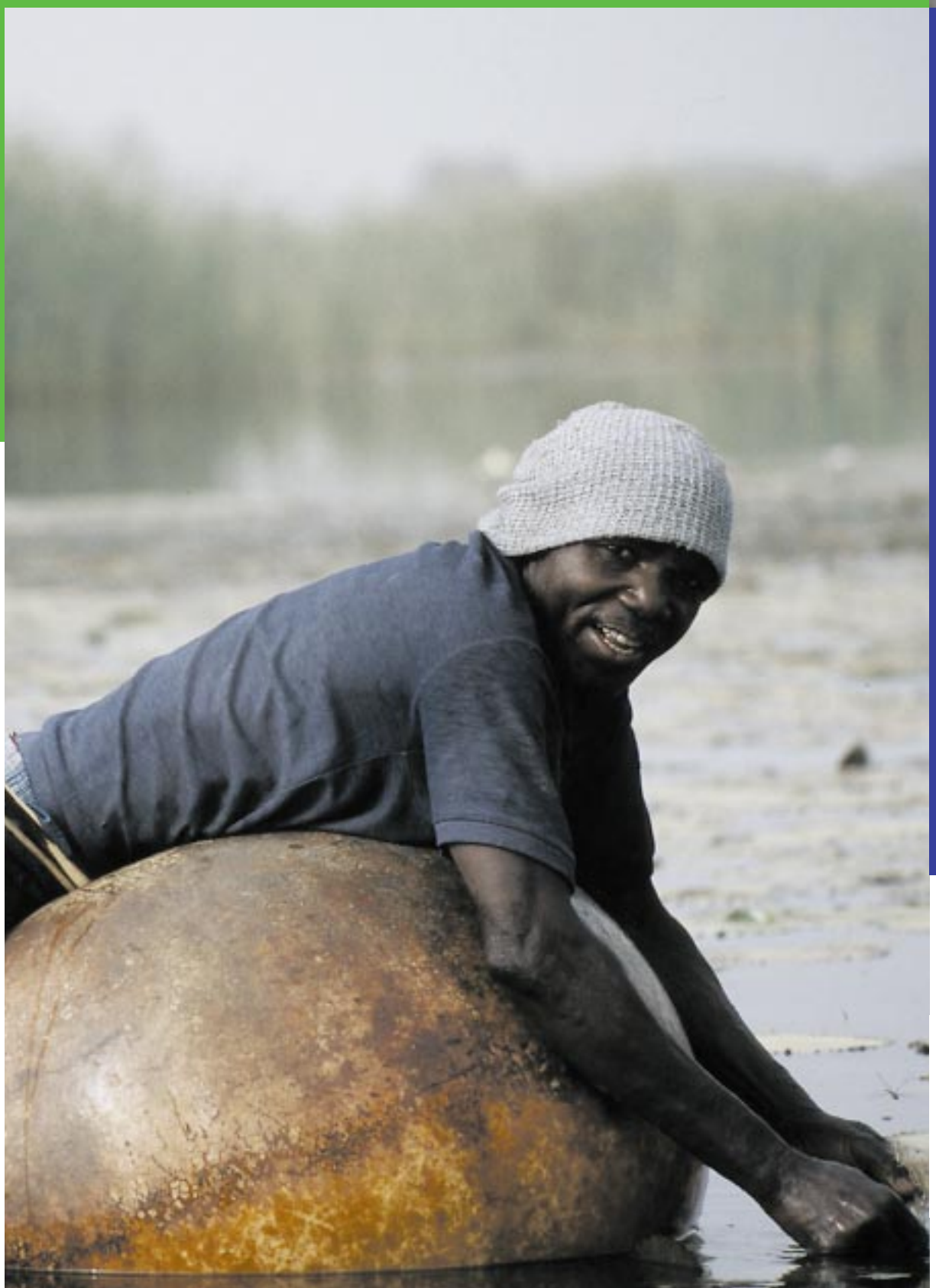
Strategies for wise use of Wetlands: Best Practices in Participatory Management

Proceedings of a Workshop held at the 2nd International Conference on Wetlands and Development (November 1998, Dakar, Senegal)

Edited by Meg Gawler



WETLANDS INTERNATIONAL

Global series 8

IUCN The World Conservation Union

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Ministry of Environment and Nature Protection of Senegal

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Many, many people have contributed their insights, good will, and hard work to the process that has resulted in this volume of case studies of best practices in participatory management of wetlands.

The 2nd International Conference on Wetlands and Development was organised under the leadership of Wetlands International, together with IUCN - the World Conservation Union, and WWF - World Wide Fund for Nature. This close collaboration of the three organisations was central to defining the broad vision that characterised the conference as a whole.

In particular Marcel Silvius, Jean-Yves Pirot, Biksham Gujja, and Alex de Sherbenin functioned as guiding lights throughout the process of developing Workshop 1 on *Best Practices in Participatory Management*. Ger Bergkamp, Gordon Claridge, Mike Moser, and Gonzalo Oviedo helped to refine the focus of the workshop.

The workshop itself would never have been possible without the tireless and utterly professional commitment of the conference team, including Senegal's Director of National Parks Souleye Ndiaye, and especially the staff of Wetlands International from both the West Africa Regional Office in Dakar and headquarters in Wageningen.

A tremendous debt of gratitude goes to the workshop Chair, Ibrahim Thiaw, whose wisdom and leadership provided the guidance that kept the workshop focused and fruitful, and to the Co-Chair Samuel Kofi Nyame, who skilfully pulled together the key lessons at the end. The three facilitators – Bill Phillips, Alex de Sherbenin, and Aliou Faye – contributed both expertise and provocative questions to ensure productive discussions of the key issues. Irene Kamau and Jean-Paul Taris fulfilled the demanding role of rapporteurs, and Daniel Shaw took care of the logistics with dedication and creativity.

Funding and in-kind support for the workshop were generously provided by Wetlands International and WWF International, and I would like to personally thank Biksham Gujja and Jenny Heap for their support. It took a very long time indeed to secure funding to publish these proceedings; in the end it was the IUCN Wetlands and Water ResourcesProgramme, and in particular Jean-Yves Pirot and Elroy Bos who saved the day.

It has been a privilege and a great pleasure to organise this workshop and to edit the proceedings. Most of all I want to thank the individuals in the communities represented herein, together with the field workers who sought and encouraged their collaboration. These are the people who deserve the real credit – for taking the risks inherent in developing co-management systems, and for their honesty and courage in sharing experiences of the real challenges in participatory wetland management.

Meg Gawler
Workshop Leader

Foreword

Strategies for Wise Use of Wetlands: Best Practices in Participatory Management was the theme of a Workshop at the 2nd International Conference on Wetlands and Development, held in November 1998 in Dakar, Senegal. Participants learned lessons from interesting case studies and had fruitful and lively discussions on approaches, concepts, successes and challenges in participatory wetland management. Counting on the skillful and committed facilitation and editorial work of Meg Gawler, the Workshop produced valuable outputs which have been finally condensed and published in this volume.

In 1999, the Conference of the Parties to the Ramsar Convention held its Seventh meeting in Costa Rica, and adopted *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands*, the first tool of its kind in the context of international environmental instruments. In the process of drafting and discussing the Guidelines - which were a result of a broad collaborative effort involving indigenous and community organizations, NGOs, and governments, we largely benefited from the case studies, discussions, and notes from the Dakar Workshop reported on in this document. The Workshop and its outcomes were indeed invaluable, immediate antecedents for that landmark resolution of the Ramsar Convention.

The international community has generally come to understand and accept that participatory management is a key factor in successful wetland conservation and wise use. Yet many barriers and problems remain for its effective implementation - ranging from issues of legal and policy frameworks to those of local capacity and institutions. Planners and implementers of wetland management, including communities as crucial local actors, require information on lessons and experiences about what works and what does not, and need to identify where the sources of useful information are. These proceedings significantly contribute to filling that gap, and thus will be of great benefit to all practitioners.

Co-management options, participatory monitoring, win-win scenarios, challenges ahead, actors' and stakeholders' roles, the likely scope of participation, building trust between communities and government agencies, national legislation and governments' interests in co-management of wetlands: these and many others are all important issues addressed in these proceedings. They will no doubt become obligatory reading for all those working on wetland conservation and interested in supporting communities' rights and wellbeing.

Gonzalo T. Oviedo C.
Head, People and Conservation
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November 2001

WHAT ARE BEST PRACTICES? LESSONS IN PARTICIPATORY MANAGEMENT OF INLAND AND COASTAL WETLANDS

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KEYWORDS: wetlands, inland, coastal, participation, community, supporting frameworks, local environmental knowledge, economic valuations, gender, participatory monitoring, win-win scenarios

ABSTRACT

This review paper provides an introduction to this volume, bringing together the case studies presented and discussed in a workshop of the 2nd International Conference on Wetlands and Development, held in Dakar, Senegal. Eight co-management themes are highlighted to identify and refine strategies for wise use: supporting frameworks, local environmental knowledge, economic valuations, gender, participatory monitoring, effectively addressing threats to wetlands through co-management, win-win scenarios where socio-economic development has gone hand in hand with wetland conservation, and exit strategies. This paper provides an overview of the lessons from the case studies published in this volume, together with other recent examples from the literature, and highlights best practices in participatory management of both inland and coastal wetlands.

INTRODUCTION

Strategies for Wise Use of Wetlands: Best Practices in Participatory Management was organised as Workshop 1 of the 2nd International Conference on Wetlands and Development, held in November 1998 in Dakar. It aimed to address the complexities and challenges of developing and implementing wetland co-management systems with local stakeholders by:

- promoting the exchange of experiences, and strengthening south-south networks, and
- identifying and refining strategies for wise use, and reviewing best practices of participatory wetland management from around the world, particularly from Africa.

This workshop was a follow-up to a previous workshop of the first International Conference on Wetlands and Development held in Kuala Lumpur, Malaysia in October 1995. Planning for the Dakar workshop drew substantially upon the landmark volume that incorporated the proceedings of the first workshop in Kuala Lumpur (Claridge and O'Callaghan (eds.), 1997).

Evidence to date indicates that local people's involvement in wetland management can contribute significantly to maintaining or restoring ecological integrity and community well-being. Building upon the recognition that every successful co-management initiative has the potential to stimulate positive initiatives elsewhere, the Dakar workshop encouraged participants to focus on solutions, and on honest assessments of practical experiences in participatory wetland management.

It also provided an opportunity for "ground-truthing" the guidelines for establishing and strengthening participatory processes to involve communities and indigenous people in wetland management, which were then under development for the 1999 Conference of Parties of the Ramsar Convention on Wetlands (Ramsar Convention on Wetlands, 1999). The Ramsar guidelines summarise five major requirements for successful co-management:

- incentives for local and indigenous people's involvement and wise use: everyone must benefit in the long term
- trust among stakeholders
- flexibility
- knowledge exchange and capacity building, and
- continuity of resources and effort.

Box 1 describes the situations when local and indigenous people *should* be involved in wetland management.

Box 1.
WHEN IS PARTICIPATORY WETLAND MANAGEMENT ADVISABLE?

(Source: Ramsar Convention on Wetlands, 1999, Resolution VII.8)

Experience has shown that it is advisable to involve local and indegenous people in a management partnesship when:

- the active commitnent and collaboration of stakeholdres are essential for the management of a wetland (e.g., when the wetland is inhabited or privately owned);
- access to the natural resources within the wetlands is essential for local livelihood, security and cultural heritage, and

- local and indegenous people express a strong interest in being involved in management.

The case for local and indeginous people's involvement is even stronger when :

- local stakeholders have historically enjoyed cistomary/legal rights over the wetland;
- local interests are strongly affected by the way in which the wetlands is managed;
- decisions to be taken are complex or controversial (e.g., different values need to be harmonised or there is disagreement on the ownership status of the land or natural resources);
- the existing management regime has failed to produce wise use;
- stakeholders are ready to collaborate and request to do so, and
- there is sufficient time to negociate among stakeholders in advance of management decisions being made.

The workshop was organised into plenary sessions (with keynote presentations, case studies, and panel discussions), poster sessions, and discussion groups to formulate the conclusions and recommendations to the final plenary session of the conference. Two-thirds of the oral presentations in this workshop concerned co-management of wetlands outside of protected areas. Of the case studies presented in this volume, half address coastal wetlands and half inland wetlands.

