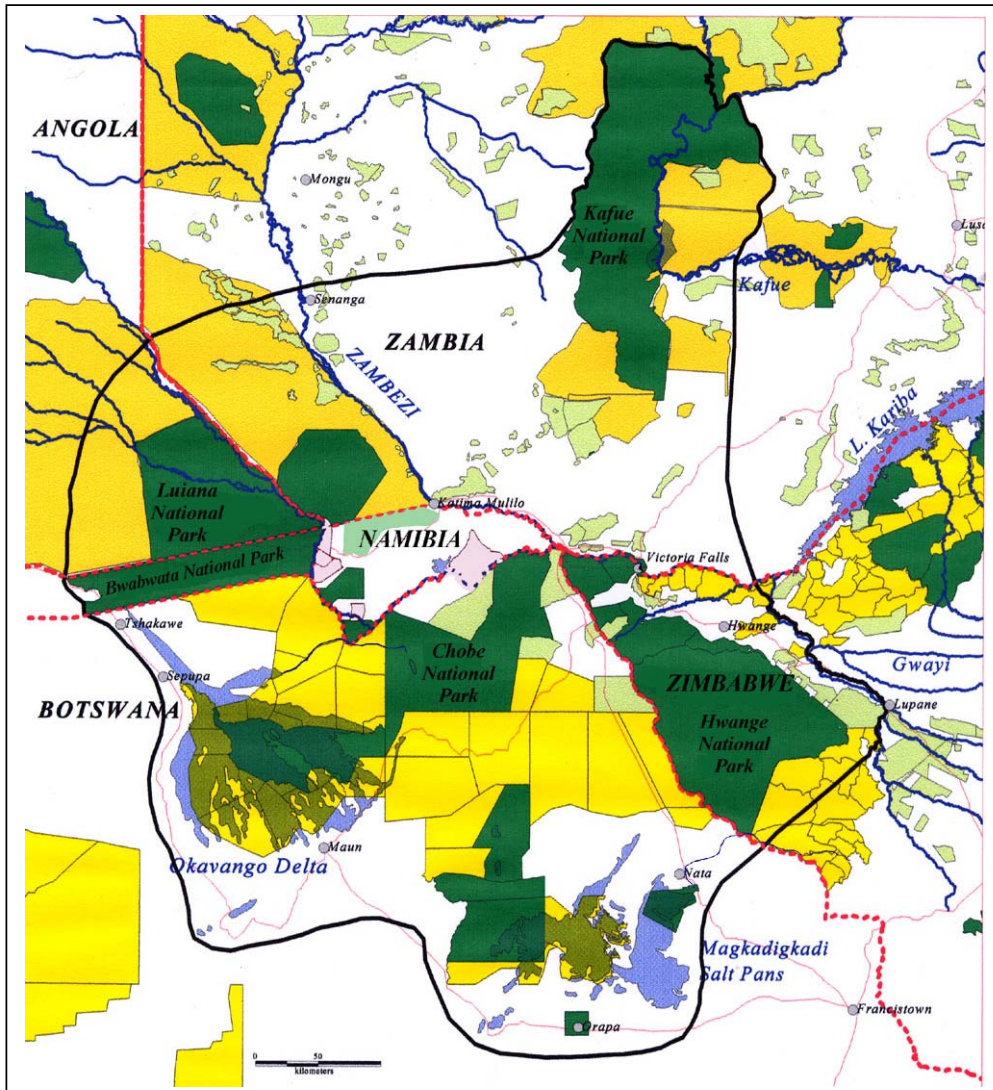
Readers who have already received the previous two Biodiversity Information Packages may find that some of the information which appeared in these earlier documents is repeated here. We apologise for this repetition, but in order for this Planning Manual to act as a “stand alone” document, it is necessary to provide a framework which includes at least the main points of the biodiversity information already published.

The “Four Corners” area (see map on Page v) was selected by USAID and by AWF’s “African Heartlands” programme for several reasons. “Heartlands” are defined by AWF as “large landscapes of exceptional wildlife and natural value, extending across state, private and communally-settled lands.” Heartlands are based on biological rather than political boundaries, and may therefore include parts of two or more countries. Heartlands are therefore, as in this case, transboundary by nature. USAID’s strategic objectives include the promotion of transboundary conservation initiatives; and both organisations believe that, under appropriate circumstances, the sustainable use of natural resources can make a major contribution to national and local development. The “Four Corners” Heartland was considered to be exceptionally rich in such resources - a hypothesis that has been confirmed by the work carried out by the Zambezi Society and Biodiversity Foundation.

The area encompassed by this document (see Map 1 overleaf) covers over 332 000km² of the continental plateau of south central Africa, including south-eastern Angola, the Caprivi Strip in Namibia east of the Kavango River, and the Okavango Delta and Makgadikgadi Pans in northern Botswana. It includes the Victoria Falls, the Hwange National Park and associated Safari Areas, Forest Areas and communal lands in northwestern Zimbabwe, and it also includes southwestern Zambia as far as Senanga, on the Zambezi. The entire Kafue National Park is included, but not the Kafue Flats.

This area differs slightly from the original AWF-defined area of 220 000 km². This is largely because the original “Four Corners” area was determined prior to the collaborative biological research carried out under the USAID-funded project. The technical studies were done on the basis of ecological processes and the ranges of the species involved, two factors that have an important bearing on the determination of conservation strategies.

Map 1. The Four Corners TBNRM Area as covered in the biodiversity reviews



2.2 Who are the “planners”?

Some people hold posts that define them, in so many words, as planners. They are often highly trained and qualified, to degree and post-graduate levels, in a sophisticated and highly specialised discipline. Such people may be found in government departments, in parastatals, in industry and NGOs, working as consultants, and in many other walks of life. If you are among them, please be assured that the authors of this booklet are not qualified planners as such, and make no attempt to represent themselves as such. It is drafted from a biological perspective, and is intended to assist you to incorporate biological and biodiversity issues into your work.

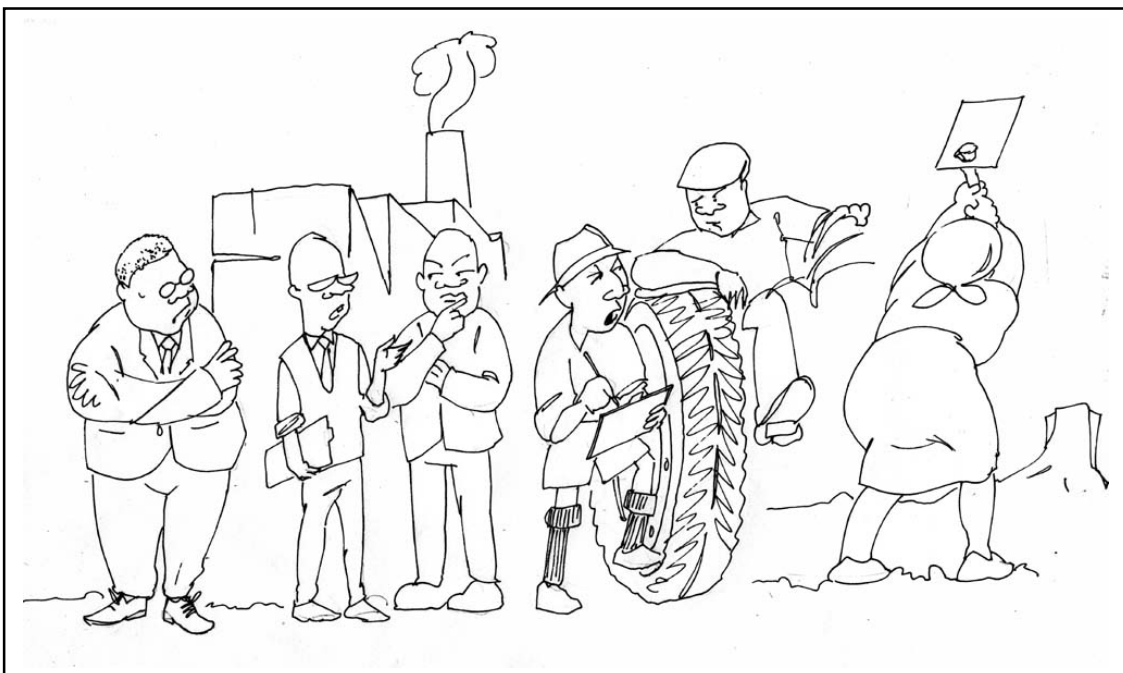
At the same time, however, many other people are also involved in planning, even if their work does not define them as such. Anyone whose position in life enables them to exert influence over the future development or use of an area or resource is, in a very real sense, a planner.

The member of a village committee responsible for developmental activities is a planner, just as much - and often at a very practical level - as the senior planning officer in a government ministry. So is a district councillor; an agricultural adviser; a highly-placed policymaker advising a multinational company; a school-teacher or higher-level educator and a subsistence farmer clearing new fields for crops. All these people - in fact most people are “planners” in this sense - can exert an important influence on the way in which developments proceed.

Obviously we cannot hope to reach all these people. You have been selected as a recipient of this, and of the preceding “Four Corners” information packages and bulletins, for two reasons. One is the influence you wield because of your position. The other is because you are in a position to convince others, at many levels of society, of the importance of planning that helps maintain the ecosystems and species - the biological diversity - of the “Four Corners” area.

That is, if you are yourself convinced that it is a good idea to do so.

Anyone whose position in life enables them to exert influence over the future development or use of an area or resource is, in a very real sense, a planner.



PART 3: BIODIVERSITY – WHAT IS IT AND WHY PLAN FOR IT?

3.1 What is biodiversity?

We dealt with this topic in an earlier information package, but it may be useful to recap briefly on the reasons why biological diversity is important; and especially so in the “Four Corners” area, which is one of the most biologically diverse parts of southern Africa.

Firstly, what is “biological diversity?” Biodiversity can be defined as biological variety at several levels, including that of the gene, the species, and the ecosystem. Biologists measure and quantify biodiversity in numerous ways, within and between ecosystems: indeed, one of the definitive features of biodiversity - as opposed to “nature” is that it can be thus measured and quantified.

At its most developed, biodiversity evaluation and measurement involves some very sophisticated techniques. Before they can be applied, however, it is vital to know a deceptively simple piece of information: what actually exists - what species and ecosystems - are to be found in a given area. Only then can the conservation biologist move on to the more sophisticated business of determining, for example, how to conserve the maximum diversity at the least cost.

Such techniques have not been applied in the “Four Corners” project. The biological diversity of many parts of Africa - this area included - is relatively little known, even today. Conspicuous groups such as large animals - elephant, buffalo and rhino - are well known, as are most birds and fish. Even so, field studies may still reveal hitherto unknown species, or broaden the ranges of known species. Further down the scale, insects and “invertebrates” may not be well studied; and minute but critical species, such as soil organisms, scarcely studied at all.

We have, for our purposes, defined biological diversity as “the variety of genes, species and ecosystems that exist within a given area”. However, the findings and recommendations that have been published during the “Four Corners” project are not based on exhaustive field studies. This would have been prohibitively costly, and would still not have filled in the numerous gaps in our knowledge. Instead, they are based on technical reviews of existing knowledge that has been acquired over many years by biologists, amateur naturalists and others working in the field.

This information is nevertheless adequate to identify a number of areas and species of high biodiversity importance, and to make some initial recommendations for their conservation from a planning perspective.

IN SUMMARY:

WHAT IS “BIODIVERSITY” AND WHY IS IT IMPORTANT?

- **“Biodiversity” is the variety of genes, species and ecosystems that exist in an area.**
- **“Biological diversity” as opposed to “nature” can be measured and quantified**
- **“Biodiversity” studies can provide baseline data against which we can measure future change**
- **“Biodiversity” studies can help us to identify areas and species of high biodiversity importance, to take these into account in our planning and to prioritise conservation actions.**

So much for the “what.” We now turn - as promised at the beginning of this section - to the “why”.

3.2 Why plan to maintain biodiversity?

Conserving - or, as often termed, “maintaining” biodiversity is considered to be important for a wide range of reasons, depending on viewpoint. Some of these reasons may be based on subjective ethical or cultural perceptions; others on matters of immediate or long-term pragmatism.

3.2.1 Subjective reasons

- Many cultures, including those of peoples within the “Four Corners” area, place a high ethical value on the survival of species and ecosystems. This may not be voiced in technical language, but can manifest itself in traditional conservation practices such as the existence of sacred forests, streams and pools; mechanisms such as “totems”; and the reservation of certain species for high-ranking members of the community.
- Members of conservation agencies, and of some sections of the general public, place a high ethical and moral value on the survival of fellow-species and indeed of significant areas throughout the world devoted to nature and wilderness.

Such values, although of considerable merit, however, often break down in the face of pressing economic and social needs at national or local levels. There are, nevertheless, several equally pressing and eminently practical reasons why biological diversity should be conserved:

3.2.2 Practical reasons

- Natural ecosystems provide benefits such as clean air or water. This function can be severely affected by the loss of individual species, or by the disturbance or destruction of ecosystems as a whole. Wetlands and forests are particularly important in this respect. Mankind has not yet discovered ways of manufacturing these essentials in the large quantities produced by natural ecosystems and essential to human survival.
- Properly-functioning and well-managed ecosystems can also provide more localised benefits and commodities, such as food, fruit, thatching-grass and building poles, to rural people. They may only use certain *components* of an area’s diversity, but the continuing supply of these components depends on the survival of the entire ecosystem and its processes.
- Many species can form the basis for lucrative tourism and hunting industries. Large animals are especially important, but tourists are increasingly visiting Africa on specialised birding, botanical or even butterfly safaris, or to catch game fish such as the tigerfish. Again, the survival of these species depends on maintaining the biological integrity of the ecosystems and habitats in which they are found. If the forests or grasslands are lost, so are the elephants and antelopes. If the rivers are dammed or polluted, their biology and hydrology may change to the extent that desirable fish species are lost. So too are revenues from tourism, fishing or hunting.
- These tourism values are greatly enhanced if visitors can enjoy these activities in wild and aesthetically-pleasing surroundings with so-called “wilderness quality” (uncrowded, and superficially unmodified by human activity). Biologically diverse eco-systems often (although not always) have this wilderness quality.