The workshop, which functioned as a sounding-board for practitioners, stressed that success must be judged from many different angles, such as stakeholder well-being, government agency satisfaction, and ecosystem health. Eight themes were highlighted in the effort to identify and refine strategies for wise use:

1. **Supporting frameworks**: appropriate changes in land tenure, resource access, property rights, and the recognition of co-management regimes in national and local policies, legislation, and development plans, and how these have affected local initiatives
2. **Local environmental knowledge**: co-management systems that have effectively incorporated traditional knowledge and technologies
3. **Economic valuations**: assessments of the benefits and functions of wetlands that have gone beyond theory, and have been used in management planning
4. **Gender**: wetlands management systems where women as well as men have a decisive influence on determining management objectives and practices
5. **Participatory monitoring**: partnerships between management and local people to monitor the ecological character of wetlands, and progress towards the community's own objectives
6. **Effectively addressing threats** to wetlands through co-management
7. **Win-win scenarios**: where socio-economic development has gone hand in hand with wetland conservation, and
8. **Exit strategies**: where co-management initiatives have pro-actively planned for, and then effectively implemented, scaling down and phasing out of external assistance.

WHAT IS PARTICIPATORY WETLAND MANAGEMENT?

Underlying the idea of community-based resource management is the recognition that humans are part of the ecological system, and not separate from it. Today's wetlands, including those considered to be the most pristine, are the result of complex interactions among physical, biological, and human forces over time. Virtually all of the earth's wetlands have been influenced and altered by patterns of – more or less intense – human use. In the case of First Nations, wetland management by local people can have a history of thousands of years.

Now, participatory management is generally defined as:

> *a partnership in which government agencies, local communities and resource users, and perhaps other stakeholders, such as NGOs, share the authority and responsibility for management of a specific area or set of resources.*

According to Addun and Muzones (1997), there are five basic principles that are required for community-based resource management:

1. Empowerment: the actual transfer of economic and political power from the few to the impoverished many, and the operationalisation of community management and control
2. Equity: communities as a whole, rather than a few individuals, benefit
3. Sustainability: inter-generational equity, based on the carrying and assimilative capacity of the ecosystem
4. Systems orientation: the community functions in the context of other communities and stakeholders, just as resources are ecologically linked to wider ecosystems
5. Gender-fair: women are involved in the control and management of community resources, and their practical and strategic needs are addressed.

The degree of community participation in the wise use of wetlands varies with the local context: from high levels of empowerment, to effective partnerships between government authorities and local communities, to situations where government remains firmly in control and stakeholders are consulted on decisions.

There is growing awareness that, in areas where indigenous and traditional peoples live, and have done so for hundreds, or even thousands of years, the authority for resource and ecosystem management must be devolved as much as possible to the local level. All over the world, indigenous peoples are demanding recognition of their rights, and a greater say in

decisions affecting their lives. Fortunately, there is a growing understanding that rich biodiversity often coincides with cultural diversity. In these areas, the trend in ecosystem management is increasingly towards systems of collaborative management with indigenous peoples (Oviedo and Brown, 1999).

One clear lesson to date is that, unless a relationship of trust between communities and government agencies can be established and maintained, it is unlikely that even the simplest co-management regime can survive. Unfortunately, in the majority of situations where communities are in a subsistence relationship with resources, their level of trust in government agencies is extremely low or even non-existent, and long periods of dialogue and shared learning are needed to build the trust required for co-management to work (Claridge and O'Callaghan, 1997). Once communication channels are functioning, the best way to build a solid foundation of trust is to ensure that plans and targets – mutually agreed between the communities and the relevant government agencies – are met.

A sufficiently long initial period of analysis and problem identification can help to make sure that resource management plans are developed based, not on token participation, but rather on genuine mutual agreement derived from a clear analysis of the benefits and costs to all stakeholders, in both the short term and the long.

The Ramsar guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands provide an extremely valuable list of indicators to help measure the extent of community involvement, reproduced here in Boxes 2a and 2b.

Box 2
INDICATORS FOR MEASURING LOCAL AND INDIGENOUS PEOPLE'S INVOLVEMENT IN WETLAND MANAGEMENT

(Source: Ramsar Convention on Wetlands, 1999, Resolution VII.8)

1. Local and indigenous people have achieved an economic stake or other interest in the wise use of wetland ressources.
2. The government agency has stated policies supporting participatory management.
3. Appropriate legal and financial incentives for participatory management are in place
4. A more equitable sharing of benefits among stakeholders has resulted from the participatory management process.
5. Stakeholders have expressed satisfaction with their involvement in the process.
6. There is a clearly stated and widely known policy or legal document that makes a commitment to involving local and indigenous people.
7. All key stakeholders (particularly government) acknowledge participatory management as legitimate and desirable.
8. Local and indigenous people are now involved in making substantive decisions affecting the wetland resource use and management.
9. Local organisations to advance participatory management are respected within the community.
10. Representatives of the local and indigenous people are truly representative and accountable to them.
11. There are resource use and participation rules that are appropriate to the local situation.
12. A management agreement exists between stakeholders (oral or written, formal or informal).
13. The management agreement has clearly defined boundaries and membership.
14. The management agreement specifically defines stakeholders' functions, rights and responsibilities.
15. The management agreement has been approved by at least the resource-using stakeholders and key decision-making groups.
16. Parties to the agreement meet their commitments.
17. Non-compliance with approaches, rules, rights, and responsibilities outlined in the management agreement is deemed to be at an acceptable level.
18. Any system of graduated sanctions for infringement of rules has been agreed upon by all key parties.
19. There is evidence that resource management controls are being implemented.
20. There is the potential for collective modification of the rules relating to ressource use by those affected
21. There are "nested" management units (different bodies at different levels).
22. There is evidence that the local and indigenous people can influence the speed and direction of change in relation to the ressources with which they are concerned.
23. Facilitators/coordinators practice "learning by doing" and adaptive management.
24. There is an awareness among stakeholders of new management approaches, rules, rights, and responsibilities.
25. There is a two-way flow of information and communication between local and indigenous people and relevant government agencies.
26. Information reaches local and indigenous people in a timely and accurate manner, and in a form that is readily understandable
27. Local and indigenous people participate in site monitoring and in evaluation of the participatory process
28. There is evidence of respect by key government agencies for local human systems and local ecological knowledge.
29. Stakeholders are demonstrating necessary skills and empowerment (e.g., capacity to make decisions, monitoring skills, etc.).
30. Measurement methods, established by the stakeholders, demonstrate and quantify the degree to which local participation was intented to, and actually has improved or conserved the recognised functions and values of the wetland and its wise use.

31. There are one or more organisational structures that facilitate local and indigenous people's involvement (e.g., a council, management body, women's group, etc.).
32. A random sample of local and indigenous people are able to identify the community's role in wetland management, and the individuals who are directly involved can accurately describe the objective of their involvement.
33. The government agency and its staff have a demonstrated commitment to participatory management, and can accurately describe the objective of local and indigenous people's involvement.
34. There is an appropriately long-term source of funding for ongoing participation and resource management.
35. Local and indigenous people have provided in-kind support (time, labour, traditional knowledge and expertise) to implement the participatory management agreement.
36. Conflict management mechanisms exist, and there is an appeals process in case of conflicts within the management partnership.
37. There is integration between local wetland management and management of the entire catchment.

SUPPORTING FRAMEWORKS

A sound legal basis is essential for establishing a participatory management regime. The chances of success are then greatly enhanced by transparent decision-making processes and multi-sectoral planning. A policy and legislative framework that legitimises the involvement of local people in resource management is the basic minimum input from government that will always be required. Issues of tenure, resource access, resource ownership, and co-management itself must be addressed. Lessons from involving people in managing marine protected areas in Belize, Mauritania, Mozambique, and Zanzibar stress the importance of a firm legal basis to support the efforts of the local people (Wells and Gawler, 1999).

In Cameroon (Kouokam and Ngantou, this volume), a law was passed in 1995 legitimizing participatory management of forests and protected areas. In many countries, however, national legislation does not support co-management. Furthermore, many government agencies lack training in participatory management. In many cases, legal, policy and implementation frameworks still need to be revised to allow for genuine models of community empowerment.

In Thailand, the general principle of people's participation in governance, resource management, and development planning has been fully recognised in the newly revised Constitution, adopted in May 1998. Legal recognition alone, however, does not suffice. Erftemeijer and Bualuang (this volume) point out that there still are major cultural barriers to effective grass-roots participation in the strongly stratified, hierarchical Thai society.

An interesting success story of community-based fisheries comes from Japan (Weinstein, 1998). After experimenting with western resource management methods (open access subject to licensing) in the late 19th century, Japan rescinded the new laws, and at the turn of the century returned to traditional community-based management for all inshore coastal fisheries. Exclusive, inalienable rights were granted to local fishing cooperatives. Membership in the cooperatives is based on residency and a period of apprenticeship, and is not transferable. The operational rules (gear, season, fishing areas, etc.) are decided by the cooperatives based on the experience of the fishers. The system provides a powerful form of accountability, as management decisions are made by fishing groups sharing the same fishing grounds, and mistakes are borne by the people who make them. According to Weinstein, Japan's inshore fishery is very healthy, as measured by macro-level indicators of sustainability.

Claridge and O'Callaghan (eds., 1997) noted that government agencies are often slow to embrace participatory wetland management, and their support for co-management may be only lip-service. They concluded that the development of techniques for increasing government acceptance of, and commitment to, co-management was one of the major challenges facing wetland conservation. Although this remains the case in many areas, some case studies from the present workshop provided encouraging examples of effective supporting frameworks.

For example, the Djoudj National Park in Senegal (Diouf, this volume) is implementing a management plan developed in consultation with the neighbouring communities. The plan is endowed with an institutional mechanism based on four committees. The Orientation and Scientific Committees provide oversight, while the Park Management Committee, including village representatives, has a direct role in the implementation of the management plan. In addition, an Inter-Village Conservation Committee maximises the participation of the neighbouring villages, facilitates the exchange of viewpoints and decisions, and coordinates the development work of the various technical committees on ecotourism, replanting, waterways, health, and forestry/pastoralism. Great care went into designing these supporting frameworks for participatory management, with positive results. A climate of trust was built between the people and the park agents, and the number of infractions within the park declined to zero when the participatory management policy began.

Lessons from Pattani Bay in Thailand (Erftemeijer and Bualuang, this volume) provide many valuable insights into identifying and creating conditions for success, as well as the potential pitfalls, of developing supporting frameworks for participatory management.

The paper by Til and Banda in this volume, on the Bangweulu wetland in Zambia, highlights the difficulties of co-management in a situation characterised by suspicion, mistrust, and outright hostility – between government agents and local

people, among different ethnic groups, and even within ethnic groups. They draw attention to the importance of democracy in participatory management, where each and every stakeholder is free to present his or her view, and to be represented. Here, however, the traditional leadership of the chiefs is by no means in the interest of all. A major lesson from the Bangweulu is the importance, in this context, of creating supporting frameworks that effectively control the powers of the traditional chiefs and empower the powerless, while at the same time keeping the chiefs on board with the promotion of democracy and co-management.

Lessons from Zambia and elsewhere highlight the need to take into account customary supporting frameworks provided by traditional kings, queens, chiefs, religious leaders, and healers. These powerful key players (who – it is true – may in some cases need to begin sharing the responsibility for decision-making) must be fully involved in developing strategies for wise use.

Faced with ever increasing threats to its important coastal fishery, Bénin has forged ahead to create a legal basis for participatory management of this key resource (Akambi, this volume). In 1993, the Fisheries Administration began creating Fisheries Committees in the major villages along the coast, which were democratically elected, and charged with ensuring the rational use of the lagoons and their resources. A legal foundation was established in 1996 with the adoption of a management plan for the coastal fisheries, and in 1997 a law was passed legalizing the existence and operations of the village Fisheries Committees. To date, 95 committees have been created to co-manage Bénin's coastal fisheries, and the resulting functional working relationships have created a climate of trust between the fishers and the government authorities.

The Tasek Bera case study in Malaysia (Prentice *et al*., this volume) focuses on the indigenous Semelai people with their close cultural affinity to the wetland, and seeks to develop the role of this disadvantaged group in a new nature-based ecotourism initiative. Initial results indicate that the consultation process was effective in raising awareness, and achieving trust and support.

Pimbert and Gujja (1997) report on issues of trust and equity in wetland management policies in Keoladeo NP in India and the Ucchali wetland complex in Pakistan. They emphasise that participation must be part of a process of dialogue, action, analysis, conflict resolution, and change. Nzioka (this volume) presents two examples of lack of transparency in decision-making, concerning the Tana and Rufiji deltas in Kenya and Tanzania respectively. Given the potential threats these developments pose to the delta ecosystems and to the livelihoods of local people, these examples underscore the urgency of appropriate policy frameworks, and in particular, robust integrated coastal zone management plans. Campredon (this volume) emphasises the importance of a regional framework in developing a planned approach to coastal zone management.

The case studies from the Tana and Rufiji deltas also point to the importance of incorporating mechanisms for conflict resolution in supporting frameworks. In situations where there may be a lack of trust between local communities and government institutions, it is important to find ways of overcoming the barriers that may exist, and to balance community ownership of the process with the full involvement of local government. User communities managing wetlands are unlikely to be able to solve problems originating outside the community.

Current trends towards decentralisation can indeed lead to greater reliance on co-management structures, but if the decentralisation of authority is not coordinated, it can result in competing and overlapping jurisdictions, conflicts in wetland policies, or in the worst cases, a total abandonment of responsibility by government agencies.

OECD (1996) provides useful general guidelines for developing supporting frameworks for the wise use of wetlands. In addition, in many situations, promoting participatory management will require changing government attitudes, approaches, policies, and/or legislation. While local projects and local successes may provide convincing arguments for the benefits of co-management, policy efforts must not be neglected in ensuring a legislative basis for collaborative resource management. It should be understood that moving government agencies away from rigid top-down habits to participatory approaches generally takes a sustained effort over a very long time, and development agencies and NGOs should be prepared for a long-term commitment. Resource management policies will need to be harmonised among regional, national, provincial, and local levels, and in addition, between present and future generations. Weinstein (1998) suggests design principles for successful and sustainable management institutions based on common property rights, and these are given in Box 3.

Box 3.
DESIGN PRINCIPLES FOR ENDURING AND SUSTAINABLE COMMUNITY-BASED MANAGEMENT INSTITUTIONS

(Source: Weinstein, 1998)

- Boundaries of the resource systems, and the parties that have use rights are clearly defined.
- Rules for individual resource allocation (or benefits) are tied to local conditions, and to rules for contributions (of labour, materials, cash...).
- Individuals who are affected by the rules, and who have the most information about the environmental and social systems, are involved in making changes to the rules.
- Users monitor physical/biological conditions, and users monitor user behaviour (or they hire people to do the monitoring).
- Users who violate the rules receive graduted sanctions (e.g., warning, then fine, then exclusion) from other users, or from officials accountable to the users, or from both.

- Users have rapid access to low-cost, local methods to resolve conflicts (amoung users, or between users and officials).
- Rights of users to create their own institutions are not challenged or subverted by government authorities or by other resource users.

Another aspect of supporting frameworks is building community capacity for self-organisation. Local groups may need help in acquiring skills in prioritizing identified problems, leading meetings to maximise participation – especially of traditionally under-represented groups, building consensus, literacy, recording agreements, general management and accounting, conflict resolution, ecological and socio-economic monitoring, preparing reports and proposals, etc. Community capacity building is a recurrent theme throughout the papers in this volume.

LOCAL ENVIRONMENTAL KNOWLEDGE

For most of human history, the natural world has been protected from the most disruptive human influences through relatively humble technology, and local laws or cultural or religious taboos preventing overexploitation. The loss of traditional knowledge about resource use is one of the central problems of our times (McNeely, 1993). Local people often have an understanding of wetland ecology in their particular context that is far subtler, and sometimes superior to that of outside "experts". Traditional practices, such as voluntary restrictions on access and use, can be invaluable tools for wetland management. However, traditional practices do not necessarily result in environmental sustainability, and they must be assessed objectively in the light of changing population dynamics and pressures on the resource. Likewise, local explanations for environmental phenomena may need to be reviewed in light of scientific understanding. Rather than simply extracting local knowledge for the benefit of wetlands science, it is critical that researchers working with local people ensure a two-way exchange of information, ensuring that local wisdom is incorporated into management strategies, and feeding back scientific knowledge and data to the communities.

Local environmental knowledge can be a powerful source of authority. The Fisheries Committees in Bénin (Akambi, this volume) are reviving traditional management practices, such as obligatory rest days, and taboos against taking juveniles and against fishing in the strictly forbidden sacred spawning areas.

In the case of Diawling National Park in Mauritania, which suffered from the same disruption of ecosystem functioning as the Djoudj NP across the river, local environmental knowledge provided the cornerstone of the restoration plan (Ba *et al*., this volume). One example of this is the very detailed traditional knowledge of the hydrology of the river and the migratory pathways of the fish that the fishers of Takhridient contributed to the design of the restoration works – with excellent results for the fish, the shrimp, and the local economy. Likewise, since many of the park regulations for resource use are based on their own traditions, the local people around the park take an active role in ensuring the respect of the rules, and inform the park authorities of infractions such as night fishing, using a sickle to harvest perennial grasses, etc.

Another spectacular case of floodplain restoration has been carried out in Waza Logone in Cameroon (Kouokam and Ngantou, this volume). Here again, the project design was based on the highly detailed knowledge of the local people with regard to the floodplain vegetation, hydrology, seasonal productivity of the fisheries, the cultivation of floating rice, and the migratory pathways of wildlife. The integration of traditional community knowledge into the restoration design is without a doubt one of the main reasons for the success of this project.

In heavily populated Nigeria, where the demand for fish far outstrips the supply, Ayeni and Mdaihli (this volume) consider that for fisheries management to have a chance of success in the future, it must combine government control with local traditional methods that were once in place, such as taboos on seasons, minimum size, and sacred no-fishing zones. With the introduction of community-based fisheries management in Kainji Lake, management decisions are now taken by representatives of the fishers and their traditional institutions. This has changed the fishers from antagonists to defenders of the regulations.

Wood *et al.* (this volume) report on wetland ecosystems in south-west Ethiopia where government development policies raise questions about sustainability, as they favour more intensive wetland use, in contrast to the less intensive uses based on tradition. In particular, local communities have a wealth of knowledge built up over generations on hydrology and soil dynamics. and they have developed management practices accordingly, which seem to permit the long-term use of these wetlands without degradation. A strong message from this paper is that government policies should be more sensitive to the diversity of local conditions, including specific wetlands and the needs of their associated communities.

Participatory Rural Appraisals carried out in three villages near the Ucchali wetland complex in Pakistan revealed important social and ecological differences among the villages, pointing to the need to integrate the site-specific knowledge and innovations of individual communities with the more general ecological principles on which management plans are usually based (Pimbert and Gujja, 1997).

Incorporation of indigenous and local knowledge, values, and management practices is absolutely critical to the relevance and success of participatory management initiatives.

Although this is usually recognised in principle, in practice, greater effort is often needed to incorporate local wisdom — and especially traditional management strategies — into wetland management plans.

ECONOMIC VALUATIONS

Wetland ecosystems, and particularly the ecological functions they provide (which are not bought and sold in markets), are typically undervalued in development decisions. Economic valuation, by providing a means for measuring and comparing the various benefits of wetlands, requires that all the values that would be gained or lost under each resource use option are weighed objectively. As such, economic valuation offers a powerful tool for ensuring the "wise use" of wetlands. OECD (1996) analyses wetland values in terms of function, products, and attributes for different types of wetlands, and Barbier *et al*. (1997) provides a good guide on economic valuations for planners and policy makers.

In response to proposals for reclamation for commercial agriculture of the Yala swamp in western Kenya, Abila (this volume) determined replacement values for key economic activities of the local communities who depend on the wetland resources. Comparing the replacement values for hunting, fuelwood, brick making, papyrus, and fishing with the costs and benefits of conversion, this study concludes that traditional sustainable uses of the wetland by local people should be promoted over conversion.

The practice of beach seining in Lake Kainji for small freshwater sardines results in substantial by-catch of juveniles of other commercially important species. Ayeni and Mdaihli (this volume) estimated the economic value of the total catch with and without beach seining, and these calculations helped to raise awareness, and build consensus to eliminate beach seines among the different conflicting interest groups. Similarly the Community-Based Wetlands Conservation Project in the Saiwa wetlands in Kenya (Awer Mohamed, this volume) used comparative gross margin analysis to help community groups determine the relative incomes they could expect from alternative enterprises in the wetland buffer zone (agro-forestry, fish farming, beekeeping) in comparison to maize, a more intensive land-use.

These examples all illustrate the use of economic tools to inform decision-making by local actors. Examples can be found in the literature of valuation exercises that have demonstrated the economic value of wetlands in the larger context of development policy. However, according to the experience of the participants in the Dakar workshop, there seem to be few economic valuation studies that have in fact made an impact on wetland policies, especially in developing countries.
Lessons to date from economic evaluations of wetlands highlight the need to:

- develop more robust, simple indicators
- use methods that are specific to different wetlands
- ensure that the techniques used are based on a good understanding of the human-resource interface
- ensure that data are then interpreted correctly, and especially
- develop easily applied techniques that can be used by local communities to evaluate what is of benefit to *them*.

Methods that exaggerate the economic value of wetlands should be avoided. In some cases, greatly exaggerated claims have damaged the credibility of this potentially valuable tool for wetland conservation. Greater effort must be made to improve synergies between wetland economists and public relations / communications specialists. Too often decision-makers and the general public are not aware of the economic value of wetlands and their ecological function. This is an area that should receive priority attention in the future, as many development decisions are made on economic grounds.

GENDER

Although gender analysis is accepted as a key element in successful natural resource management, gender roles are not always considered when wetland projects and programmes are designed. Despite its recognised importance, the concept of gender is still not well understood by policy and decision makers, planners, and natural resource managers. Matiza (1993) outlined the key issues that need to be addressed for gender to be fully integrated into wetland conservation and management:

- Correct gender perceptions, and increase gender awareness.
- Promote gender roles research in wetland conservation and management.
- Review traditional stereotypes in wetlands resource allocation and utilisation.
- Anticipate potential conflicts between traditional culture and gender roles empowerment.
- Train policy makers, planners, and wetlands resource managers in gender roles analysis.
- Integrate gender issues into national wetlands policies and into wetland projects and programmes at the planning, monitoring, and evaluation stages.

Clearly defined user rights can be a useful first step in facilitating women's participation. Training in conflict resolution may also be necessary. Invariably, in efforts to change unfavourable gender stereotypes, a measured approach – working with both men and women – is required. In traditional societies, the importance of addressing gender issues with sensitivity and patience cannot be overstated. In the Saiwa wetlands in Kenya, for example, men were reluctant at first to let women participate in study tours. However, their perceptions slowly evolved as they saw for themselves the benefits of involving women more fully.

It is important to understand that addressing gender issues with too much enthusiasm and too little sensitivity, can backfire, resulting in project failure. In some cases, deeply-

rooted traditional stereotypes pose real challenges to gender-sensitive development. The Bangweulu swamps in Zambia provide an example of strong resistance to involving women in co-management structures, even though women play a crucial role in the fishing industry. Here co-management is perceived as a political process, and therefore is the domain of men. Thus, there is a risk that the process of co-management will be monopolised by men, and will have a negative impact on the position and interests of women (Til and Banda, this volume). In strongly traditional societies such as these, concerted and sensitive efforts are needed to ensure the representation of less powerful stakeholders in co-management regimes.

In the Diawling floodplain, the incorporation of women's knowledge led to a redesign of the artificial reflooding scheme (Ba *et al.*, this volume). The men had suggested releasing the flood waters early to maximise the recruitment of *Tilapia*. The women, however, insisted that the wetland grasses, such as the valuable *Sporobolus*, needed rain before the flooding in order to reach optimum vegetative growth. A compromise solution was tested, which produced extremely positive results for the fish, the perennial grasses, and the local community as a whole.

Although not yet widespread enough, successes have been recorded in many projects, such as the Waza Logone wetland in Cameroon (Kouokam and Ngantou, this volume), where women have proved to be ideal partners in co-management. In this conservative context, the project worked slowly and sensitively, first of all negotiating with the men to allow the women to engage in activities outside their homes. Here, once resistance was overcome, and women were allowed to participate, their contribution was greatly appreciated by the men, and the entire community benefited from revisiting and changing traditional gender taboos. The women of Waza Logone now have the (previously unheard of) rights to acquire land for rice cultivation, to produce and sell goods, to manage revenues, and to participate in mixed decision-making committees. This kind of cultural change is enormous, and requires years of patient, careful work.

Since the importance of engaging both women and men in wise use strategies for wetlands is widely recognised, one must then ask: why is it that, even today, good examples of gender-sensitive strategies in wetlands conservation and development initiatives remain the exception rather than the rule?

In order for participatory management to avoid the pitfalls of excluding key stakeholders, wetland initiatives should ensure that:

1) gender issues are in integral part of planning, monitoring, evaluating, reporting, and dialogue with partners
2) the initiative has adequate expertise on gender issues
3) gender issues are incorporated in the Terms of Reference for all studies
4) statistics are disaggregated by sex; and
5) capacity is built with partner institutions to work with gender issues (ZBWCRUP, in press).

Gawler (1999) provides guidance on assessing whether a project is adequately addressing gender issues in terms of project design, monitoring, and implementation.

PARTICIPATORY MONITORING

Central to a strategy for sustainability is knowledge about how systems are performing, and what the effects of management efforts actually are. The science of wise use is by necessity an ongoing process of adaptive learning. What works in one place is not necessarily the answer for the neighbouring watershed, or even the neighbouring village. What is needed is a diversity of solutions, based on an evolving understanding of local environmental and cultural conditions. Monitoring by the people to whom the solution matters most is critical to the success and relevance of adaptive management.