- in the longer term, continued evolution - which means, in effect, the survival of the living planet and its ecosystems, as individual species all inevitably become extinct over such timescales - depends on the survival of diversity among genes, species and ecosystems. This variety is the “raw material” of evolution; without it, species and ecosystems become unable to adapt to factors such as changing climates, and die out.
- At the same time, the loss of functioning ecosystems through human interventions can itself have serious impacts on climate at local, regional and global scales. As a minor local example, rainfall patterns have changed significantly in the vicinity of the Kariba and Cabora Bassa reservoirs. More globally, the ongoing clearance of tropical forests may be impacting on world climate.

IN SUMMARY:

WHY PLAN FOR BIODIVERSITY?

Natural resources provide clean air, fresh water, wildlife and other benefits. People need these things for their health, welfare, livelihoods and future development.

But these benefits are provided by nature ONLY when the ecosystems which contain them are allowed to maintain their integrity or “wholeness” and their biological variety (“biodiversity”).

If these ecosystems are degraded by loss of species, over-exploitation, pollution and other forms of mismanagement, people’s lives will be directly affected as their environment becomes impoverished.

It is the responsibility of EVERYONE to ensure that this does not happen.

ADVANCE PLANNING IS KEY TO PREVENTING THE POVERTY THAT RESULTS FROM ENVIRONMENTAL MISMANAGEMENT

INCLUDE THE MAINTAINANCE OF BIODIVERSITY IN PLANNING BECAUSE:-

- **it is culturally and traditionally valuable to many local people**
- **as members of the global “community of life” we have an ethical and moral obligation to value other species and the areas they inhabit**
- **it provides benefits(e.g. clean air, water, fish, building materials) which are lost if ecosystems are disturbed or destroyed**
- **biologically diverse ecosystems support wildlife which attracts high-paying tourists, hunters and fishermen**
- **biologically-diverse areas often (though not always) have “wilderness quality”, which enhances tourism values and their revenue-generating potential**
- **biological diversity (or variety) contains the genes which are the “raw material” of evolution allowing life forms to adapt and survive into the future**
- **loss of biodiversity and functioning ecosystems can affect climate**

These are generalised rationales, broadly applicable to the maintenance of biodiversity wherever it occurs throughout the world. There are other, more detailed rationales at local scales, and we will look at some of these later on, when discussing planning and conservation objectives. For now, it may also be useful to restate some of the reasons why biodiversity is lost.

3.3 What are the causes of biodiversity loss?

Sometimes, a species with particular values may be driven to extinction by deliberately wilful or criminal actions. The black rhinoceros, which is often hunted illegally for its horn, is a case in point. Poverty may also be responsible for the loss of species that can provide “bushmeat” or other benefits. Even so, individual species can sometimes be redeveloped, *provided that the ecosystems and habitats that support them are allowed to survive.*

More generally, the loss of ecosystems, habitats and their species may result from one or more of several causes -

- Lack of awareness of the importance of, and rationales for, maintaining biodiversity, and therefore conserving ecosystems and their processes and species. This booklet, and the material that preceded it, are designed to improve this awareness, if it did not exist before.
- Lack of knowledge and information at various levels concerning the diversity in a particular area or region. Again, the technical work carried out by the “Four Corners” project is designed to acquire this information, and to present it to suitable audiences in an easily-assimilable manner.
- Failure to implement adequate biological surveys or “environmental impact assessments” (EIAs) before major developments are allowed to proceed. Linked to this is the tendency to take certain proposed developments for granted and to focus on reducing their impacts, rather than taking a broader view and evaluating options that may eliminate the need for a particular dam, for example, altogether.
- Land use planning that fails to incorporate and act on sound biological information. Unplanned and uncontrolled settlement can be particularly damaging in this respect. Again, this usually results from ignorance rather than wilfulness. Better alternatives can often be found, from both agricultural and biological perspectives, in the course of a well-planned and implemented programme.
- Lack of involvement of grassroots stakeholders in the developmental planning and decision-making process.

Note that all these factors are related to good planning, good land use practices and inclusive consultative processes on the part of individuals, planners at all levels, and policymakers. Good biological information is the common vital ingredient. Without this, biodiversity and ecosystem integrity - and the benefits they provide to people and to their environment - will continue to be lost.

IN SUMMARY:

TO AVOID LOSING THE BIODIVERSITY AND INTEGRITY OF FOUR CORNERS ECOSYSTEMS AND THE BENEFITS THESE BRING, WE NEED TO:-

- **Know about the biodiversity of the area and why it should be maintained**
- **Use good biological information**
- **Plan long-term, with a regional AND local focus**
- **Use planning tools like EIAs**
- **Involve ALL stakeholders**
- **Encourage land-use practices that are biodiversity-sensitive**

PART 4: SETTING OBJECTIVES

4.1 Why set objectives for biodiversity?

The setting of clear and realistic objectives is as critical in planning for biodiversity maintenance as it is in any other sphere, and possibly more so, for several reasons: -

- Biodiversity is “scale-dependent.” A species or habitat type that is common in one country may be rare in another, neighbouring country. This state of affairs may be repeated, with variations, down to the level of the district, and may lead to conflicting objectives at these various levels. It is, as a general biological rule, always best to save as much diversity as is practically possible, at whatever level; but also to place as much emphasis as possible on species, habitats and vegetation types that are identified as being particularly rare or threatened by studies such as those carried out in the “Four Corners” area.
- Competing interests may see biodiversity maintenance as directly threatening. This is seldom true from a broader perspective, but may be true in the case of specific vested interests such as the construction of dams for hydroelectric or other purposes. There may well be other, much less damaging alternatives; but the vested interests concerned may lobby powerfully against their adoption.
- National legislation may still override biodiversity objectives in some cases. In some countries, activities such as mining or agricultural disease control may conflict directly with biodiversity maintenance. Again, resolution of such conflicts by good will or legislative change is usually possible, but may meet resistance from the interests involved.
- Political and economic concerns may also override biological considerations at times. There are occasions when this may be valid, but even then, such occasions often result from prior policy failures. More often, an objective evaluation will reveal viable alternatives and options.
- Many people still do not fully understand the concept of biodiversity. In some quarters, for instance, it may be used to denote the “goods and services” that can result from biodiversity maintenance, such as fish, building poles or thatching grass, rather than the fundamental integrity that enables an ecosystem to provide these benefits. Hopefully you, as recipient of these information packs, will be able to clear up such confusion.
- It is simply not possible, even if it were desirable, to conserve everything, everywhere. Development almost inevitably necessitates the modification or even localised loss of some species and habitats. Nevertheless, good planning on the basis of sound technical information will do much to reduce these impacts. Planning for biodiversity conservation is not, as sometimes perceived, in conflict with development. It generally concerns itself with the “how” and “where” of such development. Only in rare cases - such as the dams already noted - may it find itself in direct conflict. Again, clear objectives are vitally important.

Two key factors will assist at the objective-setting stage. One is a clear understanding of the rationale for biodiversity maintenance, and what it involves. The other is a consensual approach to planning derived from a multisectoral consultative process that includes all stakeholders, and especially those most directly affected “on the ground”. Newsletters, questionnaires and workshops are all useful planning tools in this respect, and can assist in setting goals both at the general level, and at the more specific levels that will be necessary when dealing with particular sites or areas.

4.2 Setting objectives for a specific site or area

We have already dealt with the more general case for biodiversity maintenance, but more specific rationales will be required at the objective-setting stage, especially where these specific sites and areas are concerned. Should such a site or area be maintained because –

- It harbours certain species or habitat types that are rare, endangered, or “endemic” (unique to the locality and not found elsewhere)?
- It harbours an unusually high diversity of species or habitats, even if they are not unique to the area?
- There is a need to maintain “representative examples” of species, habitats or unusual vegetation types that are unprotected elsewhere and may become threatened in the future?
- The area is essential in order to maintain an important hydrological or biological process, even though the species concerned are common and widespread elsewhere?
- There is a need to maintain spectacular animals or other natural features that may be of value to tourism?
- The area enables wildlife to access food and water, either year-round or seasonally?
- The area is important for local cultural reasons that may not have been initially revealed by biological surveys?
- The area is used by local people as a source of medicinal plants, building materials or other “goods and services”?

Note that some of these rationales are not solely concerned with biological diversity in the narrow technical sense of the term. Some wetlands, for example, may not have particularly diverse or even uncommon species, but may perform essential hydrological functions such as flood control or water purification.

4.3 Wilderness tourism

The tourism issue also needs some elucidation, particularly within the “Four Corners” area. Ecotourism is often advanced as a major reason for biodiversity maintenance, and this is very largely true. Even though much tourism is based on spectacular animals such as elephants and lions, the survival of these species depends in turn on the survival of the ecosystems on which they depend.

There is, however, another aspect of tourism: surveys show that tourists are also keen to see and enjoy what they consider to be “real African wilderness.” Whether or not such wilderness is genuine, in the strict sense of being pristine and unaffected by human activity, is irrelevant; and it is not easy to find such true wilderness in any case. What matters is that a place *looks* and *feels* wild, in the tourist’s perception. This needs to be taken into account by planners in tourist areas.

The first point to note is the difference between maintaining biodiversity and maintaining “wilderness quality.” This quality is difficult to define, but can be summed up as for our purposes as landscapes and surroundings that meet the overseas tourist’s perception of “wild Africa.”

Such landscapes aren't necessarily "natural" or even "wild", in their truest senses, but are aesthetically pleasing, uncrowded, and superficially unmodified by human activity.



The Victoria Falls area needs careful planning so that tourism thrives without spoiling the valuable "wilderness qualities" (pictured above) of the Zambezi River in the area.

An area with high wilderness values does not necessarily have high biological diversity. It will be conserved primarily because of its aesthetic values. It is also possible to conserve considerable biological diversity in small areas with little or no wilderness value.

Sometimes the two may coincide. It is nevertheless important to know what is being conserved, and why; in other words, to set clear objectives. Until recently, the sensitive development of tourism areas, and the maintenance of their aesthetic qualities, was largely the province of managers of National Parks and similar protected areas, and there are unfortunately numerous bad examples of planning in such areas within the region. One cluster of corrugated-iron watertanks standing on lattices of rusty girders, visible for several kilometres on otherwise beautiful riverbanks, destroys "wilderness value" across many square kilometres. Most areas, if well planned, can accommodate a surprising number of visitors and still give an impression of space and even solitude; but the siting of roads, game-viewing facilities, camp sites and other accommodation, and of service facilities are all of great importance.

Today, as ecotourism becomes a popular activity in communal and other lands outside National Parks, there is also a need for sensitive planning in these areas as well. Some planners may already have the required expertise, but it is a somewhat specialised task, and it may be advisable to call on the services of experienced tourism planners.

IN SUMMARY:

WHEN SETTING OBJECTIVES FOR CONSERVING BIODIVERSITY

- 1. Be clear why you need to maintain biodiversity and what this involves at all levels**
- 2. Involve all the stakeholders, especially those directly affected "on the ground"**
- 3. Take specialist advice where necessary (e.g. tourism planning)**

IN SUMMARY:

SOME GUIDELINES FOR SETTING PLANNING OBJECTIVES:

- As a general biological rule: save as much biodiversity as practically possible, especially species, habitats and vegetation types identified as rare or threatened by biological studies such as those carried out in the Four Corners.
- Watch out for vested interests with lobbying power who see biodiversity maintenance as directly threatening. Try to remain objective.
- National legislation may override biodiversity considerations. Conflicts of interest can be solved with good will or legislative change, but there may be resistance. Again, try to remain objective.
- Biodiversity is often misunderstood as being the “goods and services” (e.g. fish, building poles or thatching grass) of an ecosystem. However it is more precisely the biological variety of an ecosystem, the “wholeness” or “integrity” of which provides these benefits.
- In developing countries, some compromises have to be made in biodiversity conservation, but careful planning is key to reducing impacts. Planning for biodiversity is NOT in conflict with development. It is the only sensible option for sustainability. Clear planning objectives are vital.
- There may be specific reasons for conserving particular sites and areas. These reasons may be biodiversity-focused, but they may have wider environmental application. Planners need to be very clear on the rationales for conserving a specific area and set clear planning objectives from the outset.
- “Wilderness values” (which may or may not co-incide with high biodiversity) are important and should be taken into account when setting planning objectives for areas where eco-tourism is likely to be important.

PART 5: LAND AND LAND USE PLANNING

5.1 Tools for biodiversity planning

Land planning and management is one of the most important tools available to those intending to incorporate biodiversity considerations into their activities. We would not presume to offer guidance on land planning as such, as we are much less qualified to do so than are most recipients of this document. Nevertheless, a few general points are in order, the first of which concerns the general framework within which land planning must take place if it is to be effective. Briefly, such a framework requires political stability; equity in respect of land distribution; effective legislation; suitable consultative mechanisms; and institutions not only capable of undertaking the planning functions themselves, but - and this is the really critical issue - of ensuring that the planning is implemented. There are many examples within the region in which this vital factor is absent. The land planning exists on paper, but the situation on the ground is likely to be chaotic - and highly destructive in terms of biological diversity, ecosystem integrity, social equity and economic viability.