Waterwatch Australia provides an exciting example, at a nation-wide scale, of participatory monitoring (Chalkley *et al.*, this volume). Waterwatch is an environmental education and awareness programme that promotes and supports water quality monitoring, in order to create an ownership ethic for catchment-wide land and water management by the Australian people. Since 1993 Waterwatch Australia has grown to include over 50'000 people monitoring over 4000 sites in every state and territory of the country. The Waterwatch method is based on community awareness and ownership, regional facilitators helping community groups, and strong technical support. Waterwatch is now evolving beyond monitoring, and is entering a new era of activism, pressing for solutions to waterway problems.

Local ownership and informed local decision-making have been key to the initial successes in Pattani Bay, Thailand, where a project is facilitating community initiatives to restore severely degraded sites of former mangroves (Erftemeijer and Bualuang, this volume). The project approach emphasises process rather than outputs, and focuses on learning, strengthening community organisation, building environmental awareness, and sharing information. The villagers themselves determined why their initial efforts were not effective, and decided how the rehabilitation work should be re-oriented.

Involving local people in monitoring is not only a cost-effective solution, drawing on local knowledge, but it also has many potential positive spin-offs. Participatory monitoring provides a powerful learning element, and a tool for village environmental plans. Just having data can give people a sense of ownership. Communities involved in monitoring see for themselves the impacts of project interventions, and can recommend corrective actions if necessary. Baseline surveys during the planning phase or at the beginning of the intervention can build awareness, and are important so that the communities have a reference point from which to measure progress. A well designed community monitoring programme is one of the most effective ways to enhance skills in resource management.

Despite the benefits, local people may not wish to volunteer their time for monitoring, particularly if they believe the monitoring is solely satisfying the scientific curiosity of outside stakeholders. In some cases, clear incentives will be needed. Challenges to participatory monitoring include: the need for robust indicators to measure impact or change, the need to secure the continuity of data collection, and ensuring the relevance and quality of the data collected. The capacity of community structures must not be overly romanticised. Experience has shown that in many cases, there will still be a need for outside help to document and disseminate the information collected, while the role of the community in monitoring is gradually increased as they build their capacity.

In many cases, monitoring techniques do not need to be highly sophisticated, and locally chosen indicators – such as "Are there bigger fish catches?" or "Does the water taste better?" – may be most relevant. Marguolis and Salafsky (1998) provide a wealth of valuable suggestions for developing and implementing a community-based monitoring plan, as well as using the results of monitoring for learning and adaptive management.

EFFECTIVELY ADDRESSING THREATS

It must be recognised that even within communities there can be a large diversity of stakeholders. It is important to ensure that the needs of the weaker groups within the community are addressed, and to avoid the risk of over-organizing the community. Threats to wetlands often involve major issues of equity among stakeholders, and addressing these issues can be an effective first step towards resolving the threats to biodiversity. Co-management is an important tool for conflict management and even resolution. Among the great advantages of participatory management is that it opens up dialogue, and increases transparency in decision-making.

Finlayson *et al*. (1998) demonstrate successful strategies for addressing threats to three coastal wetlands in northern Australia, where land tenure systems, resource use, and management structures are vastly different. The common denominators of these successful programmes were that they were: 1) essentially cooperative, and involved genuine local input, and 2) based on formal arrangements that acknowledge the diversity, aspirations, and economic and cultural values of the local communities.

Local communities are increasingly aware of the negative impacts to their resource base of large development projects. More and more, communities are eager to defend their rights to sustain their livelihoods as resource users. However, when faced with a diversity of interest groups, local people do not necessarily have the negotiating skills needed to achieve solutions to the threats of most concern to them. Communities may need to be trained in order to be able to discuss their concerns with government agencies. The capacity building that is necessary to empower communities must be planned for and taken seriously.

With declining government resources on every continent, it is clear that involving local communities as the main actors in wetland management is by far the most promising solution to the ever-increasing threats to the integrity of wetlands. However, co-management must not be an excuse for government inaction. Governments need to set appropriate environmental standards, and to be actively engaged in helping to meet these standards.

Thampy (this volume) argues that decision-makers need to know with more scientific certainty how forces such as migration, urbanisation, rapid population growth, tourism, and high rates of resource consumption affect the natural ecosystems on which life depends. Astute and realistic environmental policies that are compatible with human needs, and that provide incentives will be critical to achieve enduring success in maintaining ecosystem health. It is well known that environmental issues cannot be tackled in isolation of the prevailing economic and social context. The Nakuru case study illustrates that, until the issues of inequity, insecurity, and political instability are addressed, sustainable development and ecosystem health will remain an elusive pipe dream.

De Sherbenin (1998) stresses that access to water is a human rights issue. Water is often captured by powerful economic interests, to the detriment of local communities. Inappropriate (or un-implemented) national policies underlie many of the most severe threats to wetland ecosystems, such as water diversions, agricultural policies, and pollution. A major challenge is to establish effective, integrated coordinating mechanisms for river basin, or transboundary wetland management (Moser *et al*., 1999).

Likewise, the root causes of wetland degradation may be international trade or climate change. This highlights the urgency of accompanying co-management initiatives with the necessary national and international policy reforms. Measures to conserve wetlands for the goods and services they provide may ultimately fail if they are not supplemented by efforts to address water allocations, human demography, pollution, climate change, etc.

WIN-WIN SCENARIOS

In this context, a win-win scenario is where a wetland intervention results in measurable benefits to both humans and nature. When resources become scarcer, people have incentives to regulate use. In the short term, there will often be winners and losers, and losers may need to be compensated. Strategies for wise use mean taking the long-term view, and devising outcomes where all stakeholders can be winners. Experience shows that creative negotiation and trust are vital to create win-win situations.

Olesu-Adjei (this volume) presents an example from Ghana, where the blockage of freshwater corridors leading to the coastal lagoons had resulted in serious degradation of the lagoon vegetation, especially mangroves, and a radical decline

in the biodiversity of the assemblages of coastal fishes, in addition to painful consequences for the local communities and their livelihoods. The project provided equipment, and the communities contributed their labour to remove weeds and silt from the freshwater channels, thus restoring mangroves in the lagoons, and a multitude of ecological amenities, such as rice and sugar cane farming along the banks of the channels, fishing, domestic water supply, and boat transport. This experience also helped to foster unity within and among the communities.

As described by Ba *et al.*, the initial results of the restoration of the Diawling floodplain showed dramatic improvements in fish and shrimp abundance, pasture, and vegetation, and this in turn benefited the subsistence and economic activities of both women and men. As a result, local communities are now demanding an extension of the park, as the park's legal mandate provides them with the greatest chance of being able to continue their traditional use of wetland resources.

Floodplain restoration, as illustrated by the projects in the Senegal River delta, and in Waza Logone in Cameroon (Diouf, Ba *et al.*, and Kouokam and Ngantou, in this volume), can provide spectacular examples of successful win-win scenarios. At the scale of an entire river basin, though, harmonisation of competing uses is very difficult, especially with conflicting interests of upstream and downstream users. The risk in these situations, especially in arid areas, is that everyone loses if appropriate water policies are not established and implemented in time.

EXIT STRATEGIES

Effective community participation in wetland management is a long-term process that can only be achieved through an incremental approach. Unfortunately, the development literature is riddled with examples of projects that ultimately failed because appropriate exit strategies were not included in the project design. Building viable participatory management structures requires continuity in effort and resources. Realistic exit strategies must be devised at the beginning of a project, and they must be monitored during the project's lifetime.

One key lesson is that projects should adopt the role of facilitator rather than implementer, and that the role of stakeholders should shift from passive to active. The focus should be on process, and long-term ownership by the communities. As communities become more empowered, support can be decreased. Good results have been achieved when the phase-out is gradual, and project inputs evolve from continuous to part-time support. Scale is important. Sustainability is enhanced when projects start small, building upon what people have already, relying on local institutions, and ensuring that any inputs of equipment and infrastructure can be maintained after external support has ended.

The development of low technology, low cost solutions for wetland management and restoration, based on local environmental knowledge is particularly important for developing countries (Moser *et al.*, 1999). A good example of this approach is the Saiwa wetlands project in Kenya (Awer Mohamed, this volume), which was intentionally designed with a small budget to enhance the prospects for sustainability. The project aimed to develop a land-use system that would simultaneously benefit the resident community and the wetlands, and the project's specific objectives were determined through analysis by the local communities, who identified soil conservation as their major strategic concern. The approach in Saiwa gives reason for optimism, as the farmers themselves now lay out terraces and leave uncultivated strips between their farms and the wetlands, and in so doing they are benefiting economically.

Kouokam & Ngantou (this volume) advance a plan of progressive dis-engagement, including creating a local NGO to carry on as development assistance is phased out and afterwards.

The Lake Nakuru conservation and development project (Thampy, this volume) is another example where examples of exit strategies were incorporated into the re-design of the project. Using a catchment approach to promote the health of the lake ecosystem, the project helped to initiate over 200 tree nurseries, with an annual turnover of 200,000 seedlings. Most of these nurseries are now independently motivated, self-reliant initiatives, which do not receive any material support from the project.

Likewise, the Yadfon Association, a Thai NGO, ensured the sustainability of their work to restore mangroves by gradually expanding their approach over 13 years from a few villages at the outset to over 30 by the late 1990s, and by expanding the scope of their work to the more general aspects of coastal resource management, rural community development, and sustainable fisheries. Now the villagers themselves, without any substantial involvement of Yadfon staff, are promoting community capacity building for self reliance and the wise use of coastal resources to other villages in Trang Province (Erftemeijer and Bualuang, this volume).

In most wetland conservation and development projects, however, more attention must be paid to devising exit strategies as part of the project design, so that gains that are made during the life of the project are not lost when donor funding or outside support comes to a close.

CONCLUSIONS

What are best practices? As noted by Erftemeijer and Bualuang (this volume), there is no single correct way to establish effective local community involvement in wetland resource management. What is crucial is to share with others

working in the same field, experiences of both successes and failures.

Clearly, the emphasis on the process rather than the outputs contributes to a longer-lasting, sustainable change in attitudes towards resource use. At the same time, however, the process approach must be accompanied by clear and measurable indicators of progress – as defined by the target communities. One of the challenges, as mentioned by Erftemeijer and Bualuang, is balancing an open, flexible approach based on local ownership of the process with clear prioritisation of objectives, and weighing the community's desire for immediate benefits with the need for sustainable, long-term solutions.

Best practices in participatory management often take wetland managers far beyond the specific concerns of conservation and wise use, and touch upon some of the most significant aspects of human life: democracy, equity, development, and cultural survival (Borrini-Feyerabend, 1996). Empowerment is about people – both women and men – taking control over their lives: setting their own agendas, gaining skills, increasing self-confidence, solving problems, and developing self-reliance. It is both a process, and an outcome (ZBWCRUP, in press).

It is hoped that this volume, *Strategies for Wise Use of Wetlands: Best Practices in Participatory Management*, will strengthen our collective understanding of the wise use of wetlands by documenting some examples of best practice. Much more, however, needs to be done at all levels – local, national, and international – to learn from co-management experiences, and to develop supporting policies and the capacity to implement them. As emphasised by the 2nd International Conference on Wetlands and Development, water and wetlands are the source of life. The papers in this volume do show that important and encouraging lessons on participatory management of wetlands are being learned in a variety of human and ecological settings. There is no room, however, for complacency.

Water and wetlands are the source of life, highlighting the urgency in every country of developing, before it's too late, strategies for the wise use of our source of life.

A key lesson from all of these contributions is that, for a strategy of wise use to be sustainable, it cannot be based solely on a concept developed by government or international experts, but must ensure that it incorporates the priorities and the wisdom of local people.

REFERENCES

Abila, R. (this volume). Utilisation and economic valuation of the Yala Swamp wetland, Kenya, pp 89-55.

Addun, R.P. and D.M. Muzones. 1997. Community-based coastal resource management (CBCRM): Tambuyog's experience in the Philippines. In: Claridge, G.F. & B. O'Callaghan (eds.) *Community Involvement in Wetland Management: Lessons from the Field.* Wetlands International, Kuala Lumpur. pp 219-230.

Akambi, L. (this volume). L'approche participative pour la gestion des pêcheries dans les zones humides du Sud-Bénin, pp 43-45.

Awer Mohamed, M. (this volume). Mitigating the effects of intensive agriculture on wetlands: The case of Saiwa Wetlands, Kenya, pp 57-100.

Ayeni, J.S.O. and M. Mdaihli. (this volume). Conservation and Management of Kainji Lake Fisheries: A Community-Based Approach.