Land planning that includes conservation objectives can also be a sensitive issue. Some may characterise it as “stealing more land for animals.” This perception is based on a misunderstanding that it is important to eliminate from the beginning. Biodiversity issues seldom, if ever, pit conservation against development. Planning for biodiversity does not pose “either-or” questions. It is almost always a matter of the “where” and “how” of development initiatives, *not* of suppressing development itself. In other words, it seeks to ensure that development occurs in suitable places and in an appropriate manner.

Some 30% of the land within the Four Corners area is already under some form of government protection for conservation goals, whether in the form of National Parks or other designations such as hunting reserves. This figure is far in excess of the global - or even regional - average, and these areas already maintain a great deal of the region’s biological diversity.

The obverse, of course, is that 70% of the land in the area is *not* protected, except possibly by minor legislation concerning issues such as streambank cultivation, often created by former colonial governments and seldom strictly implemented.

The biological research carried out within the “Four Corners” area has shown that some of the features within these unprotected lands are of particular importance to the region’s biology. Some include routes used by animals moving to seasonal water sources, or even between the major protected areas, and it is important, for biological reasons, to keep these routes open - or if they have already been closed, which has happened in much of northern Botswana, to find ways of reopening them.

Others, such as certain areas of riverine and other forest or woodland - the major ones are detailed later in this document - may harbour plant or animal species that are not represented within the protected areas, and thus make an important contribution to overall biodiversity.

The key to sound planning lies in identifying these areas, planning land uses accordingly, and encouraging the willing implementation of this planning by providing a clear indication of the benefits likely to result. Meanwhile, a note of caution: the “Four Corners” project was far too brief to allow an exhaustive listing of all areas outside National Parks that may be of significant biodiversity value. The responsibility for identifying other such areas lies with biologically sensitive planners. Happily, there are tools available to help them.

5.2 Biological surveys and Environmental Impact Assessments (EIAs)

The planner faced with potential or actual conflicts in land use or other developments may need to call upon specialised assistance, either from governmental natural resource management ministries or departments, or from outside in the form of specialised consultants or consultancy companies.

The best way to avoid such conflict is by pre-emption, which is what the biodiversity component of the “Four Corners” project is largely trying to do by identifying a number of critical biodiversity areas *before* they become critically threatened. Proposed developments can, in these cases, usually be sited elsewhere, or alternatives found.

As already noted, though, the list of sites and areas identified by the “Four Corners” project is by no means exhaustive. Ideally, planners responsible for the development of particular areas should request prior surveys by biodiversity experts. This does not necessarily involve huge costs, and it may be possible to accommodate these costs provided they are ascertained and budgeted for at an early stage. If the development planning is donor-funded, then the inclusion of a biological component should be welcomed - and possibly even insisted on - by the donor. A single well-qualified biologist should be able to paint a reasonably accurate picture of the diversity within a fairly small area in a week or so of fieldwork and two or three days of report writing.



Planners responsible for the development of particular areas should request prior surveys by biodiversity experts.... A single well-qualified biologist should be able to paint a reasonably accurate picture of the diversity within a fairly small area in a week or so of fieldwork and two or three days of report writing.

This may work well enough when broad outline land use or similar planning is being contemplated, but sometimes matters may be complicated by proposals to locate and construct specific development projects in predetermined locations. In this case, there may be little option but to carry out a full environmental impact assessment (EIA). This is already required by law in some of the “Four Corners” countries. Even if it isn’t, governmental environmental policies are likely to support and endorse such a move.

Many planners will already be familiar with such assessments. If not, then some notes may be helpful, of which the first and most important is that biological assessments should be incorporated *at the earliest possible stage in the developmental process*, and should form an integral part of it thereafter.

5.3 Environmental impact statements and assessments

There is a difference between an environmental impact *statement* and an environmental impact *assessment*. A statement is - or should be - no more than an objective determination of the likely impacts of a project, activity or development, either positive or negative, on the environmental features and characteristics of the area in which it is to be located. Environmental features include, but are not limited to, the area's biological diversity. Aesthetic and wilderness values may also be described, albeit subjectively.

As in the case of straightforward biological surveys, the biodiversity component should be undertaken by qualified biologists, preferably with considerable prior experience of such work and some knowledge of the kind of activity that is proposed. This is necessary to determine the *effects* the activity may create, such as increased atmospheric dust, removal of vegetation, or contaminated waste water. Technically speaking, it is these *effects* that create *impacts*; as an example, if a project has the *effect* of discharging contaminated effluent, this may create *impacts* on aquatic species such as fish.

So far, so good. The surveys are an objective, technical issue. So too, up to a point, is the evaluation of the *severity* of the impacts identified. However, this is where the process begins to cease being a mere statement, and starts turning into an *assessment*. There are no universally-recognised criteria for assessing the severity of the impacts that are identified. Judgment begins to play an important role in the process; and this is a further reason why such activities should be undertaken by experienced and – as far as possible – objective experts.

Often, impacts may be categorised as positive or negative; and as major, intermediate or minor. The real problems begin to occur when – as should happen – stakeholders are consulted in an effort to reach consensus on the actual importance or otherwise of the impacts identified and therefore on the future of the project concerned. These problems arise from the multiplicity of viewpoints and perceptions that may exist among stakeholders and decisionmakers.

Stakeholders with specialised interests will inevitably make judgments that accord with their inclinations. Biologists and conservation agencies will tend to take a particularly serious view of severe biological and environmental impacts. Ministries responsible for employment or rural development may take a more sanguine view, often on the basis of parallel sociological assessments of the same development. Again, there is no universally-accepted way of evaluating and weighing these widely differing perceptions. Clearly-stated, high-level policy guidance may be of some assistance. In the “Four Corners” area, where tourism and other activities that place great emphasis on biological diversity, wilderness and other environmental features are a priority, high-level policy may provide guidance by viewing the retention of these features intact as critical.

Usually, though, there is considerable room for manoeuvre and compromise. It may be possible to move the proposed development to an area of less importance to biological diversity, tourism and other environment-related topics. **Sometimes, however, there are few choices other than the total abandonment of a project or, at least, the mitigation of its biological impacts.**

It is important to remember this. The practical application of the EIA process needs to be entirely objective. Without objectivity, the process can be abused and distorted by the influence of vested interests – in which case it serves merely as a “window-dressing” exercise undertaken to satisfy bureaucratic or legislative requirements. This benefits nothing and no-one in the long-term.



Eradication of the tsetse fly – an example of environmental impact controversy

As an example, tsetse fly eradication has often been controversial within the subregion because of its potential impacts on species and ecosystems. Some conservationists would rather it didn't happen at all, but this is often an impractical view, either because of the social costs involved or because of the difficulties involved in clearing the fly from inhabited areas while allowing it to remain in others.

The majority of conservationists accept the need for tsetse eradication and have no quarrel with the underlying principles involved, but have often objected to the methods that have been used. Wholesale wildlife destruction, widespread clearance of valuable woodland including riverine forests and endemic species, and controversial chemicals such as DDT have all been used at various times in the course of tsetse control.

The development of the tsetse “target” (pictured below), which utilises small pieces of cloth impregnated with a chemical such as deltamethrin, eliminated many of these objections. Tsetse targets have now been used in several biologically-sensitive areas in the region, with little or no discernible impact on ecosystems and species (always excepting, of course, the tsetse fly itself).



Once again, however, it is important to distinguish between objectively measurable and quantifiable biological diversity, and the intangibles of wilderness quality. In high-quality wilderness areas, aerial spraying may be much less intrusive than networks of tsetse targets; but sensitive biological groups - fish are a notable example - may be seriously affected.

There are often no easy answers to these dilemmas. Their resolution boils down to the values society places on particular areas and activities. Part of the purpose of these documents has, of course, been to encourage society to place a higher value on biological diversity. This may be regarded as a biased view by some, because of the conservation goals of the agencies involved in their production. One fact is, however, incontrovertible: *the impairment or loss of ecosystem integrity is likely to impact severely on human wellbeing. Activities that generate such impacts should either be avoided, or subjected to the most effective mitigatory measures available.*

And mitigation of impacts - by moving projects elsewhere if possible, or by structuring and implementing effective mitigation programmes if they are not - is the desired outcome of most environmental evaluations. Many such measures can be built into a project from the beginning, which is why the inclusion of biological topics at an early planning stage is desirable. Others, possibly unforeseen, can often be reduced or eliminated as the project progresses, *provided that the biological component extends beyond a one-off impact assessment and forms a continuous, ongoing programme.* Further unforeseen impacts can also become apparent some time after completion of the project itself, and may only be recognised if an effective environmental management plan is in place, and includes ongoing monitoring.

5.4 Management plans and Monitoring

Most planners will be well acquainted with the formulation and implementation of management plans for specific areas and developments. Such plans are an ideal vehicle for the accommodation of biodiversity issues, whether formulated as the result of biological surveys and impact studies or developed from the beginning. The key to sound management planning is, as ever, good information, consensus among stakeholder interests, and the institutions, capacity and motivation to implement the results and monitor progress over time.



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Outside unprotected areas - and possibly, in some cases, within them as well - a structured system of *multiple use* is often likely to be considered. The formulation of such systems is a complex and delicate task, largely because of the potential for conflict instead of synergy between various forms of land and resource use: as simple examples, sport hunting and ecotourism often attract clients of very differing perceptions; furthermore, animal populations that are hunted may avoid human activity, thus rendering “game viewing” - a favourite ecotourism attraction - difficult. Both these activities are likely to conflict with agriculture. Multiple-use approaches therefore blend seamlessly into land planning issues.

There are nevertheless numerous potentially sustainable activities and livelihoods that can be pursued within areas of biodiversity importance, so long as they are subjected to strict controls. The harvesting of plant species of food or medicinal value, artisanal and sport fishing, the extraction of controlled quantities of building and other materials are all forms of consumptive use that will not, if well planned and controlled and applied in appropriate circumstances, entail reductions in biological diversity. Some areas can be utilised for activities such as beekeeping or the husbandry of indigenous species, such as guinea fowl, of commercial and subsistence value. Biological and social expertise is, however, important in the formulation of such plans.

In other cases, the need may primarily be to substitute sustainable livelihoods for currently unsustainable practices, such as the reduction of pressures on sensitive areas by the intensification of agriculture and the promotion of commercial, industrial and other forms of development in the vicinity of the area.

Regular biological monitoring is a critical activity that is seldom implemented. Monitoring is important because, firstly, it provides a baseline against which future change can be measured; and secondly, by detecting such change, it gives “early warning” of possible problems.

So far, so good. The actual monitoring is not necessarily a difficult or highly specialised task, and can often be undertaken by local people or relatively unqualified personnel. Interpreting the results of such monitoring, however, is a different matter. Changes may be due entirely to natural processes, the causes of which may be difficult to determine because the subtleties of these processes are not well understood. If they are the result of human activity, however, the causes may be equally difficult to determine, requiring specialised knowledge and detailed analysis. Monitoring programmes are often not attractive to donor organisations because of their lengthy timescales and -by their nature - unpredictable outcomes; NGOs may find them difficult to implement for fundamentally similar reasons; and government institutions, particularly at local levels, have often felt that they often do not have the resources, capacity or “institutional memory” to establish and sustain monitoring programmes.

This may be due to a low prioritisation caused by a lack of understanding of the importance of sustained biological monitoring. It would be pleasing to think that this might change within the “Four Corners” area, as biological and biodiversity issues are hopefully internalised and institutionalised. Organisations such as AWF, the Zambezi Society and the Biodiversity Foundation for Africa are also able to provide further guidance if necessary. The term applied to the outcome will already be familiar to many. It is called “sustainable development.”



Regional museum technicians take part in a biodiversity monitoring training course.

IN SUMMARY:

BIOLOGICAL MONITORING

Regular biological monitoring is a critical activity that is seldom implemented. It is important because:-

- it provides a baseline against which future change can be measured; and**
- by detecting such change, it gives “early warning” of possible problems.**

IN SUMMARY:

USEFUL LAND PLANNING AND MANAGEMENT TOOLS

- **BIOLOGICAL SURVEYS (by qualified experts).** These help to identify critical biodiversity areas *before* they are threatened, and should be done as early as possible
- **ENVIRONMENTAL IMPACT ASSESSMENTS** help to analyse the potential impacts of specific development projects which could threaten an area, and suggest mitigatory measures. EIA specialists should be objective.
- **MANAGEMENT PLANS** involve all interests and provide sound frameworks within which biodiversity and other conservation issues can be harmonized with development.
- **BIOLOGICAL MONITORING AND ENVIRONMENTAL AUDITING** provide essential checks and balances that ensure sustainability.

ENVIRONMENTAL IMPACT ASSESSMENT: USEFUL INFORMATION

REGIONAL

Environmental Impact Assessment in Southern Africa (2003) ISBN 99916-63-03-7 Published by the Southern African Institute for Environmental Assessment, P O Box 6322, Ausspanplatz, Windhoek, Namibia
www.saiea.com

BOTSWANA

There is no formal EIA Policy document. The Botswana National Conservation Strategy depends on the 1990 Natural Resources Conservation Policy in which section 7.3 recommends a requirement for EIA prior to any development. A draft EIA act has been formulated by The National Conservation Strategy Co-ordinating Agency in the Ministry of Environment, Wildlife & Tourism and is under consideration. Contact: P Bag 0068, Gaborone, Botswana.