Ba, A., O. Fall and O. Hamerlynck. (this volume). Le Parc National du Diawling: Expérience de co-gestion pour la restauration des plaines inondables, pp 19-25.

Barbier, E.B., M.C. Acreman and D. Knowler. 1997. *Economic Valuation of Wetlands: A Guide for Policy Makers and Planners.* Ramsar Convention Bureau, Gland, Switzerland. 127pp.

Borrini-Feyerabend, G. 1996. *Collaborative Management of Protected Areas: Tailoring the Approach to the Context.* Issues in Social Policy, IUCN, Gland, Switzerland. 67pp.

Campredon, P. (this volume). Pêche artisanale et conservation du littoral de la Mauritanie à la Guinea-Bissau, pp63-67.

Chalkley, S., B. Edgar and K. Gowland. (this volume). Who is watching our water: Participatory monitoring by Waterwatch Australia, pp 101-105.

Claridge, G.F. and B. O'Callaghan (eds.). 1997. *Community Involvement in Wetland Management: Lessons from the Field. Incorporating the Proceedings of Workshop 3: Wetlands, Local People and Development, of the International Conference on Wetlands and Development held in Kuala Lumpur, Malaysia, 9-13 October 1995.* Wetlands International, Kuala Lumpur. 278pp.

Claridge, G. and B. O'Callaghan. 1997. Making co-management of wetland resources work. In: Claridge, G.F. & B. O'Callaghan (eds.) *Community Involvement in Wetland Management: Lessons from the Field.* Wetlands International, Kuala Lumpur. pp 25-66.

De Sherbenin, A. 1998. Water and population dynamics: Local approaches to a global challenge. In: De Sherbenin, A. and V. Dompka (eds.) *Water and Population Dynamics: Case Studies and Policy Implications*. American Assoc. for the Advancement of Science, Washington, D.C., USA. pp 9-22.

Diouf, A.M. (this volume). Djoudj National Park and its periphery: An experiment in wetland co-management, pp 13-17.

Erftemeijer, P.L.A. and A. Bualuang. (this volume). Participation of local communities in mangrove forest rehabilitation in Pattani Bay, Thailand: Learning from successes and failures.

Finlayson, M., L. Thurtell, M. Storrs, R. Applegate, P. Barrow and P. Wellings. 1998. Local communities and wetland management in the Australian wet-dry tropics. In: W.D. Williams (ed.) *Wetlands in a Dry Land: Understanding for Management*. Environment Australia, Biodiversity Group, Canberra. pp 299-311.

Gawler, M. 1999. *Special Emphasis on Women. DGIS-WWF Tropical Forest Portfolio Newsletter, Issue 3.* WWF International, Gland, Switzerland. 4 pp. "Is Your Project Adequately Addressing Gender?" available at: http://www.artemis-services.com/english/home.html.

Kouokam, R. and D. Ngantou. (this volume). Le processus de cogestion dans le contexte du projet Waza Logone, PP 69-73.

Margoulis, R.A. and N.N. Salafsky. 1998. *Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects.* Island Press, Washington, D.C. 362 pp.

Matiza, T. 1993. Gender and wetlands management: Issues and challenges in Southern Africa. Paper prepared for the Workshop on *Gender and Water Resources Management: Lessons Learned and Strategies for the Future*, Stockholm, Sweden. 20 pp.

Moser, M., M. Silvius, J.Y. Pirot, and M. Gawler. 1999. Wetlands in the balance… at the dawn of the third millenium. In: *Wetlands – A Source of Life: Conclusions of the 2nd International Conference on Wetlands and Development, 10-14 November 1998, Dakar, Senegal*. Wetlands International, Wageningen, The Netherlands. pp 2-3.

McNeely, J.A. 1993. People and protected areas: Partners in prosperity. In E. Kemf (ed.) *The Law of the Mother: Protecting Indigenous Peoples in Protected Areas.* Sierra Club Books, San Francisco, USA. pp 249-257.

Nzioka, P. (this volume). Networking in East Africa for threatened coastal wetlands, pp 57-61.

OECD. 1996. *Guidelines for Aid Agencies for Improved Conservation and Sustainable Use of Tropical and Sub-Tropical Wetlands.* Organisation for Economic Co-operation and Development, Paris, France. 69pp.

Olesu-Adjei, I. (this volume). Community participation in coastal resources management in Ghana.

Oviedo, G. and J. Brown. 1999. Building alliances with indigenous peoples to establish and manage protected areas. In: S. Stolton and N. Dudley (eds.) *Partnerships for Protection: New Strategies for Planning and Management for Protected Areas.* Earthscan, London. pp 99-108.

Pimbert, M. and B. Gujja. 1997. Village voices challenging wetland management policies: Experiences in participatory rural appraisal from India and Pakistan. *Nature and Resources* 33 (1): 34-40.

Prentice, C., Z. Surut, P.C. Christensen and P. Sinnah. (this volume). Community development including ecotourism at Tasek Bera, Malaysia's first Ramsar site, pp 47-55.

Ramsar Convention on Wetlands. 1999. Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands. Resolution VII.8. *Resolutions and Recommendations, "People and Wetlands: The Vital Link", 7th Meeting of the Conference of Contracting Parties to the Convention on Wetlands (Ramsar, Iran, 1971), San José, Costa Rica, 10-18 May 1999.* Ramsar Bureau, Gland, Switzerland. Available at: http://ramsar.org/key_guide_indigenous.htm.

Thampy, R.J. (this volume). Wetland conservation and development: The Lake Nakuru case study, pp 111-116.

Til, J.B. and M.G. Banda. (this volume). Co-managing the Bangweulu fishery, pp 37-42.

Weinstein, M.S. 1998. Pieces of the puzzle: Getting to the solution for community-based coastal zone management in Canada. Key-note address to *Coastal Zone Canada 98*, Victoria, B.C.

Wells, S. and M. Gawler. 1999. Involving people in marine protected areas: Experiences in Central America and Africa. In: S. Stolton and N. Dudley (eds.) *Partnerships for Protection: New Strategies for Planning and Management for Protected Areas.* Earthscan, London. pp 118-125.

Wood, A., Afework Hailu, P. Abbot and A. Dixon. (this volume). Sustainable management of wetlands in Ethiopia: Local knowledge versus government policy, pp 81-88.

ZBWCRUP. (in press). Gender integration strategy. Zambezi Basin Wetlands Conservation and Resource Utilisation Project. IUCN Regional Office for Southern Africa, Harare, Zimbabwe.

DJOUDJ NATIONAL PARK AND ITS PERIPHERY: AN EXPERIMENT IN WETLAND CO-MANAGEMENT

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ABSTRACT

The creation of the Djoudj National Park in the delta ecosystem of the Senegal River valley in 1971 engendered conflict, as the population was removed from their traditional setting. Moreover, the building of the Diama Dam upstream in 1986 for irrigated agriculture and navigation – without environmental studies – severely affected the park and the entire ecosystem. The exclusionary policy of the government and park partners between 1971 and 1994 failed. Since then, however, a policy favouring collaborative management has been implemented. Currently the park is operating under a Five Year Plan for integrated management, developed in collaboration with all stakeholders, including the national government and local communities, whose conflicting interests were revealed by preliminary studies.

The main achievements of the plan are observable today in environmental education, village development, institutional research, and the development of ecotourism. However, the greatest achievement has been the reconciliation between the population and the park authorities on the one hand, and a closer collaboration between researchers and development institutions on the other, together resulting in a new situation, conducive to sustainable co-management.

INTRODUCTION

The National Bird Park of Djoudj (PNOD), created in 1971, is entirely located in the delta ecosystem of the River Senegal, and covers 16'000 ha. It was registered in 1977 in the list of internationally important wetlands of the Ramsar Convention, and in 1981 as a World Heritage site by UNESCO. Situated in the Mid-Delta of the River Senegal, the PNOD is directly influenced by the ecological and socio-economic dynamics of the upper and lower delta. The present situation in the delta results from a complex historical evolution, which has deeply affected and modified the area's ecological and socio-economic systems. A number of different factors over the last few decades have determined the tensions and conflicts around the park.

In 1964, a dyke was built on the left bank of the River Senegal, stretching for 80 km between Saint-Louis and Richard Toll to help control the rise of the water level for the development of irrigated agriculture in the delta. The dyke represents the first element of a plan that ended in 1986 with the closing of the Diama dam, which was carried out without an environmental impact study on how it would affect the park and its periphery.

The creation of the National Bird Park of Djoudj in 1971 was accompanied by the forced scattering of the populations who were living in the site. This naturally engendered conflicts, since the people were deprived of access to their original lands, where they had sites of worship, cemeteries, and the natural resources that ensured their livelihoods.

Since the closing of the Diama dam, the park has been subject to the unstable ecological situation of the river, making its management difficult and complex. Qualitative changes of the waters, invasion of the lakes by floating vegetation, and a regression of biodiversity are the main ecological problems facing the park. In addition, there are pressures on the resources linked to agricultural exploitation, human population growth, and the lack of grazing pathways for livestock.

THE PEOPLE OF THE DJOUDJ BASIN

The population of the Djoudj basin is historically characterised by dispersed settlements, due to the natural constraints such as the halomorphous aspect of the soils, and difficult access to drinkable water at certain periods of the year. More recently, changes in settlement patterns (arrival of new migrants, transfer of village sites) have resulted in ecological disturbances such as flooding and drought, as well as socio-economic changes (hydro-agricultural developments, creation of the park, and the building of the Diama dam).

There are now eight villages around the park (Tiguet, Debi, Rone, Fourarate, Diadem 1, Diadem 2, Diadem 3, and Kheun). These villages have been growing rapidly due to the irrigated perimeters made available by the hydro-agricultural policies in the higher and mid-valleys. The three main ethnic groups are the:

- Wolofs, who are the majority group in the villages of Tiguet, Debi, and Kheun

- Moors, who are the dominant group in the villages of Rone, Fourarate, and the three Diadem villages
- Peuls, who form a scattered minority.

The main socio-economic activities are raising livestock, agriculture, fishing, handcrafts, trading, and hunting.

All ethnic groups in the Djoudj area raise livestock, an ancient activity that is still important, in spite of the difficulties linked to climatic change. The rapid extension of irrigation works in the buffer zone of the park has closed the traditional transhumance pathways, and has hemmed in the most populated north-north-east area between the river and the park. The incursion of Mauritanian migratory herders on the left bank, increased livestock pressures on the periphery (and sometimes on the park), and was the first source of open conflict between the people and the park agents.

Agricultural methods in the Djoudj Basin have seen profound changes. Before 1965, flood recession agriculture was dominant. Then, with the advent of hydro-agricultural developments, implemented by the state Delta Development and Exploitation Company (SAED), traditional methods were replaced by irrigated agriculture. Now with access to agricultural credit, farmers' organizations (GIE or economic interest groups) are replacing the state company as the spearhead of agricultural activity.

Fishing is confined to the shallow waters outside the park, and generally occurs in the zones where the *Nymphea* lotus is gathered. Traditionally oriented towards domestic consumption, fishing in the Djoudj Basin now supplies markets in Saint-Louis. The income from selling fish, and the loans granted to fishers through community funds, are giving new dynamism to fishing.

Handicrafts are made by women, who produce reed mats (from *Sporobulus* and *Typha*), tanned animal skins, pearl-plated and silver-plated jewellery, and domestic goods (pots, teapots, etc.).

Some small shops are set up in the villages for the sale of basic consumer goods, and some villages have stores located in large urban centres such as Dakar and Saint-Louis. Bartering with rice is still a common trading practice.

Generally, the local populations do not practise legal hunting, but work as tourist guides in leased areas managed by the Association of the Hunters and Shooters of Senegal.

In the past, before the transformation of the site into a National Park, the local people lived by subsistence exploitation of the area's natural resources. The system benefited from traditional regulations and prohibitions, and squandering of resources was unknown. Profound changes occurred with the opening of the delta to hydro-agricultural developments, which stimulated the transition to a trading economy and the destructive exploitation of resources.

MAIN TRENDS AND EVOLUTION IN THE DJOUDJ BASIN

Located in the middle of the delta system, Djoudj National Park is subject to the influences and changes affecting the entire area. Irrigated rice growing, introduced in the Djoudj Basin by SAED and then expanded following the building of the dam by private initiatives (GIEs and agro-entrepreneurs), has become the dominant agricultural production system around the park. The extension of rice growing has engendered:

- a reduction in pasture areas (especially the dry season grazing pathways)
- the closing of transhumance corridors, and
- the rapid degradation of soil and vegetable resources due to the over-use of chemical fertilisers and pesticides, and to the practice of extensive agriculture.

Together these elements aggravate livestock pressures on the park. In addition, the increase in income from activities such as fishing and handicrafts will likely stimulate a larger human presence in the Djoudj Basin, and thus affect resource exploitation in the future.

The stakes involved are both ecological and socio-economic. The question remains: How to preserve biodiversity and ecosystem functioning in the Djoudj Basin, now marked by the serious constraints of persistent drought, and the modification of hydrological processes resulting from the Diama Dam? To answer this question scientific research is being carried out, to inventory natural resources and to gain a better understanding of the ecology of the river basin.

At the socio-economic level the question is: How to sustainably manage the Djoudj ecosystem? What is needed are management mechanisms which, while preserving natural resources, meet the development needs of the people and take into account the structural changes introduced by regionalisation. Concerted and participatory management provides the best hope of meeting both human and ecosystem needs.

RELATIONS BETWEEN THE LOCAL POPULATIONS AND THE PARK

Early, repressive management systems

The creation of the park in 1971, and its extension in 1975, were based on authoritarian measures imposed upon the local populations, which resulted in the exclusion of the people from part of their land. These policies created conflictual relations between an administration jealous of its prerogative and determined to enforce the law, and local populations frustrated from being deprived of their resources, and reluctant to conform to the new regulations. Over the years, the park realised that repression, as a mean to ensure the protection of the park, did not achieve the desired results.

The year 1994 marked the beginning of a new policy in natural resource management, based on consultation with the different actors, and particularly with the populations living around the park. The new policy does not mean franchising a part of the park to the populations, but rather aims to:

- give value to defined spaces
- regenerate natural resources, and restore the environment
- define customary law, and
- give value to local environmental knowledge.

The new policy embodies the spirit of the Ramsar Convention and of Biosphere Reserves, and consists of:

1) looking for solutions aimed at carrying out activities according to regulations that ensure conservation, and in the definition of which the populations have been associated, and
2) improving the institutional foundations of conservation, which requires redefining management processes such that the supervising services are no longer solely responsible for management ("Protection is our business"), but rather become co-managers together with the people ("Protection is our business and that of the people").

This involves a shift from a directive approach to a supportive and participatory approach.

New participatory management

In 1994, with the development of a five-year integrated management plan, the park began an era of exchange and consultation with the neighbouring communities. This new orientation was designed and implemented the Direction of National Parks with the assistance of IUCN and the support of various partners. During the development of the plan, the administration was concerned about how to minimise destructive behaviour by the local people, and how to promote awareness of the importance of restoring and preserving the park's ecologically weakened environment. At the same time, the populations were seeking ways to better take advantage of the economic benefits of the park. The methodology to develop the plan was based on wide consultations between all the relevant actors (local populations, state technical services, NGOs, research institutes and international partners).

Two types of studies were carried out: scientific studies to measure the ecological values of the park, and to propose appropriate land development measures, and socio-economic studies to analyse the relationships between the site and the priorities of the various actors, including the local populations. The major stakeholders and their priorities are the following:

Stakeholder group	Priorities
International community	Migratory birds
National government	National self sufficiency (rice production)
Local populations	Daily needs (health, education, water, food)

The integrated management plan was based on three strategic foundations:

- the reaffirmation of the status of the Djoudj National Park as an island of biological diversity in an ocean of rice, and the effective integration of the park in the local institutional environment
- a conservation-development orientation, backed by a real synergy between the park and the local populations, making them partners in the management of the area's biodiversity, and
- a policy of partnership in investments, environmental education, and information in order to rehabilitate the Djoudj Basin ecosystem.

As shown in Table 1, the number of infractions within the park was reduced to zero when the participatory management policy was introduced in 1994.

Table 1. Infractions in Djoudj National Park, 1990-1997

Year	Type of Illegal Activity Fined	N° of Cases	Total Fines (FCFA)
1990	Wandering animals, illegal fishing, illegal settlements	33	836'000
1992	Wandering animals	6	220'000
1993	Hunting, wandering animals	5	90'000
1994	none	0	0
1995	none	0	0
1996	none	0	0
1997	none	0	0

(Source PNOD)

Implementation structures

The plan was endowed with an institutional mechanism for implementation and supervision, based on four committees: the Orientation, Scientific, Park Management, and Village Conservator Committees.

The Orientation and Scientific Committees are consultation structures with an advisory and supportive role to the Direction of National Parks, which implements national policy and directives within the Ministry of the Protection of Nature and Environment. The park's Orientation Committee is responsible for gathering support for the five-year plan, and for adopting the major decisions affecting the park, namely those related to investments within the buffer zone, on the basis of the recommendations of the Scientific Committee. The Scientific Committee prioritises and approves scientific and technical research and investments to be carried out within, and in the periphery of the park.

The Park Management Committee has a direct influence in the implementation of the five-year plan. Its members are the Park Conservator, the Director of the biological station, two representatives of each village in the buffer zone (the head of the village and a representative of the village associations and groupings), one rural council representative, the water and forestry agent, and the representative of the Hotel Union in Saint-Louis. The Conservator is the committee chair, and the IUCN programme officer handles the secretariat.

The participation of the neighbouring villages requires a structure to facilitate the exchange of viewpoints, choices, and decisions. Thus, the Inter-Village Conservation Committee has a central role in the implementation of options in the five-year plan. It coordinates the work of specialised committees on ecotourism, replanting, waterways, health, and forestry/pastoralism. These technical committees steer the execution of activities in the different sectors. For example, the ecotourism committee manages the craft workshop and the eco-museum in collaboration with the craftspeople who exhibit there. The same is true for the committees for cleaning up the waterways, managing the fountains and boreholes, the medicines in the health posts, and some clean-up operations in the villages. Each of these entities coordinates the development activities carried out by the communities living near the park in collaboration with the Park Conservator and the Park Management Committee.

SOME INITIAL ACHIEVEMENTS IN THE IMPLEMENTATION OF THE PLAN

Environmental education

The main targets of the environmental education programme are youth associations, women's groups, students and teachers in schools neighbouring the park, and junior and high schools in the town of Saint-Louis. Specific tools include:

- the creation of a cadre of 35 volunteer eco-wardens, representing all seven villages of the buffer zone, who raise awareness strike in the villages about the importance of the park and its resources, their various functions, and co-management principles
- dramas, sketches and talks, created by the eco-wardens about the relations between the park and the communities
- a school environment programme in the schools around the park, with the introduction in the syllabus of an environment course on elementary principles of conservation of various species in the park, together with guided tours of the park
- an environmental education bulletin (*Njagabar*, meaning "Pelican") on the park resources and relations with the communities, managed by teachers, students, park agents and local people
- a 30-minute weekly radio broadcast in national languages about the park and the buffer zone development activities, animated by the local people, journalists, park agents, research institutions, and other partners. This broadcast has good ratings throughout the delta, and provides a space for debates and consultation for the general public about the conservation and management of the park and the wetlands of the Djoudj Basin.
- a short film on the park and the experience of co-management.

The activities of the environmental education section have enlarged the exchanges between the different partners, and have established a mechanism for ongoing consultation. The effects of these activities are noticeable in the collaboration and participation of different actors in exchanging information, which had never been possible before.

Support to community initiatives

The five-year plan focuses on providing concrete benefits to the local communities, including a community credit fund, drinking water, and medicines.

The community fund was set up to finance small projects proposed by the people, via small loans with very low interest rates. The fund is entirely managed by a managing committee and credit committee set up in the seven villages around the park. A rotating system to distribute loans after repayment was devised to maximize the number of people to receive loans. In 1996, FCFA 5'000'000 financed 21 micro-projects in the seven villages around the park. These credits were totally reimbursed at an interest rate of 7 %. In 1997, the capital was doubled from FCFA 5'000'000 to FCFA 10'000'000, and a village banking system was set up to manage the funds. Presently, seven village-banks are operational, each with 50 beneficiaries. This village bank system was devised in collaboration with CARITAS, an organisation that has been supporting similar systems for over 10 years in Senegal. The activities financed by the banks are mainly fishing, breeding, craft works, and small trade.

In addition to the credit scheme, the local populations identify priority activities to improve their living conditions. Drinking water supplies were improved with the construction of boreholes in the three villages that were the most affected by waterweeds.

Medicines were also supplied to the flamingo health hut and to the health post used by the local populations.

Research and institutional support within the park

The priority research activities are:
- hydrology, and the quality and quantity of water required for the species of the park
- inventory and monitoring of the fish fauna and vegetation
- wildlife monitoring, and detailed bird counts.

The findings of this research will provide management information to inform decisions by the park managers, the local populations, and the various committees. The research programme hopes to eventually be able to determine sustainable levels of resource use, while maintaining the ecological balance of the system. Resources that are heavily used include fish, fruits, water lilies, and pasture.

Institutional and infrastructure support has included building posts for eco-wardens to improve their living conditions, boreholes, park logistics, and training park agents.

Ecotourism managed by the local populations

Each year, 30'000 tourists visit the park. In order to create first contact points between the local people and the tourists who come to visit the park, several infrastructures have been set up, including a crafts shop, the eco-museum, and a Moorish tent (*Kha'ma*). These activities are coordinated by the ecotourism committee representing the seven villages around the park.

Traditional crafts and entertainment for tourists are now generating substantial income for the local people. Crafts have long been one of the main activities in the area, but they suffered from a lack of market opportunities. The craft shop, also an exhibition place, is well visited by tourists, and contributing to the development of the craft sector. During the 1996/1997 tourist season, the shop was visited by 1257 tourists, and had a turnover of FCFA 2'650'000 from the crafts sold and the tea service under the Kha'ma.

Discovery tourism is planned for villages surrounding the park, to offer tourists the opportunity to visit the rich cultural heritage of the Fulani, Moor, and Wolof societies.

CONCLUSIONS

A participatory approach to the management of wetlands of international importance has been tested in Djoudj National Park.

Among the most significant results are the closer relationships between the local populations and the park managing authorities. This represents a major change from the early days when the park was created and the people living inside were compelled to remove. This resulted in hatred and permanent conflict between the communities and the park agents, and encouraged illegal exploitation (poaching) of the park resources.

The consultation structures (the Management Committee and Inter-Village Committee) set up under the five-year plan together with the principles for participatory management have facilitated this closer relationship between the local people and the park agents. Today, a corps of volunteer eco-wardens from the villages function as the relays between the village people and the park agents. They also transmit conservation messages to the people via entertainment, and contribute to the surveillance and integrity of the park.

The craft shop and village banks have engendered lucrative work, with more than 135 families finding occupations in these activities. This support to improving people's living conditions strongly contributes to the effective co-management of the area.

Another important result has been the closer relations between researchers, research institutions, and the development structures that work in the park and its surroundings. In the past, these actors used to work in isolation, and it was common to have two or more institutions working on the same subject without knowing it, because they communicated so little. Through the Scientific Committee, the park has developed a forum for exchange between researchers. Now all research and land-development programmes in the park are debated and validated by the Scientific Committee, which ensures that the research contributes to management tools.

The results from the third year of the five-year plan for Djoudj National Park and its environs, based on a co-management approach, affirm the importance and the viability of participatory instruments for conservation.

LE PARC NATIONAL DU DIAWLING: EXPERIENCE DE COGESTION POUR LA RESTAURATION DES PLAINES INONDABLES

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MOTS-CLES : Diawling, delta, Diama, participation, restauration, inondation

RESUME

Le Parc National du Diawling est un établissement public créé en 1991 avec comme objectifs:

- la conservation et l'utilisation durable des ressources naturelles d'un échantillon de l'écosystème du bas-delta
- le développement harmonieux et permanent des diverses activités des populations locales
- la coordination des activités pastorales et piscicoles menées sur son territoire.

Il occupe 16,000 ha divisé en trois bassins dont un en permanence sous l'eau et deux pouvant être inondés par des ouvrages sur le fleuve Sénégal. Suite à la sécheresse et la construction du barrage antisel de Diama, la productivité naturelle, qui était la base des activités économiques des collectivités (pêche, élevage, cueillette) a été compromise. Une baisse considérable de la biodiversité avait aussi été constatée.

La réalisation des objectifs assignés au Parc s'effectue d'abord par la restauration des écosystèmes caractéristiques de ses plaines inondables et la création d'un estuaire alimenté de façon artificielle. Ceci a été réalisé par la construction de digues et d'ouvrages sur fonds du gouvernement des Pays-Bas. En collaboration avec les collectivités locales, le Parc, avec un appui technique de l'Union Mondiale pour la Nature (UICN), a élaboré un plan directeur d'aménagement qui a été adopté par le gouvernement mauritanien. Ce plan s'est fixé huit objectifs visant tous à rétablir les conditions écologiques d'avant-barrage, à permettre aux collectivités de poursuivre les activités traditionnelles d'exploitation durable et de favoriser le développement de nouvelles activités compatibles avec l'axe restauration-conservation. Les résultats déjà obtenus poussent à l'optimisme, car plusieurs espèces végétales et animales s'épanouissent à nouveau et que les activités pastorales, piscicoles et artisanales reprennent, favorisant ainsi la fixation des collectivités dans leur terroir.