NAMIBIA

Namibia's Environmental Assessment Policy (January 1995) Compiled and edited by Directorate of Environmental Affairs, Ministry of Environment & Tourism, Private Bag 13306 Windhoek, Namibia

[Unpublished documents available from the Directorate of Environmental Affairs]:-

General Environmental Guidelines for the Mining (onshore & offshore) sector in Namibia
by Dr R Mcg. Miller, and G Kegge (Nov. 2000)

Environmental Assessment Guidelines: Sector: Water Infrastructure (May 2001)

Environmental Assessment Guidelines: Sector: Irrigated Agriculture (May 2001)

ZAMBIA

Environmental Impact Assessment (EIA) Procedures Manual (part of the Environmental Protection & Pollution Control Act [EPPCA] No 12 of 1990, Cap 204) Government of Zambia. This document includes the Environmental Impacts Assessment Process in Zambia and the EIA Regulations Statutory Instrument 28 of 1997. Available from: Zambia Government Printers or Environmental Council of Zambia, Box 35131, Lusaka, Zambia.

ZIMBABWE

Environmental Impact Assessment Policy & Guidelines (1997) Published by the Ministry of Mines, Environment & Tourism, Zimbabwe ISBN: 0-7974-1796-6 Ls

Available from: Environmental Assessment Unit, Department of Natural Resources, P O Box CY 385, Causeway, Harare, Zimbabwe.

Environmental Management Act: Chapter 20:27 Environmental Impact Assessments, Audit and Monitoring of Projects. Sections 97-108 inclusive. (Government of Zimbabwe Statutory Instrument 103 of 2003).

PART 6: TRANSBOUNDARY PLANNING

6.1 International transboundary action

The concept of transboundary planning may be a novel concept to some recipients. They may take comfort from the fact that it is also novel to many governments, NGOs and local authorities; there are relatively few long-standing precedents in terms of suitable institutions and strategies; and the art of transboundary negotiation and planning is still in its infancy. On the credit side, this means there is still much room for innovation and creative thinking, unconstrained by history.

There are many obstacles, not the least being already-entrenched but conflicting land uses on either side of international boundaries; the understandable reluctance of governments to amend national legislation to accommodate what may be seen as essentially localised need; and a history of establishing “institutions” that are donor-funded and therefore unsustainable. Maybe the major obstacle, however, is a failure to perceive mutuality of interest beyond narrow biological - and therefore inherently partisan - considerations. A number of “transboundary initiatives” have indeed been undertaken for no better reason than because they looked like nice units when drawn on the map.

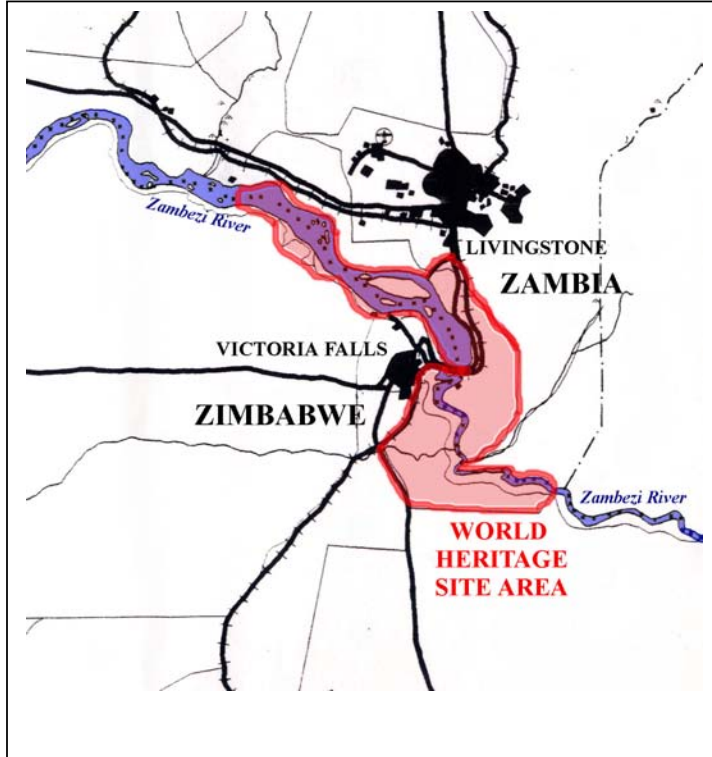
Here’s a suggested golden rule: *transboundary initiatives will almost certainly fail unless there is a strong - and widely perceived - mutuality of economic interest.* Some may be able to suggest better ones, but this will do for present purposes.

Some countries in the “Four Corners” area do, however, have experience of the successful establishment of transboundary conservation areas. The Kalahari complex, implemented jointly by Botswana and South Africa, is one. The Gonarezhou-Kruger-Gaza complex, being implemented by South Africa, Mozambique and Zimbabwe is another, although it is not yet fully operational and displays some of the disadvantages of major donor-driven projects: the Zimbabwean contribution is temporarily in abeyance due to the withdrawal of EU funding.

So far, as shown by these examples, transboundary collaboration and planning at a national and international level has proved to be easiest where there are contiguous National Parks or other protected areas. There is an immediate commonality of land use; there are strong biological imperatives for joint management; but most of all, in the eyes of governments, there are immense economic gains to be won by widening the ecotourism net. It only remains to tackle the minor issues of joint management, equitable allocation of costs and benefits, ease of tourist movement across borders and so on. This takes years, even with strong economic incentives. Imagine how difficult it would be without them.

Even where strong incentives exist, the situation at the Victoria Falls - arguably one of the major hubs of the potential “Four Corners” nexus - provides an extreme and cautionary example of hitherto unsuccessful transborder planning. This regional and global tourism attraction, shared by two countries, is a joint World Heritage Site (see map 2 overleaf). But so far, all efforts to introduce trans-boundary collaboration and planning and to slow the pace of inappropriate development on both sides of the Zambezi River have failed. This failure can be blamed on a combination of factors including economic resentments and lack of political will. But a major problem has been the dependence of governments on unsustainable donor funding. The development of a partly-completed Master Plan process for the Victoria Falls’ (Zimbabwean) side came to an abrupt halt when Canadian assistance was withdrawn for political reasons. In the vacuum provided by this funding withdrawal, vested interests which were already rushing to develop unsuitable facilities before new planning restrictions rendered it impossible, now have

Map 2: The Victoria Falls/Mosi-oa-Tunya World Heritage Site – a transboundary asset of global significance: but there are problems.



IN SUMMARY:

TRANSBOUNDARY PLANNING

Transboundary initiatives will fail unless there is a strong - and widely perceived - mutuality of economic interest.

But even where strong economic incentives exist (as with the Victoria Falls/Mosi-oa-Tunya World Heritage Site) things can go wrong.

What is needed is a collective will on the part of the nations involved to invest in durable institutions beyond the narrow timeframe of donor funding; to structure and enforce appropriate planning controls where necessary; to temper this with the equitable distribution of the resulting benefits; and to reinvest a reasonable percentage of tourist and other income into the development of the area.

free rein. Current (and outdated) planning structures are increasingly unable to control the “magnet effect” of perceived prosperity that has given rise to the growth of unsuitable developments, informal settlements and shanty towns. The result has been a dramatic decline in the aesthetic experience offered to tourists visiting both sides of the Victoria Falls.

If efforts can fail at a hub, one might ask: what hope is there for the wheels of the transboundary ecotourism train? The situation is also made more difficult in the “Four Corners” area by the lack of large, contiguous and already-protected areas. All participant countries have major protected areas, but they are, in the main, connected by rather tenuous - and often more imaginary than real - “migration corridors” that traverse other forms of land use, often with significant human settlement. The creation of a viable transfrontier conservation area, or TFCA, will present many challenges, without the reassurance of a well-established local formula to assure its success. Examples do exist in the more developed world, but they have the advantage of abundant financial and other resources.

Having said which, there is indeed hope, but not without a collective will on the part of the nations involved not only to invest in durable institutions beyond the narrow timeframe of donor funding, but also to structure and enforce appropriate planning controls where necessary; to temper this with the equitable distribution of the resulting benefits; and to reinvest a reasonable percentage of tourist and other income into the development of the area.

6.2 Local transboundary action

It is often possible to undertake some forms of local transboundary collaboration, to the benefit of all parties involved, even if a fullscale TFCA takes some time to be formalised or, indeed, is not formalised at all. Such collaboration can often be initiated relatively quickly, especially at the technical level of local management and planning. Local authorities also often have considerable freedom of action, and may be able to formulate and harmonise bylaws that promote sound resource management.

Pending the establishment of the ZIMOZA transboundary area near Lake Cabora Bassa, for example, local councils, committees and resource managers in Mozambique and Zambia created their own informal collaborative networks. These were based on a mutuality of interest in maintaining resource management schemes for community benefit, and focused on issues such as the management of an elephant population that moved freely across international borders, the integrity of their habitats, collaboration on issues such as illegal hunting, and an informal consensus on land planning that accommodated these mutual interests. As the area also forms part of AWF's Zambezi heartland, AWF have recently sponsored wildlife surveys of the area as a unit.

In the absence of a formal TFCA, the Zambian and Zimbabwean managers of the Middle Zambezi Valley wildlife complex, which includes the Mana Pools National Park in Zimbabwe and the Lower Zambezi International Park in Zambia, have also established a similar collaborative arrangement.

Participants in both these examples operate within the framework of their own national policies. Although this imposes some constraints, the perceived benefits arising from existing local collaboration are likely to encourage the governments concerned to formalise TFCAs in both areas.

IN SUMMARY:

LOCAL TRANSBOUNDARY ACTION

It is often possible for local authorities to undertake some forms of local transboundary collaboration, to the benefit of all parties involved, even if a fullscale TFCA takes some time to be formalised or, indeed, is not formalised at all.

The perceived benefits arising from existing local collaboration are likely to encourage the governments concerned to formalise TFCAs in such areas.

PART 7: THE FOUR CORNERS AREA: A BROAD PERSPECTIVE

7.1 Background to the biology of the Four Corners Area

The major documents and reviews produced by the Zambezi Society and the Biodiversity Foundation for Africa in the course of the “Four Corners” project go into considerable biological detail. They represent a major contribution to biological knowledge of the area and, in the absence of significant ongoing funding for extensive biological fieldwork, are likely to remain the standard reference documents for the area for some time. They are a useful addition to the libraries of planning and developmental authorities in the area, but generally include too much detail to use as a reference for planning purposes. The summary and synthesis document, which formed the second of the Information Packages sent to you, is much easier to use for this purpose. Here, we merely intend to highlight some of the salient features that emerge from this synthesis, and their relevance to the developmental planning process.

As noted earlier, the area encompassed by this document includes parts of four countries totaling some 332 000km² of the continental plateau of south central Africa (see Map 1). The Four Corners area is centred around the point where several major rivers once joined in the geological past. The drainage from much of the south central African plateau flowed through here, possibly less than a million years ago, and formed several large lakes, as evidenced by, for example, the Makgadikgadi Salt Pans. Most of the area is now blanketed with windblown Kalahari sand. There are only limited examples of outcropping bedrock, mainly basalt and Karroo sandstones in the Matetsi area of Zimbabwe and at the Victoria Falls.

The area has several unifying climatic, geological and topographical features. These include a continental interior location, with a narrow altitude range of ±900-1200 metres above mean sea level; a savanna climate, with a dry season lasting between five and eight months; and a rainfall gradient from an annual mean of around 900mm in the north, to about 400mm in the south. Evapotranspiration rates exceed rainfall in all months; there are occasional severe winter frosts, increasing in severity and frequency in the south; and a mineral-poor surface geology.

One of the area’s key biological attributes is that it is a meeting-place for the biodiversity of the ancient Upper Zambezi system with that of the Kalahari and the younger Middle Zambezi system, which was rejuvenated as one of the consequences of the geological uplifting that also created the extensive former lakes now represented by the Makgadikgadi Salt Pans, and the remarkable termination of the Kavango River in the Okavango Swamps. The lower-lying parts of the area have been environmentally unstable for the last million years or so, because of radical changes in hydrology, and this is reflected in the composition of both flora and fauna.

The most significant feature of the area today is the large drainage system that still runs through it, notably the Zambezi, Kavango/Okavango, Kwando and Chobe rivers. They are linked by grasslands, ribbons of riparian woodland and, in some places, numerous seasonal pans. The “core” of the area - the heart of the Heartland, in fact - is the wetlands at Okavango and Chobe-Zambezi, and the Makgadikgadi saline lakes. These wetlands are surrounded by various types of woodland, dominated by mopane, *Brachystegia* and *Acacia* species, and especially by Zambezi teak, *Baikiaea plurijuga*. Another major linking feature, the area’s elephant population, is of great importance biologically for several reasons, and economically in terms of ecotourism and natural resource management schemes. The area is thought to hold some 180 000 individuals, or about 30% of the world’s entire estimated African elephant population. This population is, however, thought to be responsible for widespread modifications to ecosystems and habitats, and to impact on some aspects of the area’s biodiversity. Many authorities consider these modifications and impacts to be biologically adverse. The elephant issue, together with the topic

of transboundary movements and hypothetical “migratory routes”, is of some importance and is considered later in a separate section.

In summary, the “Four Corners” area is one of high biological diversity, encompassing aquatic, wetland, grassland and woodland habitats. It is a meeting-place for flora and fauna typical of the drier Kalahari region with those of the central African woodlands and grasslands. In spite of this wide variety of species and habitats, however, few of the species in the area are “endemic” (endemic species are those that are unique to an area, and not found elsewhere). Most also occur elsewhere. This lack of endemism is because of the area’s characterisation as a biogeographical “meeting-place”, as described above; and also because its landscape is relatively recently formed and still constantly changing. New species, unique to the area, have not had time to evolve. As a contrasting and nearby example, much of Barotseland, which is not included in the “Four Corners” area, represents a much older landscape, has several species not found elsewhere, and is a so-called “centre of endemism”.

IN SUMMARY:

BIOLOGICAL BACKGROUND

The Four Corners area is one of high biological diversity. It is a biogeographic “meeting place” where the fauna and flora typical of the drier Kalahari region meet with those of the central African woodlands and grasslands. Because this “meeting” has only occurred relatively recently in evolutionary time and its biology is still changing, there has not been enough time for “endemic” species (unique to the area) to evolve. There are therefore relatively few of these.

7.2 Four Corners biodiversity: some key points

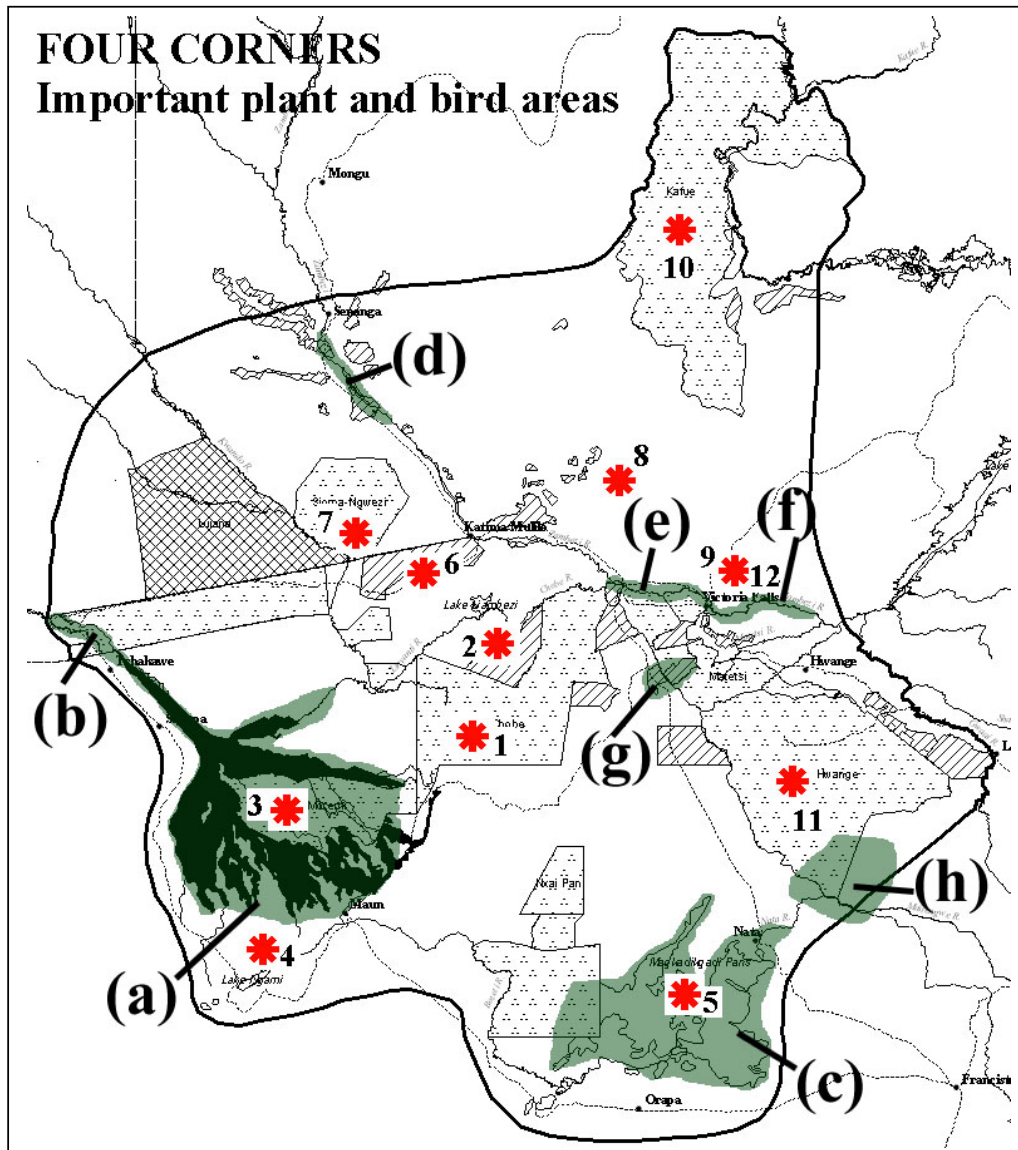
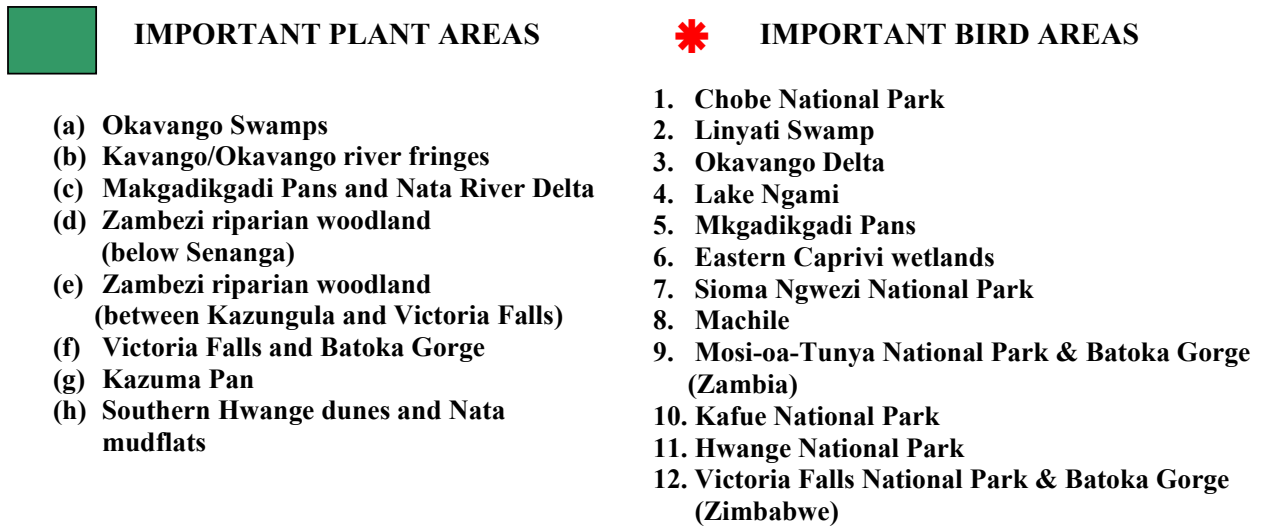
Our state of knowledge concerning major biological groups, and their status in the area, is fully detailed in the taxonomic reviews and summarised in Information Package Two. However, some key points are worth restating briefly:

- In broad terms, the *most important habitats* within the area for biological diversity are riparian woodlands; wetlands; floodplain grasslands; pans; and rocky outcrops or gorges, which usually have distinctive or unusual vegetation types and associations.
- The area’s most important *woodland type*, from a conservation perspective, is that dominated by the Zambezi Teak, *Baikiaea plurijuga*. This woodland type is restricted to this part of south central Africa, and the “Four Corners” area encompasses almost half of its total extent.
- *Wetland vegetation* is of major importance and represents not only much of the area’s diversity, but is also largely responsible for the unique nature of the “Four Corners” area.
- The *saline grasslands* of the Makgadikgadi pans and other smaller pan systems are unique.
- Eight areas within the Four Corners are considered important for *plant conservation* (see Map 3), being threatened mainly by elephant damage and land clearance for settlement and agriculture.

- The area probably has one of the richest assemblages of *mammals* in southern Africa, with a full complement of both herbivores and carnivores, and natural predator-prey cycles can still occur. The wide range of *antelope* species, reflecting the variety and extent of the area's grasslands, is of particular interest.
- There are 17 *bird species* of global conservation interest, of which six are of particular importance.
- Ornithologists have identified 12 *Important Bird Areas* within the "Four Corners" area (Map 3). Some are small, such as Lake Ngami and the Batoka Gorge, both of which are less than 250sq km in area. Some, such as the Okavango Swamps, and the Kafue and Hwange National Parks, are very large.
- Five of the area's 178 recorded *reptile and amphibian* species are endemic or near-endemic.
- The *Nile crocodile* and the *tigerfish* are major predators in aquatic ecosystems.
- Over 100 species of *fish* have been recorded in the "Four Corners" area, and another 26 in the Zambezi headwaters or immediately downstream. Floodplains and fast-flowing rocky rivers are important habitats for fish breeding.
- *Changes in hydrology* resulting from dam construction and water abstraction schemes are a major conservation concern, threatening fish and other aquatic and terrestrial biodiversity.
- The introduction and spread of *alien invasive fish species*, notably escapees such as Nile tilapia (*Oreochromis nilotica*) (right) from aquaculture schemes, is also a major conservation concern.
- Invasive *exotic plant species*, such as *Lantana camera* (below right) and floating aquatics such as water hyacinth (*Eichhornia crassipes*) (below left), are also of major concern.



Map 3: Important plant and bird areas of the Four Corners



7.3 Four Corners ecological processes: some key points

Salient points in respect of the *ecological processes* of the area are:

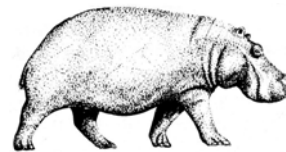
- The area's mosaic of often interconnecting *habitats and nutrient-rich "hotspots"* is important in maintaining its present level of diversity.
- The network of *rivers, wetlands and floodplains* within the seasonally-dry "Four Corners" area is an important key to its biological diversity.
- The generally low *nutrient status* of much of the area is reflected in the livelihood strategies adopted by plants and animals.
- The importance of *fire and frost*. The frequency of fire is now much higher than in the past, and fire-tolerant species are beginning to predominate at the expense of less tolerant species. Frost, which is not uncommon, impacts more severely on vegetation once the tree canopy is opened up. Fire and frost, now also combined with the impacts of a high density of elephants, can inhibit woodland regeneration. This is a major conservation concern in the "Four Corners" area.



7.4 Key or determinant species

Some species are known as *key* or *determinant* species because of the manner in which they can modify landscapes or exert influence on biological and hydrological processes. The key or determinant species in the "Four Corners" area are:

- **Hippos**, because they are *ecological engineers*, maintaining waterways and channels in swamps and thus the dynamics of aquatic ecosystems;
- **Tigerfish**, which are the main predators in aquatic ecosystems, and act as indicators of clean
- **Termites**, which are also ecological engineers, critical to the recycling of nutrients, and create islands of high nutrient content in otherwise impoverished environments; and
- **Elephants**, which travel such large distances, take up so much space, cause such major modifications to vegetation structure and often create so many problems for rural people that they merit a subsection to themselves.



Readers may well be asking themselves what, if anything, needs to be done about such species. There are no easy answers to this. Their importance needs to be acknowledged as part of the background to developmental planning in the area. Generally speaking, such species only become problematic - or, often, symptomatic of other biological problems - if they either begin to decline severely or become overabundant. The establishment and maintenance of effective biological monitoring systems provides early warning of problems, but will usually require specialised knowledge.

7.5 “Flagship” species

The Four Corners biodiversity studies identified eight charismatic species within the project area which, if kept in focus for conservation by planning authorities, will at the same time help to protect habitat and act as “umbrellas” for the protection of many other species. Again these species need to be acknowledged as part of the background to developmental planning in the area. Like the key species mentioned above, their wellbeing will require effective biological monitoring systems to be established and maintained. Specialised knowledge will again be needed here.

The eight flagship species are as follows:-



PUKU

A specialist floodplain grassland antelope. Conservation of the Puku antelope on the Chobe floodplains, for example, will also help to protect other floodplain-dependent antelope and birds.



WILD DOG

This large, attractive species is one of the most endangered carnivores in Africa. It is a “specialist” in that it has particular needs in terms of habitat and prey and its social habits make it more susceptible to disease than “generalists” like hyaenas. It has great tourism value, but requires large areas of wildlife habitat, a situation which often brings it into conflict with cattle ranchers



LESSER FLAMINGO

This attractive and rare waterbird breeds in only two localities in southern Africa, including the Makgadikgadi Pans. It has globally near-threatened status and great tourism value and needs conservation attention.



AFRICAN SKIMMER

This attractive bird requires open river sandbanks to breed. Sandbanks are a feature of major rivers like the Zambezi, where annual floods deposit the sand habitat that the skimmers need. However dams and weirs severely threaten this species because they either permanently flood existing habitat or remove the annual flood regime which provides sandbank nesting sites. Other threats include the wave-wash from passing motorized boats, and human disturbance of nests by tourists or fisherman. Careful planning which is sensitive to the needs of this bird can help conserve its threatened habitat.



ZAMBEZI TEAK (*Baikiea plurijuga*)

This valuable tree is an indicator of relatively undisturbed and well-functioning woodland; it is an important timber species, very slow growing and well adapted to growing on Kalahari sands. Mature stands of Zambezi teak *Baikiea* trees showing a good age structure are now very rare, and every effort needs to be made to keep them from being logged, cleared or subject to frequent fires. By doing this a unique vegetation type will be conserved, along with the assemblage of other plants and animals that live in it.



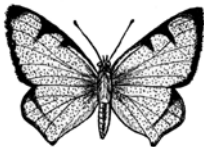
PAPYRUS

This “swamp grass” is a “primary producer” (i.e. the single biggest trapper of the sun’s energy) in swamps. Its presence indicates permanent water and healthy swamp conditions which provide a habitat for many animals, birds, insects, fish and other aquatic species.



FLOODPLAIN ACACIA (*Acacia kirkii*)

This tree has a “relict” distribution (i.e. it is what remains of a formerly much wider distribution). It grows on alluvial mudflats and ancient drainage fans and is currently threatened by being subject to very heavy elephant impact.