ABSTRACT

Diawling National Park is a public institution created in 1991 for the following objectives:

- the conservation and sustainable use of the natural resources of a sample of the lower delta ecosystem
- the sustainable and harmonious development of a range of activities by the local population
- co-ordination of the pastoral and fishing activities within its boundaries.

The Park covers 16,000 ha divided into three basins: one permanently flooded, and two others which can be flooded through sluice gates on the Senegal River. Following the drought in the Sahel, and the construction of the Diama dam, the natural productivity of the area, which was the basis of the economic activities of the local population (i.e., fishing, pastoralism, and food gathering), was affected. A considerable loss of biodiversity also occurred.

Achieving the park's objectives requires first and foremost the restoration of the ecological character of its floodplains, and the creation of an artificial estuary. This was done by building embankments and sluice gates, with financing from the Dutch government. In collaboration with the local communities, and with the technical assistance of the World Conservation Union (IUCN), a management plan was established. This plan was approved by the government, and has eight main objectives favouring the re-establishment of the ecological conditions that prevailed before the construction of the dam, thus permitting the local population to resume their traditional management practices, and to develop new activities compatible with the restoration and conservation objectives. The initial results give reason for optimism, as several plant and animal species have made a comeback, and the pastoral, fishing and artisanal activities have increased, thus stemming rural-urban drift.

INTRODUCTION

La zone d'étude se situe dans le bas-delta du fleuve Sénégal en rive droite entre 16°35'00 et 16°30'00 N. Jusqu'au début des années '60 le bas-delta était une zone d'une extraordinaire richesse biologique tant pour la végétation (Diawara 1997), les poissons (Diagana 1997) que pour les oiseaux (Hamerlynck *et al.* 1997). A l'instar de tout le pays, la zone

a été touchée par une crise écologique depuis la diminution des crues dans les années '60 et les grandes sécheresses des années '70 et '80.

Pour contrer cette péjoration climatique les pays de l'Organisation pour la mise en valeur du fleuve Sénégal (OMVS), regroupant le Mali, la Mauritanie et le Sénégal et soutenus par les bailleurs de fonds, ont mis en place un programme ambitieux de contrôle des eaux du fleuve. Des aménagements hydrauliques réalisés à cet effet, ont fondamentalement modifié le caractère du fleuve Sénégal et du bas-delta. La construction du barrage anti-sel de Diama a réduit de façon considérable la zone estuarienne. Le mode de gestion des barrages de Diama (Sénégal) et Manantali (Mali) a entraîné de nombreux impacts environnementaux et sociaux (Hollis, 1996; Verhoef, 1996; Salem-Murdock, 1996; Vincke, 1996).

IMPACTS ENVIRONNEMENTAUX DES BARRAGES

Caractéristiques hydrologiques de la zone avant la construction des barrages

La crue annuelle atteignait le delta aux environs de la mi-août, repoussant progressivement les eaux salées et envahissant les plaines d'inondation. Le modèle de l'inondation était extrêmement complexe, avec un mouvement initial essentiellement du sud vers le nord par le N'Thiallakh et, en fonction de l'évacuateur dominant pendant l'année concernée, une inversion du courant dans les principaux chenaux. La hauteur d'eau maximale était généralement atteinte à la mi-octobre, la superficie inondée pouvant alors varier de 3,000 ha (1974) à 100,000 ha (observée en 1950 quand l'Aftout es Saheli, dépression côtière au nord du bas-delta, a été envahie jusqu'à Nouakchott). Selon l'importance de la crue, les niveaux d'eau pouvaient baisser rapidement ou se maintenir élevés pendant un maximum de deux mois lors des crues atteignant 2 m au-dessus du niveau de la mer. A mesure de la décrue l'eau de mer pénétrait progressivement vers l'amont dans le lit du fleuve (atteignant même Podor en 1982, à 300 km de l'embouchure du fleuve) et dans les principaux chenaux de marées. L'eau douce stockée dans les dépressions isolées devenait progressivement saumâtre par contact avec les sols salés.

L'évaporation entraînait l'assèchement des lacs saisonniers entre janvier et mars et créait des conditions hypersalines dans les chenaux de marées (donnant ainsi naissance à un estuaire dit inversé) et des zones lagunaires. Les grandes marées de la fin de la saison sèche (mai et juillet) pouvaient envahir les plaines peu élevées et éventuellement même certaines dépressions, entraînant la formation de croûtes de sel. Au début de la crue, l'eau extrêmement salée du Nthiallakh était repoussée vers le Nord dans les dépressions et contribuait ainsi à augmenter leurs réserves de sel et à former des sebkhas (dépression marécageuse salée) (Baillargeat, 1964).

Les eaux souterraines du bas-delta sont généralement hypersalées et proches de la surface (-1 m par rapport au niveau de la mer). Il y a, sous les dunes, des poches d'eau douce d'importance variable reposant sur les couches profondes plus salées. Il est probable qu'elles étaient essentiellement alimentées lors des crues suffisamment importantes (1,5 m au-dessus du niveau de la mer) pour atteindre les terres sablonneuses des bords des dunes.

Caractéristiques hydrologiques de la zone après la construction des barrages

Depuis l'achèvement de la construction du barrage anti-sel de Diama et des travaux d'endiguements nécessaires pour la création de la retenue de Diama, l'hydrosystème deltaïque a été fortement modifié. En effet l'ancienne plaine d'inondation a été partagée en une zone qui est en permanence sous l'eau et une autre qui ne peut être alimentée en eau qu'à travers un ouvrage hydraulique. L'inondation par l'aval est ne peut se réaliser que lors de lâchés par le barrage de Diama. Les lâchés de Diama sont en fonction de l'hydrocité sur le plateau de Fouta Djalon et de la gestion du barrage de Manantali. Depuis 1997 des lâchés sont pratiqués pour baisser le niveau de la retenue avant l'arrivée de la crue.

Ces perturbations du milieu naturel ont un impact d'autant plus négatif sur les économies villageoises qu'elles interviennent après une période à péjoration climatique qui a décimé les troupeaux bovins et compromis les cultures pluviales. Les anciennes cuvettes ont eu tendance à évoluer en sebkha. Ainsi la ressource halieutique a fortement diminué, tandis que la végétation estuarienne a quasi disparu (Diawara, 1997).

Parmi les ouvrages hydrauliques nécessaires pour restaurer les inondations et créer un estuaire artificiel, et qui auraient donc dû être en place lors de la fermeture du barrage de Diama en 1986, seule la vanne de Lemer était pleinement opérationnelle en 1994 (année du début de l'exercice de restauration). Malgré les calculs qui avaient montré qu'un débit de 18 m^3s^{-1} au moins était nécessaire pour repousser les eaux salées vers l'embouchure du N'thiallakh (Gannet Fleming, 1986), les contraintes budgétaires ont limité l'admission d'eau du fleuve dans le bassin de Bell à la vanne de Lemer à 15 m^3s^{-1} et l'écoulement du bassin de Bell au bassin du Nthiallakh à 5 m^3s^{-1} seulement.

Aspects biologiques

La mangrove (*Avicennia germinans* et *Rhizophora racemosa)* a été réduite à moins de 10% de son étendue de 1960. Seuls quelques spécimens d'*Acacia nilotica* (espèce très importante pour les femmes comme source de tannins pour le cuir utilisé en artisanat) ont survécu sur les centaines d'hectares qu'ils couvraient précédemment. Le *Sporobolus robustus*, une graminée pérenne (utilisée pour la fabrication traditionnelle de matériel de pêche et de nattes), qui couvrait autrefois des milliers d'hectares de la plaine d'inondation, ne se trouvait en 1994 que sur quelques parcelles en bordure des dunes. L'*Echinochloa colona*, une graminée de grande valeur

fourragère, avait à peine survécu. L'*Oryza barthii*, une forme de riz sauvage, a été éliminé, et le *Nymphea lotus* (une espèce de nénuphar dont les graines étaient employées comme aliment de base remplaçant les céréales) avait virtuellement disparu (Diawara 1997).

La seule amélioration qu'on ait pu observer concernait les pâturages halophiles du type *Salsola* et *Arthrocnemum*, espèces consommées par les camelins quand les autres ressources se font rares. Le lac d'eau douce derrière le barrage a rapidement été colonisé par le roseau massue (*Typha domingensis*) et l'espèce exotique *Pistia stratiotes*, source de nombreux problèmes environnementaux dans le Parc National des Oiseaux du Djoudj, a aussi fait son apparition. Sur les dunes intérieures de Ziré, Birette et Ebden et sur la dune côtière, les zones sablonneuses complètement déboisées et sans aucune couverture végétale occupaient les espaces du détriment des peuplements de plusieurs espèces d'*Acacia.*

Le bas-delta était célèbre pour son exceptionnelle avifaune. D'importantes colonies reproductrices de hérons, d'aigrettes et de cormorans (plus de 10'000 nids au début des années '60) peuplaient les mangroves et les forêts d'*Acacia nilotica* (Naurois, 1969) et la population locale y prélevait de grandes quantités d'œufs et de jeunes oiseaux. Il ne reste aujourd'hui qu'un très vague souvenir de cette richesse dans l'unique grand peuplement de *Rhizophora* à l'embouchure du N'thiallakh. Parmi les autres espèces notables figuraient le flamant rose, le petit flamant et le flamant nain (P*hoenicopterus ruber* et *P. minor),* le pélican blanc (*Pelecanus onocrotalus*) et la grue couronnée (*Balearica pavonin*) - les trois premières espèces nichant essentiellement dans le Sud de l'Aftout durant les années de crue majeure. L'absence d'inondation a facilité l'accès au delta, et le braconnage effectué par les citadins, se déplaçant en véhicules tout terrain, a pratiquement éliminé la grande outarde (*Ardeotis arabs*), espèce qui était encore commune à la fin des années '80.

La sécheresse et la pression de chasse ont conduit à l'élimination des grands mammifères. Le dernier lion (*Panthèra léo*) a été tué en 1970 et la gazelle à front roux (*Gazella rufifrons*) a été observée pour la dernière fois en 1991. Il ne reste que des chacals (*Canis aureus*), quelques phacochères (*Phacochoerus aethiopicus*), des chats sauvages (*Félix sylvestris*), des lièvres (*Lupus capensis*) et des singes (*Erythrocebus patas*). On n'a plus observé de lamantin (*Trichechus senegalensis*) ni de crocodile (*Crocodylus niloticus*) depuis la fermeture du barrage, et l'hippopotame (*Hippopotamus amphibius*) a été vu pour la dernière fois au début des année '60.

Aspects sociaux

La zone était à l'origine essentiellement peuplée de wolof, mais les maures forment maintenant l'ethnie dominante. La plupart de ces maures ne venaient habituellement dans la région avec leurs troupeaux que pendant la saison sèche, mais ils se sont progressivement sédentarisés depuis les années '60. On trouve également des halpularen (peulh). Avant la sécheresse, l'économie était basée sur la pêche, l'élevage et l'agriculture de décrue à petite échelle. Il s'agissait essentiellement d'une économie de subsistance, sauf en ce qui concerne les produits de la pêche et les fourrages, qui étaient principalement vendus à Saint-Louis.

La sécheresse a entraîné un important exode rural. La population maure s'est essentiellement investie dans le petit commerce au Sénégal, et ce jusqu'en 1989. Les wolofs sont quant à eux allés grossir les rangs des pêcheurs artisanaux et industriels de Nouadhibou et de Nouakchott. En 1994, la population permanente de la zone était presque exclusivement constituée de femmes, d'enfants et de personnes âgées. On estimait alors qu'elle ne dépassait guère 6'000 habitants. Le revenu principal des résidents permanents provenait de la vente de nattes faites de tiges de *Sporobolus robustus* tissées avec des lanières de cuir. Pour la confection de grandes nattes, les femmes forment des associations coopératives temporaires appelées *twiiza*. Les jardins maraîchers en bordure du réservoir apportaient un supplément de revenus.

ELABORATION DU PLAN DE GESTION

Pour compenser les impacts environnementaux négatifs des barrages de Diama et de Manantali sommairement décrits ci-dessus et compte tenu du fait que la zone est inapte à la riziculture, le Gouvernement a décidé de trancher en faveur de la conservation de cette zone du bas-delta. Ainsi en 1991 fut créé le Parc National du Diawling (PND) couvrant 16'000 ha en bordure du fleuve. Le PND forme une unité écologique transfrontalière avec le Parc National des Oiseaux du Djoudj (PNOD) au Sénégal dont il n'est séparé que par le fleuve.