NORMAN'S COPPER (*Eriksonia alaponoxa*)

This very rare butterfly has an interesting life-history. It has been found only in one small area of miombo woodland near Kataba, W Zambia. This patch of habitat supports a number of other interesting invertebrates and plants, and has not yet been fully investigated.

IN SUMMARY:

FOUR CORNERS BIODIVERSITY : MAJOR CONCERNS

- The biodiversity information that is summarised in this and other documents in the series needs to be incorporated into ALL decision-making and developmental planning in the Four Corners area. Major concerns which need planning attention are as follows:
- Woodland (especially mature woodland of slow-growing hardwood species like the Zambezi Teak) is threatened by logging, clearing for agriculture or by fire.
- Some important plant areas (see Map 3) are threatened by elephant impact or clearance for agriculture or settlement
- Wetlands and saline grasslands are of major importance for conservation
- Changes in hydrology from the construction of dams and water abstraction schemes can impact negatively on riverine and wetland eco-systems, threatening fish and other aquatic and terrestrial species.
- Introduction of exotic species of fish and plants is a major problem
- Higher frequency of fire, combined with frost and the impacts of a large elephant population is inhibiting the ability of woodland to regenerate
- “Flagship” species can be used to focus conservation attention and at the same time help to conserve habitats and other species.

PART EIGHT: ELEPHANTS

8.1 Elephants and habitat

The “Four Corners” area has some 180 000 elephants - almost a third of all the African elephants in the world - but they mainly occur in about half the project area. This means that they are concentrated in possibly less than 2 00 000km² at an average density of almost 1 per km². Furthermore, they are thought to be increasing in number by some 6% per annum.

The biggest concentrations are thought to be in northern Botswana, along the Chobe and Linyanti rivers (123 000 animals) and in north-western Zimbabwe (49 000). Populations are fairly low in the Caprivi and south-western Zambia, and Angola has an unknown but probably very small population.

Elephants often push mature trees over and strip them of bark and branches, causing extensive coppicing and sometimes the death of the trees concerned. Up to a point, this can increase the diversity of habitats available to other species. Elephants also assist in the dispersal of seeds, which may in turn be helped to germinate by passing through an elephant’s digestive system.

When present in large numbers, however, elephants can transform woodland into shrubland, or even open savanna, in ten years or so. These changes may also be compounded by fire and frost. Once-closed woodland becomes so open that many associated species cannot survive. Many biologists believe these changes may begin to occur once elephants exceed an “acceptable average” density of around 0.5 elephants per km².

It is important to realise that there are many differing views on the management of elephant populations from a biological perspective; and that whereas the impacts caused by elephants are visible and quantifiable, the importance or otherwise of these impacts is often a matter of subjective judgment. Some authorities take the view that elephants may cause entire ecosystems to undergo long cycles of development and periodic destruction; that these cycles are “natural” and should be allowed to continue. Others argue that such cycles can no longer operate when elephant numbers are permitted to increase unchecked and their movements are restricted by loss of habitat due to fencing, increasing human settlement or other causes.



Some guidance may be obtained by setting management objectives for a specific area or areas, if they do not already exist. Objectives that place high value on retaining woodlands in a particular condition may try to establish “limits of acceptable change”, beyond which some form of management action is necessary. Objectives that value the retention of maximum biological diversity may require a similar approach. In areas where ecotourism is the major goal, high densities of elephant may be tolerated in spite of their biological impacts.

IN SUMMARY:

There are many differing views on the management of elephant populations from a biological perspective. Planners need to set clear management objectives for a specific area or areas, if they do not already exist, and develop management strategies based on these objectives: i.e. if retaining woodland is important, managing (or reducing) elephant populations is necessary; if eco-tourism is important, higher densities of elephant may be tolerated as acceptable because of their interest value to visitors.

8.3 Elephants and people

Though often regarded as the prerogative of natural resource management ministries and agencies, issues related to elephant management often impact on a wide range of developmental activities. Rural communities living close to protected areas, or in less developed regions in which elephant habitat survives, may suffer serious crop damage or, in extreme cases, personal death or injury. In some cases, as in many parts of Zimbabwe, the responsibility for wildlife management may be devolved to local authorities or landholders. In others, decision-making may remain centralised. In all cases, there is a need to attempt to reconcile the conflicts that arise between humans and elephants.

If it has not already been done, the establishment of community-based natural resource management schemes based on ecotourism and sport hunting (these two activities require careful planning and, usually, separation if they are to co-exist) may raise the tolerance levels of local people towards large and potentially dangerous animals. Experience shows, however, that although the income from such schemes is welcome, it does not adequately compensate for the risks involved in living close to such wildlife. Demands for some form of protection against injury and crop damage almost inevitably arise.

This is a much-studied topic. So far, there are no guaranteed solutions other than constructing expensive physical barriers such as electric fences or wide and deep ditches, or eliminating elephants altogether. Neither of these options is usually considered acceptable. However, innovative experiments with crops such as chili peppers, which are unpalatable to elephants while commanding good export prices, have shown promise in some areas. Provided that such choices are still open, well-researched land planning that creates adequate movement corridors for elephants and “buffer zones” between wildlife and agricultural land is probably the best option, together with a mix of other deterrent measures. This is unlikely to eliminate conflict altogether, but it may reduce it to acceptable levels, *provided that affected communities acquire a fair share of benefits from the resource, either directly from locally-based management schemes or indirectly from national hunting and tourism earnings.*

The issue is further complicated by the mobility of some elephant populations and individuals. They may make long seasonal - and sometimes random - movements, often across international borders. Within the “Four Corners” area there is a clear and urgent need for collaborative planning, strategy formulation, and management action because of these movements. Overall, elephant movement is not as yet a major conservation issue within the area as there has not as yet been massive loss of range due to agricultural expansion. Elephant movements are still largely “natural”, responding to environmental influences such as the availability of food and water. However, it may well become a problem in the future. In particular, high levels of human settlement and activity along the Zambezi River may, if allowed to develop, threaten the future continuity of elephant range across the river.

There are good biological reasons why there should be interconnectivity between populations of large wildlife species such as elephants. Without some limited but critical genetic interactions, isolated populations can undergo genetic change and smaller populations may die out altogether. Movement between populations avoids these problems, and therefore has a direct bearing on the long-term wellbeing of one of the area’s foremost tourism attractions and income-earners.

These issues pose major challenges for planners at regional, national and local levels within the proposed “Four Corners” TFCA, and these challenges can, unless carefully addressed, be compounded by philosophical differences in approaches to wildlife management. Deliberate reductions in elephant numbers - often known inaccurately as “culling” - are often controversial,

as are issues such as the sale of ivory and other products. However, three of the “Four Corners” countries - Botswana, Namibia and Zimbabwe - have at times made common cause in relevant international forums such as CITES.

The quantity of surviving habitat and consequent lack of urgency as regards the accommodation of elephant movement within the “Four Corners” area does not imply that there is no need for the urgent formulation of collaborative management strategies. Some areas, particularly in the vicinity of the Chobe River, show significant signs of biological degradation. Unilateral actions, such as elephant population reductions, veterinary fencing or incompatible land planning and use can have profound impacts on neighbouring countries. The status of the “Four Corners” area as a potential TFCA, with the development of ecotourism as a central objective, provides both springboard and urgency for the regional harmonisation of management strategies.

8.3 Known cross-border elephant movements

In northern **Botswana**, elephants undertake seasonal movements of up to 200km within a 73 000km² range bounded by livestock-rearing areas to the west and south, and the Namibian and Zimbabwean borders in the north and east. They congregate in the Okavango and on the Kwando-Chobe-Linyanti river systems during the dry season, and disperse at the onset of the rains. These movements are driven by the availability of surface water. There is some transboundary movement between Botswana and both Namibia and Zimbabwe.

Zimbabwean research has demonstrated wet-season dispersal from the Hwange National Park westwards into Botswana. This is driven by dry-season dependence on artificially-pumped water in the Hwange National Park. During the rains elephants prefer to use seasonal pans in eastern Botswana.

An estimated 5 000 elephants inhabit **Namibia’s** Caprivi region. These animals probably remain in the Caprivi during the dry season, but at least part of the population moves across international borders into Angola, Botswana and Zambia during the rains.

Some **Zambian** elephants may make internal seasonal movements between the Mulobezi and Sichifulo Game Management areas and the Zambezi River near Kazangula, where limited cross-border movement may also occur. A small elephant population in the Sioma Ngwezi National Park also apparently moves through a narrow corridor to the Zambezi to drink. However, this population is unlikely to be connected to the Kafue elephant population because of the intervening human settlement and the open Barotseland grasslands.

Finally, we quote from the information on movements of large animals in general within the project area, provided by Dr David Cumming, a leading regional authority. Dr Cumming examined several species, including wildebeest and zebra, which are known to make regular large-scale movements: -

“The results of research on large mammal movements in the (project) area do not suggest that the creation of a Transfrontier Conservation Area will make much difference to patterns of movement or restore mythical migrations that are often cited as a major reason for establishing (such areas). The major impacts of fences and land use fragmentation on animal movements are to be found in Botswana. **However, the establishment of a TFCA may well encourage and foster the management of large mammals and their habitats at the larger and more appropriate scales at which these systems function most efficiently and under which they evolved.**”

The unspoken word is, of course, *if* a TFCA is established. It may not be. Even if it is, it may be some time before harmonised policies and collaborative strategies are established. Either way, however, localised collaborative action, of the kind we have noted elsewhere, can be of great mutual benefit.

IN SUMMARY:

ELEPHANT MANAGEMENT

- Well-researched land planning that creates adequate movement corridors for elephants and “buffer zones” between wildlife and agricultural land is probably the best option for the human/elephant conflict issue, together with a mix of other deterrent measures. This is unlikely to eliminate conflict altogether, but it may reduce it to acceptable levels, *provided that affected communities acquire a fair share of benefits from the resource, either directly from locally-based management schemes or indirectly from national hunting and tourism earnings.*
- Because of the movement of Four Corners elephants across international borders, there is a clear and urgent need in this area for collaborative planning, strategy formulation, and management action.
- The status of the “Four Corners” area as a potential TFCA, with the development of ecotourism as a central objective, provides both springboard and urgency for the regional harmonisation of elephant management strategies, and other issues such as culling, vet fencing or incompatible land planning and use.
- Research on large mammal movements in the Four Corners area does not suggest that the creation of a Transfrontier Conservation Area will make much difference to patterns of movement or restore mythical migrations that are often cited as a major reason for establishing TFCAs. The major impacts of fences and land use fragmentation on animal movements are to be found in Botswana. But establishing a TFCA may well encourage and foster the management of large mammals (including elephants) and their habitats at the larger and more appropriate scales at which these systems function most efficiently and under which they evolved.

PART 9: SOME SPECIFICS IN THE “FOUR CORNERS” AREA

9.1 Planning recommendations

We now move to some more specific recommendations designed to provide some guidance to planning authorities concerned with the “Four Corners” area at various levels. As we have emphasised throughout this document, we are very aware both of the wealth of planning expertise within the region, and of the multitude of other interests that will have to be accommodated in any planning processes that occur. We have confined ourselves to a biological perspective, with one more general proviso: that, if they are to be successful, these processes will have to accommodate these other interests and stakeholders in a broad, multisectoral consensus. We have also assumed that some consensus already exists on the potential of the area for the development of ecotourism and other natural resource-based activities as a means of reducing poverty and improving the quality of life for its human inhabitants.

9.2 Some transboundary implications

The findings of the biological research strongly support the view that a transfrontier and landscape-scale approach to conservation should be implemented across the area.

Transboundary planning may be new to many and, as we have previously noted, there are few precedents in terms of suitable institutions and strategies other than the Kalahari and Gonarezhou-Kruger-Gaza complexes, both of which are possibly rendered slightly less complex as they are primarily based on existing protected areas. Nevertheless, the Mozambican portion of the GKG complex involves the resettlement of a significant number of people. This has only recently been initiated at the time of writing, and the resulting complications or otherwise still remain to be seen.

The nature of the institutions required is likely to differ from case to case. However, the issue of sustainability is critical. Often, such institutions are dependent on donor funding and are therefore inherently unsustainable. We would hope, therefore, that the perceived national benefits from an international approach to tourism in the “Four Corners” area will persuade the countries involved to spend the relatively minor sums required in order to sustain such institutions beyond the termination of such donor funding as may be ultimately located.

Unfortunately, the planning situation at the Victoria Falls provides a prime example of unsustainability. Despite recommendations since the mid 1990s by IUCN (The World Conservation Union) and others, for a transborder approach to planning around Victoria Falls, little has been achieved to harmonise development approaches on both sides of Zambezi River for this joint World Heritage Site. The creation of a Master Plan for Victoria Falls town on the Zimbabwean side (a pre-requisite for any transboundary negotiations) has been frozen since the withdrawal of Canadian funding, and whilst the planning authorities concerned have expressed a desire to continue the process, they are unable to do so because of the failure of central treasuries to offer ongoing support. The results are arguably worse than if the planning process had never been initiated.

In the “Four Corners” area, planning for this sustainability should form a central activity during the period of donor funding. Mechanisms such as levies on tourism and other commercial beneficiaries, alongside matching incentives to develop facilities within the area, may prove useful.

The biodiversity studies identified a number of important habitats across the Four Corners area that are, or may become, threatened by human activity. A number of sites of particular importance to biodiversity are dealt with in a later section. Meanwhile the following table provides some suggested responses to such threats, whether at local, national or regional levels.

Table 1: Major threats to important Four Corners habitats and suggested responses

HABITAT & THREAT	EFFECT	RESPONSE
<p>Riverine woodland</p> <p>Structural damage caused by removal of large trees by elephants</p> <p>Invasive species</p>	<p>Riverbank instability Erosion Loss of fish breeding & nursery areas Decreased diversity</p> <p>Suppression of indigenous vegetation</p>	<p>Evaluate elephant management options in consultation with management authorities and local communities</p> <p>Research and institute eradication programmes</p>
<p>Zambezi Teak Woodland</p> <p>Logging and increased frequency of fire</p>	<p>Canopy loss Increased aridity Increased grass Increase of fire-resistant species Structural change from woodland to open shrubland with coppice</p>	<p>Implement sustainable logging practices Institute fire management programmes</p>
<p>Acacia woodland & savanna</p> <p>Overgrazing</p> <p>Increased frequency of fire</p> <p>Elephant damage to some species</p>	<p>Bush encroachment Decreased grazing Decreased productivity</p> <p>Loss of woodland structure Loss of diversity</p> <p>Loss of diversity</p>	<p>Promote improved agricultural practices & grazing schemes</p> <p>Institute fire management schemes</p> <p>Evaluate elephant management options in consultation with management authorities and local communities</p>
<p>Mopane woodland</p> <p>Damage by elephants</p>	<p>Bare ground Soil erosion Decreased biodiversity</p>	<p>Evaluate elephant management options in consultation with management authorities and local communities</p>
<p>Wetlands, floodplains and dambos</p> <p>Changes to hydrology because of damming, diversion of water, streambank cultivation and siltation</p> <p>Overgrazing</p> <p>Frequent Fire</p>	<p>Loss of fish breeding grounds Loss of waterbird habitats Desiccation of areas important for biodiversity or tourism</p> <p>As above</p> <p>As above; soil erosion</p>	<p>Seek alternatives or mitigating measures through impact statements and multisectoral consultation</p> <p>Plan and implement controlled grazing schemes in less sensitive habitats</p> <p>Plan and implement fire management programmes</p>
<p>Pans</p> <p>Introduction of exotic fish</p> <p>Breaking of seal through hoof pressure</p>	<p>Decline or loss of indigenous species</p> <p>Loss of vegetation and diversity; decline and loss of pan</p>	<p>No effective remedy once established</p> <p>Plan and implement controlled grazing schemes in less sensitive area</p>
<p>Freshwater rivers and lakes</p> <p>Changes in hydrology by damming, diversion of water, streambank cultivation, siltation</p> <p>Invasion of exotic aquatic plants</p> <p>Invasions by exotic fish</p> <p>Contamination by tsetse or mosquito control chemicals</p>	<p>Loss of fish habitats and breeding grounds Loss of waterbird habitat</p> <p>Blockage of channels and eutrophication of system Loss of clean water Loss of indigenous species</p> <p>Decline or loss of indigenous species</p> <p>Impacts on many groups including invertebrates and fish</p>	<p>Seek alternatives or mitigating measures through impact statements and multisectoral consultation</p> <p>Difficult and costly to control once established. Research and adopt preventative measures where possible.</p> <p>No effective remedy once established</p> <p>Seek alternatives or mitigating measures through impact statements and multisectoral consultation</p>

There are also, beyond the generalised need for the maintenance of the habitats noted above and the adoption of transboundary management strategies for natural ecosystems, a number of specific issues within the “Four Corners” area that will benefit from such an approach. These are:-

- **Hydrology:** The need for collaborative and equitable management of water resources is increasingly recognised by governments in the region, as evidenced by such instruments as the SADC Protocol on Shared Watercourses; and the management of these resources is given added urgency by possible reductions in runoff due to climate change. There are also some more specific water-related plans within the region, such as possible water abstraction from the Zambezi River or the proposed hydroelectric schemes upstream of the Okavango Swamps, that may have significant biological impacts. The recent creation of the Zambezi Basin Commission (ZAMCOM), headquartered in Lusaka, may provide a platform for constructive debate on such issues.
- **Large mammal movements:** These have already been noted in previous sections. Again, a collaborative approach to the management of mobile populations of large mammals will be critical.



stocks, prevention of invasions by alien exotics, and control of invasive floating aquatic plants are all examples of issues that should all be included in transboundary management strategies.

- **Fisheries:** The issues noted under hydrology above apply with equal force to the fisheries in the region. Changes in hydrology resulting from potential dam construction and water abstraction may have considerable adverse impacts on fisheries, and may also require a transboundary approach. Fisheries are a major source of rural livelihoods in the area, and attention should be devoted to ensuring sustainability while retaining diversity of species. The monitoring of fish



- **Timber exploitation:** Mature stands of Zambezi teak (*Baikiaea plurijuga*) (left) are becoming rare in the region because of logging, land clearance and increased fire. There need to be strong and collaborative efforts to monitor the status of this and other species, to control the frequency of burning in mature woodlands such as those in National Parks or Forest Areas, and to exercise strict control over commercial logging activities.

Some of these issues can undoubtedly be addressed without the formalised creation of a TFCA. The task will, however, be more easily achieved under the umbrella of high-level policy agreements implied by the establishment of a TFCA.

9.3 Ecotourism

The area's inclusion of the Mosi-oa-Tunya/Victoria Falls, the Okavango, of several major national parks, and of significant stretches of the Zambezi River currently utilised for recreational purposes all support the contention that ecotourism should be a major planning goal in the transboundary "Four Corners" area. This hypothesis has also been confirmed by the initial biological studies; and the goals of both income generation through ecotourism and of biological conservation are, with certain *caveats*, capable of being met through a landscape-scale approach to planning. There is, in fact, already a *de facto* emphasis on ecotourism due to the presence of these attractions, at national levels. The major *caveat* applies to unbalanced tourism development that impacts on biodiversity, scenic attractions and wilderness quality.

It will nevertheless be necessary to formalise such a goal in the context of any international agreements that may be signed; and it will be vital, in this respect, to ensure that a genuinely multisectoral approach is adopted from the outset. Agriculture, urban development, rural development, power generation and water resource management are all examples of essential interests that must be accommodated with a broad consensus. There are many others. However, the latter two interests - power generation and water abstraction - are likely to prove especially difficult to resolve in view of existing plans that will modify the hydrology and other important aspects of areas such as the Okavango Swamps and Batoka Gorge. The biological and social impacts of these potential developments will require careful attention at an early stage, if the projects concerned appear likely to proceed.

IN SUMMARY:

GENERAL PLANNING CONSIDERATIONS

- **The findings of the biological research strongly support the view that a transfrontier and landscape-scale approach to conservation should be implemented across the area.**
- **The sustainability of required transboundary institutions is critical. In the "Four Corners" area, planning for this sustainability should form a central activity during the period of donor funding. Mechanisms such as levies on tourism and other commercial beneficiaries, alongside matching incentives to develop facilities within the area, may prove useful.**
- **Some of the major issues associated with biodiversity conservation can undoubtedly be addressed without the formalised creation of a TFCA. The task will, however, be more easily achieved under the umbrella of high-level policy agreements implied by the establishment of a TFCA.**
- **If eco-tourism is to be a high-level goal for the Four Corners area, agriculture, urban development, rural development, power generation and water resource management are all examples of essential interests that must be accommodated with a broad consensus.**
- **The biological and social impacts of any potential developments will require careful attention at an early stage, if the projects concerned appear likely to proceed.**

9.4 Specific geographical areas and localities

Nine areas of particular conservation interest have been identified within the project area, and these, together with important areas for bird conservation are highlighted on Map 4. They are: -

a) The Okavango swamps

The Okavango Swamps are wellknown worldwide as a prime tourist attraction, but nevertheless merit attention here because of frequent threats such as potentially damaging pest eradication methods and, more recently, the possibility of water abstraction streams that would have severe impacts. The Okavango is one of the largest - and possibly the most pristine and unmodified - wetlands in south central Africa. Although it does not have endemic or threatened species, it has a high diversity of habitats including perennial and seasonal swamps; heavily wooded islands; and lies immediately adjacent to dry woodland dominated by mopane or Kalahari vegetation. It also has a rich diversity of species and is possibly the most threatened habitat in the project area, in spite of the protection of much of the area as the Moremi Wildlife Reserve.

b) The Kavango/Okavango river fringes

This area flanks the Kavango/Okavango river in western Caprivi and northern Botswana, sometimes known as the “panhandle.” It consists primarily of woodland and grassland, mixed with wetland vegetation. This area has no endemics or threatened species, but good riparian woodland is becoming increasingly scarce in southern Africa, and the woodlands here are still in near-pristine condition. They are, like the Okavango Swamps, threatened by possible water abstraction schemes.

c) The Makgadikgadi Pans and lower Nata River

This is a well-known and extensive area of north central Botswana, with salt flats surrounded by dry woodland, mostly mopane, and various grassland types. The salt flats are the remains of ancient lakes formed when geological uplifting first dammed the ancient Zambezi River, and then diverted it into its present course. Sowa (formerly Sua) Pan is one of only two known breeding sites in southern Africa for the threatened Lesser Flamingo, and White Pelicans breed in the Nata Delta Though not under any particular threat, the Makgadikgadi habitats are unusual and deserve special consideration from a planning perspective. Only a small part of the area is protected in the Makgadikgadi Pans Game Reserve.

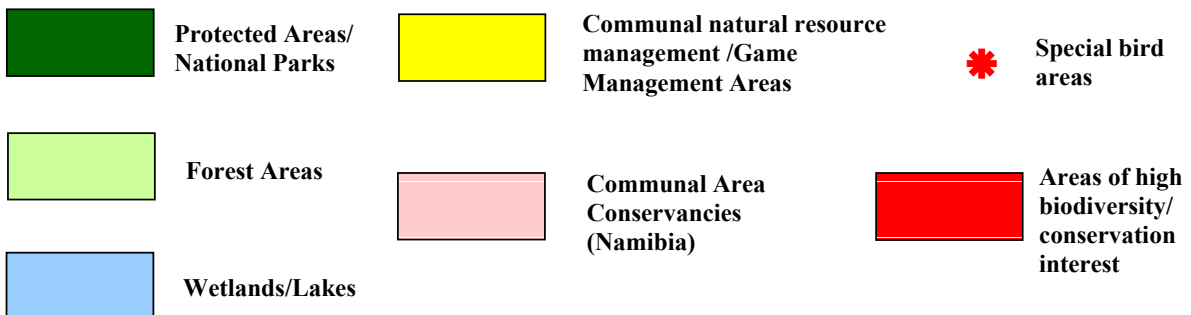
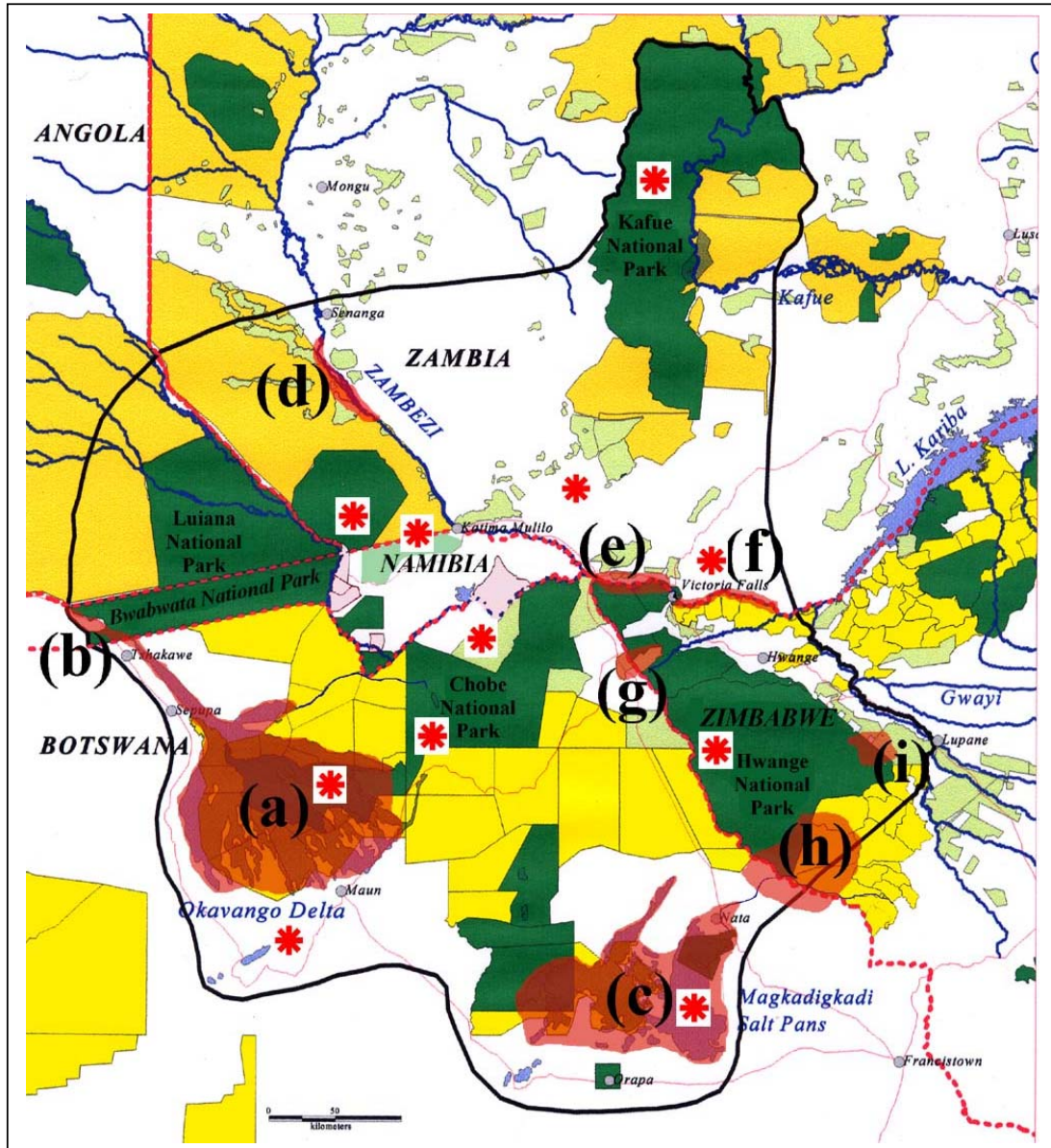
d) Riparian woodland on the Zambezi below Senanga

This area flanks the Zambezi River upstream of the Ngonye Falls, and has riparian - basically riverbank - woodland with several plant species that occur in few other places. Such areas are becoming increasingly rare because of damage caused by both humans and wildlife, notably elephants. The area is not currently protected, but should be given high conservation priority and status.

e) and f) The Victoria Falls and Batoka Gorge

The Victoria Falls themselves are protected on both sides of the river by Zambia and Zimbabwe. Outside the protected area, though, the Victoria Falls is - on the Zimbabwean side, at least - a prime example of uncontrolled development being allowed to reduce the aesthetic values that are valuable to tourism. Although a planning initiative was commenced in Zimbabwe using Canadian finance, this funding has been withdrawn and there is no indication that the process is being continued independently. The resumption of this process is a high priority if the Victoria Falls are to retain much of their value as a tourism asset. Meanwhile the Batoka Gorge, which

Map 4: Areas of high biodiversity and conservation interest in the Four Corners TBNRMA



extends for many kilometres downstream of the Victoria Falls, is Zimbabwe's sole remaining "natural" stretch of the Zambezi, unmodified by hydroelectric projects.

The gorge also has exceptionally high "wilderness value" which is currently enjoyed mainly by the clients of white-water rafting companies but could, given imaginative marketing, be much more widely sold. The Moemba Falls, for example, are extremely beautiful and lie in one of the few parts of the gorge that are accessible by road. Moemba will be lost, and the wild character of the remainder of the gorge heavily modified, should the planned Batoka gorge hydroelectric project go ahead.

g) Kazuma Pan

This is a classic example of an area of high biodiversity and wilderness value that has been severely impacted in the absence of transboundary collaboration on planning issues. Kazuma is a transfrontier area centred on a large seasonal pan, with high habitat diversity, unusual grasslands, and populations of such valuable species as roan antelope and a possibly unique variety of oribi, a small antelope. It is also a trans-boundary crossing point for large herds of buffalo. Although the entire Zimbabwean portion is protected as a National Park and forest land, much of the adjacent area in Botswana, just to the south, is now commercial farmland.

h) Southern Hwange dunes and Nata mudflats

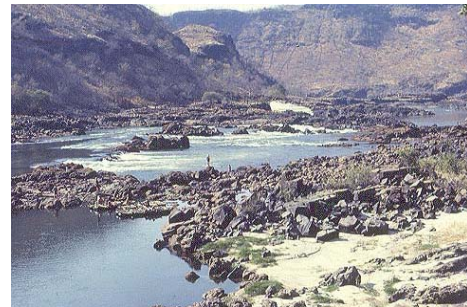
This is an extensive mosaic of relatively untouched dense teak, camelthorn and acacia woodland on Kalahari sand dunes dating from the Pleistocene period. There are also grasslands on mudflats and shallow sandy areas with *Combretum* scrub. There is a high diversity of plant species as this is a meeting-place for Zambezian and Kalahari floras. Otherwise, the biodiversity of the area is poorly known but is likely to be rich. Much of the area lies in the Hwange National Park, but it also extends into Botswana and into the Tsholotsho communal land in the south.

i) Ngamo Pan and surrounding area

Ngamo Pan lies in the Hwange National Park and neighbouring Ngamo Forest Land in western Zimbabwe, and has calcareous pans on Kalahari sand, with the remnants of ancient sand dunes. The pans are surrounded by teak woodlands, and the grasslands support a high density of palms. The southern part of the pan lies in communal land, with no protection.

9.5 Planning Considerations: Batoka Gorge and Okavango Swamps

Of these areas, the Batoka Gorge and Okavango swamps are prime examples where competing interests require reconciliation. The Batoka Gorge (below right) is a leading contender for the Zambezi's next major dam; the Okavango may be threatened by possible hydroelectric generation at Popa Falls, in Namibia (below left).



The implementation of both schemes, as they stand, is likely to be fundamentally irreconcilable with environmental and biological concerns. It is impossible to build a dam *and* retain the Batoka gorge in its present pristine condition. The impacts of the Popa scheme are thought to be more subtle, but may lead to major changes in the hydrology and biology of the Okavango Delta.

Two points arise, of which the first is that both are water-related, and water is one of the big issues - maybe the biggest issue - likely to face southern Africa in coming decades. The equitable allocation of water resources, already difficult in the face of growing human demand, is likely to be severely increased if forecast declines in runoff in the region prove correct. This is a probable scenario.

Both cases have transboundary implications. The Okavango's water supply derives from Namibia and Angola. The Batoka Gorge forms the border between Zambia and Zimbabwe, and may also have downstream impacts as far as Mozambique.

The potential resolution to hydroelectric issues lies in a creative approach to energy generation and use. Because of their immense cost, large dams tend to be at least partly driven by lobbies with significant vested interests, notably multi-national civil engineering concerns. Such concerns have little interest in seeking alternatives, and evaluations of energy generation options should be carried out by impartial multisectoral bodies constituted for the purpose. There has, for instance, been relatively little attention paid to demand-side management in the region. Meanwhile, other generation options include coal and coal-bed methane, regional power-sharing, and small-scale solar generation.

Equitable allocation of water resources for agriculture and human consumption is a different and altogether more complex issue, as options are not always easily available. Such issues may to some extent be capable of internal or transboundary resolution, but ideally require the formalisation of basinwide protocols for the allocation of water resources. The SADC Protocol on shared water Resources goes some way towards addressing these issues at regional policy levels, but mechanisms for the impartial resolution of conflicts are not as yet in place. The embryonic Zambezi Basin Commission (ZAMCOM) places a high priority on equitable resource allocation, but is not yet fully functional and the Okavango Swamps lie beyond its geographical mandate. There are few options other than constructive negotiations between the governments and agencies involved.

9.6 Planning considerations: Victoria Falls

A cynical view would cast serious doubts on the future ability of regional governments to structure and implement effective large-scale planning across the Four Corners area, when they have so far proven incapable of resolving urgent issues at the Victoria Falls - a UNESCO World Heritage Site and the natural tourism "hub" of the area.

The biodiversity report concerns itself mainly with biological features - the so-called "rain forests" within the permanent spray zone, which contain a number of unusual species; the Batoka Gorges which are home to endemic and endangered plants and birds; the extensive riparian forests along the Zambezi River upstream of the Falls, which have been severely impacted by elephants; and the growing presence of invasive exotic plant species.

But there are other problems in this area. Burgeoning development around Victoria Falls town has served to concentrate animal movement routes into certain areas, resulting in excessive impacts on vegetation and increasing conflict with humans. Although the Falls themselves remain relatively untouched, their Zimbabwean environs have been seriously degraded by unplanned and uncontrolled developments of various kinds, including inappropriate “luxury” tourism facilities at one end of the scale and the growth of informal settlement at the other. Neither the first sight of the area from the airport road, nor the ensuing journey through the town centre, are of an aesthetic quality calculated to inspire the visitor (see below).



Furthermore, fuelled by the demands of a “honeypot” tourist attraction, visually inappropriate riverside developments and tourism activities continue to impact on the aesthetic quality of the area and reduce the “wilderness” value of the tourism experience from both sides of the river.

It will be difficult, if not physically impossible, to reverse this situation.

However, if the governments concerned are serious about maintaining the Victoria Falls as a leading tourism destination, efforts should be made to address these problems. There has been a considerable investment in planning, much of it funded by the Canadian government; as matters stand, this investment will be wasted unless the Zimbabwean and Zambian governments allocate significant resources to the completion of the Victoria Falls Master Plan process and the urgent implementation of transborder management strategies. The stipulations of the UNESCO World Heritage Convention should also be scrupulously promoted and observed if this status - and the resulting prestige and funding opportunities - are to be retained.

9.7 Fully-protected areas

It might be thought that valuable biodiversity areas under full legal protection, as within National Parks or analogous designations, require no further attention; or if they do, that they are the province of the relevant management authority and require no further attention from other developmental agencies.

But, in the Four Corners region there are many agencies with a vested interest in the success of tourism initiatives based on these biodiversity areas. And, almost without exception, the relevant protection authorities are underfunded and under-capacitated, a situation which handicaps their ability to perform their protective role to maximum efficiency.

There are many cases in which the loss of a biological asset within a protected area can impact heavily on the success of tourism initiatives. Poaching is a case in point. Historically,

collaborative action against organised poaching has generally been limited to Park management authorities, police, and sometimes national army and air force units.

Much useful assistance can be rendered by NGOs and donors, and also by local authorities, CBNRM managers and community-based organizations. However, the responsible authorities need to be wary of hidden agendas where motivations such as commercial profit may outweigh genuine efforts to help protect biodiversity.



“Subsistence poaching” and the unsustainable use of plants and other natural products from within protected areas, though not as immediately serious as organised poaching of elephant and other valuable species, can also impact severely on species diversity and biological integrity. Most experts now advocate approaches based on education rather than heavy-handed legal actions, but developmental planners should also be aware of the recent developments in Park management philosophy encapsulated in the phrase “benefits beyond borders.” In simplistic terms,

this means involving local people in decisionmaking and equitable benefit-sharing in respect of adjacent protected areas. Such moves may require high-level policy and legislative changes, but it is in the interests of local authorities to promote and catalyse such change.

9.8 Areas with part protection

Some areas, such as the Makgadikgadi Pans in Botswana and Ngamo Pan in Zimbabwe, are only partly protected. It would be *nice*, from a biological perspective, if such areas were more fully protected, but the question must be asked: is it *necessary* from this and other perspectives? Can changes in legislation and possibly land use be justified on economic, biological or social grounds?

This is a difficult question for most developmental and planning agencies to answer without specialised assistance. Furthermore, the form such protection might take requires careful consideration. As matters stand, merely extending a formal protected area can often pose immense difficulties, and may be justifiable only if particularly sensitive species or ecosystem processes are at risk, or if the area in question is uninhabited or sparsely so, and is not widely utilised by local communities. “Land swaps” may be one way to solve these difficulties. Alternatively, encouraging appropriate forms of land use in the unprotected portion - community-based ecotourism or sport hunting, for example - may be appropriate.

9.9 Transboundary biodiversity areas – varied protection status and mixed land use

These can present even greater difficulties, in the absence of a unified collaborative approach to area development. Transboundary approaches to biodiversity conservation were developed precisely because of the way in which ecosystems and habitats were frequently ruptured by different land uses at international boundaries.

The prior existence of contiguous protected areas will, as we have noted, provide a relatively well-focused platform for collaborative transboundary action (Victoria Falls/Mosi-oa-Tunya /Batoka comes to mind). Where other land uses are concerned, however, difficulties are likely to arise if options have already been foreclosed. The commercial farmlands close to Kazuma Pan are a case in point, as is the southern part of Hwange National Park which extends into the Tsholotsho communal lands and across the border into Botswana. Rehabilitation of such areas may be possible and, if so, should ideally be undertaken. More often, however, the major policy focus should be placed on the pre-emption of future problems of this kind, backed up by liaison at relevant technical local planning levels.

IN SUMMARY:

SPECIFIC PLANNING CONSIDERATIONS

- 1. Areas of particular conservation interest (Map 4) as identified by the Four Corners biodiversity studies need to be carefully considered in all decision-making and development planning for the area.**
- 2. Some of these require transboundary approaches (e.g. the Okavango Swamps, Vic Falls/Batoka Gorge, Kazuma Pan, Southern Hwange/Nata).**
- 3. Transboundary cooperation on long-term water and electricity supplies for the region may help to prevent environmental impacts on places like the Okavango and Batoka Gorge (which are high biodiversity areas threatened by water abstraction and hydro-electric schemes).**
- 4. Victoria Falls/Mosi-oa-Tunya/Batoka is the most important focal point in the region for transboundary collaboration on tourism. Commitment from regional governments is vital to reduce the dependency on unsustainable donor funding.**
- 5. Protected areas can benefit from collaborative action (e.g. to help reduce poaching) and legislative change to involve local people in decision-making and benefit sharing.**
- 6. Ways of providing better protection to areas that are only part protected need to be carefully examined.**
- 7. Transboundary biodiversity areas provide a major challenge to planners, especially where land-use is different on one side of a border to the other (e.g. Kazuma Pan and Southern Hwange/Nata)**

PART 10: CONCLUSIONS

- 1. The Four Corners area as a whole is biologically diverse. This diversity will benefit from collaborative, trans-boundary management.**
- 2. Trans-boundary management requires long-term vision and commitment, which will present political, economic and social challenges to governments.**
- 3. These challenges should not be an excuse for lack of action on the ground. Planners are in a position to mould a better future for their people and their areas. Tools are at their disposal. They should use them.**
- 4. While high-level political negotiations proceed, much can be achieved at a local level using existing biological knowledge, assessing environmental impacts, creating management plans and establishing on-going monitoring mechanisms.**
- 5. But... all trans-boundary and local planning initiatives will fail unless people in the Four Corners area can see that some real benefits will result from it.**