Le Plan Directeur d'Aménagement du PND et sa périphérie, finalisé en 1996 avec l'appui technique de l'UICN, qui intervient sur le site depuis 1996 sur financement de la Coopération Hollandaise (DGIS), prévoit:

- autour d'un axe "Conservation des Richesses et Restauration des Valeurs Ecologiques Antérieures", la restauration:
- du fonctionnement hydraulique de la plaine inondable et de l'estuaire par la mise en service d'ouvrages hydrauliques de la végétation caractéristique du bas-delta des potentialités halieutiques et de la faune sauvage
- autour d'un axe "Eco-développement":
- le renforcement des activités traditionnelles des populations locales, compatibles avec l'axe conservation / restauration le développement de nouvelles activités et l'amélioration de la qualité de vie des populations.

Ces objectifs précisent clairement qu'il convient d'intégrer conservation et développement et de s'assurer de la pleine participation de toutes les parties prenantes de l'ensemble du delta, et non des seuls groupes dont les parcours traditionnels se retrouvaient au sein de l'aire protégée. Pour

soutenir l'approche résolument moderne adoptée par le Gouvernement Mauritanien, l'UICN et ses partenaires locaux et internationaux ont démarré leurs activités en 1994 en organisant des visites de spécialistes des aires protégées, en botanique et de l'écologie estuarienne.

Une approche participative a été privilégiée, afin d'intégrer les opinions de la population locale. Il est immédiatement apparu que cette population détenait d'importantes connaissances du fonctionnement originel du système et que ces connaissances favorisaient l'établissement d'un plan de gestion. L'étude concluait notamment que le premier objectif devait être la restauration du cycle d'inondation d'avant barrages. Le rétablissement de la productivité permettrait à la population locale de reprendre ses activités traditionnelles (dans le bassin de Bell, au centre du Parc, et dans sa zone périphérique) et d'en développer de nouvelles, en particulier dans les domaines de l'écotourisme et du maraîchage.

Une telle évolution devait être accompagnée par des mesures destinées à faciliter les transports (routes d'accès, digues) et à assurer un approvisionnement adéquat en eau potable pour les populations. En 1994 et 1995, des concertations en profondeur ont été effectuées avec la plupart des parties prenantes qui ont conduit à la définition des pistes de recherche. La première version du plan de gestion a ensuite été diffusée au sein des institutions partenaires locales (Faculté des Sciences de l'Université de Nouakchott, Parc National du Banc d'Arguin, Direction de l'Environnement et de l'Aménagement Rural). La deuxième version a été présentée en décembre 1996 devant un large auditoire, constitué des représentants des parties prenantes et des institutions gouvernementales qui a recommandé son approbation par le Ministère du Développement Rural et de l'Environnement. Cette étape fut conclue au début de l'année 1997.

Entre-temps, le programme de conservation des zones humides de l'UICN avait été lancé, grâce à un financement assuré essentiellement par le gouvernement Néerlandais (DGIS). Une première phase de restauration de l'écosystème, de formation et d'équipement des services du Parc a été mis en place à travers de petits projets pilotes en collaboration avec la population. D'autres fonds ont été mobilisés par le Gouvernement de la Catalogne (construction sans bois pour le siège du Parc), par le fonds Ramsar (équipements hydrologiques, station météorologique, consultants locaux) et par la Fondation Internationale du Banc d'Arguin (échelles limnimétriques pour le suivi de la hauteur de l'eau, études scientifiques). Des vannes ont été installées et de nouvelles digues bâties pour restaurer le cycle d'inondation (Hamerlynck & Cazottes, 1998). La mise en œuvre des autres objectifs majeurs du plan de gestion (1997-2000) sera financée conjointement par l'Agence Française de Développement (infrastructures pour l'accès routier, approvisionnement en eau, maraîchage, pêche et tourisme), le Fonds Français pour l'Environnement Mondial (recherche, renforcement des capacités, enrichissement de la diversité biologique) et l'UICN-DGIS (assistance technique, développement communautaire, construction navale, artisanat, éducation à l'environnement).

PREMIERS RÉSULTATS

Cadre Institutionnel

Après une présentation des grands axes du plan de gestion et de la mise en place de certains projets pilotes de développement rural intégré, une proposition de création d'un comité de gestion intervillageois, chargé d'assurer la liaison entre le Parc et la population locale dans l'optique d'une gestion conjointe, a été soumise à la Commune. Il était proposé que ce comité comprenne un représentant de chacun des principaux groupes d'intérêt: pêche en eau douce, pêche en estuaire, pâturage, cultures maraîchères, artisanat, etc. La Commune a répondu en proposant une copie conforme du conseil municipal, organe composé essentiellement des chefs de villages. Toutefois, certaines des communautés parties prenantes estimaient qu'elles n'étaient pas suffisamment représentées dans ce conseil municipal, surtout que certains membres connaissaient très mal le fonctionnement de l'écosystème. Cette structure n'a donc pas été très fonctionnelle. Un compromis a alors été trouvé consistant en impliquant à la fois les villages et le conseil municipal.

Aujourd'hui le maire de la Commune de Ndiago est membre du Conseil d'Administration du PND et assiste à ce titre à toutes les délibérations en tant qu'élu des populations concernant la gestion du Parc.

Restauration de l'environnement grâce à la gestion conjointe

Le retard dans la mise en service des différents ouvrages de prise d'eau (Cheyal) et d'évacuation (Bell) a posé un problème de maîtrise de l'hydrologie du bas-delta. En dépit de ces différents retards, la restauration écologique a pu être lancée. Les inondations des bassins par les fortes crues du fleuve (crue par l'aval) en 1994 et 1995 et par l'ouverture de Lemer depuis 1994 et Cheyal depuis 1997, ont eu des résultats spectaculaires, avec la reprise de végétation, notamment des espèces importantes pour l'exploitation par les collectivités locales comme *Sporobolus robustus* (utilisée pour la fabrication artisanales de nattes), *Nymphea lotus* (utilisé comme couscous), le poisson (87 espèces), les crevettes du fleuve et de l'estuaire, les pâturages de qualité (*Echinochloa* sp.), etc.

De jeunes palétuviers (*Avicennia germinans*) colonisent aujourd'hui les zones basses du bassin de N'thiallakh. Le retour tout à fait spectaculaire des oiseaux (Messaoud *et al.*, 1998; Triplet *et al.*, 1995, 1997; Yésou *et al.*, 1997), qui se trouvent au sommet de la chaîne trophique et sont donc des indicateurs du bon fonctionnement de toutes les mailles de l'écosystème, résume assez bien l'évolution. Les

collectivités locales initialement hostiles à l'idée d'une aire protégée dans leur zone, commencent à sentir les effets bénéfiques.

Pêche

Les habitants du village de Ziré Takhridient manifestent un intérêt pour la pêche en eau douce. On admet généralement que cette communauté de pêcheurs, issue d'une tribu guerrière ayant ses racines sur l'île de Tidra dans le Parc National du Banc d'Arguin, constitue le premier des groupes encore présents à avoir occupé le bas-delta. Traditionnellement, chaque Takhridient est "propriétaire" d'une ou de plusieurs unités d'exploitation appelées *mechras*. Normalement les Takhridient ne pêchent pas les poissons lors des migrations vers les zones de frayère. Comme ces pêcheurs avaient une connaissance très détaillée des caractéristiques hydrologiques et des voies de migration et de reproduction des poissons et des crevettes, ils ont suggéré aux autorités du Parc de mettre en place deux ouvrages supplémentaires pour permettre de faciliter la migration entre les bassins du Bell et du Diawling-Tichilitt (pour les poissons) entre ce dernier et le N'thialkh (pour les crevettes). Cette collaboration technique s'est avérée très productive.

Pour relancer l'activité de pêche, les pêcheurs ont été dotés d'un fonds pour l'acquisition de matériel de pêche. En 1997, les prises ont atteint 400 kg par jour, du fait de l'importance des niveaux d'eau (1,25m IGN) et des échanges avec le bassin du Diawling. Ils ont pu commercialiser plus de 90 T de poissons à raison 1US$/kg. Les prises effectuées après la fermeture des ouvrages au début du mois d'octobre 1998 augurent d'une bonne campagne de pêche. En effet, les prises journalières ont pu dépasser la tonne.

L'année 1997 a aussi été marquée par l'apparition d'une forme intensive de pêche aux crevettes. Cette activité était autrefois pratiquée à petite échelle par la population locale, les crevettes étant ensuite séchées et vendues à Saint-Louis. Mais un homme d'affaires a obtenu en 1997 un permis d'exploitation du Ministère des Pêches. Les prises journalières pouvaient atteindre 300 kg. Les ouvriers pêcheurs locaux étaient payés par cet homme d'affaires à raison 2US$/kg de crevettes.

Hydrologie

La mise en place du scénario hydrologique s'est fortement inspirée de la connaissance des populations des caractéristiques hydrologiques du bas-delta. En effet, dès l'achèvement des infrastructures, en 1996, les pêcheurs ont proposé une inondation précoce sachant que les *Tilapia* étaient prêts à frayer dès le début du mois de juillet.

Mais les femmes ont insisté sur le fait que le *Sporobolus robustus* et d'autres graminées avaient besoin de pluie avant l'inondation pour garantir un développement végétatif optimal. Il aurait aussi fallu retarder l'inondation jusque vers le 1er ou même le 15 août, ce qui par contre aurait considérablement raccourci la période de croissance des poissons. Il a donc été décidé de simuler une pluie en laissant une mince couche d'eau recouvrir les zones cruciales de la plaine d'inondation en juillet. Ce compromis a été testé en 1996 et les résultats ont été extrêmement positifs, puisque les femmes ont pu récolter des tiges de graminées de plus 2,5 m de long.

Foresterie et artisanat

Sporobolus robustus est une graminée pérenne, dont les tiges sont utilisées pour la confection des nattes. Cette espèce avait presque disparu dans la zone du bas-delta. Grâce aux efforts de restauration de la végétation caractéristique du bas-delta, *Sporobolus robustus* s'est régénérée de manière spectaculaire. L'exploitation des tiges de cette espèce n'est aisée, car elle s'effectue directement à la main sans faire usage d'un outil tranchant tel le couteau ou la faucille. Les populations locales expliquent qu'un tel usage compromettrait sa régénération. Ainsi l'intervention du Parc est sollicité pour empêcher l'usage de faucille ou de couteau pour couper les tiges de *Sporobolus* par les personnes étrangères à la zone non familières à la technique.

La régénération de *Sporobolus* a permis de lancer un projet pilote en faveur de la production artisanale des nattes tissées avec des tiges et du cuir, une spécialité des femmes maures. En effet, la quasi-disparition de *Sporobolus* pendant plus de dix ans avait fait disparaître de nombreuses compétences en matière d'artisanat. Seules les nattes les plus élémentaires, vendues à 50 US$ la pièce, pour deux semaines de travail de cinq femmes, étaient encore fabriquées. Le lancement de ce projet a permis d'accroître la valeur ajoutée du produit et de renforcer la collaboration entre les femmes de la zone et le Parc à gérer la ressource.

Pastoralisme

Le Plan Directeur d'Aménagement du PND et de sa périphérie préconise dans le cadre de la restauration des valeurs écologiques du bas-delta, deux saisons d'inondation. La première dite de contre-saison s'effectue au début du mois d'avril pour contrer la tendance de l'estuaire inversé. En plus elle rend disponible de l'eau douce pour certains villages et favorise le développement des mangroves. Elle permet accessoirement de développer certaines plantes herbacées qui constituent durant la période de soudure un fourrage d'appoint, important pour les 1400 bovidés visitant régulièrement la zone. Cette échéance est toujours attendue avec beaucoup d'impatience par les éleveurs qui n'hésitent pas souvent à demander à l'administration d'anticiper l'ouverture des vannes et ou de vidanger les bassins du Parc afin de les rendre plus accessibles au bétail.

La deuxième inondation dite d'hivernage s'effectue au début du mois de juillet. Elle permet la mise en eau de plusieurs milliers d'hectares où poussent certaines espèces herbacées très appâtées. Durant cette période, qui coïncide avec un

mouvement de transhumance vers le nord des troupeaux de vaches fuyant les moustiques, les herbacées sont inexploitées, constituent de vastes prairies vertes. Ainsi à la décrue, comme ce sera le cas cette année, une opération de fauche est effectuée en vue de constituer des stocks de foin pour la période de soudure.

QUELQUES NUAGES QUI SE DISSIPENT

La population du bas-delta réclamait la construction d'un barrage sur le N'thiallakh pour satisfaire deux doléances: l'adduction d'eau potable et le désenclavement. La réalisation de ce barrage est incompatible avec la création de l'estuaire artificiel, indispensable pour le développement de certaines espèces végétales et animales dont la vie est inféodée à l'alternance de l'eau douce et de l'eau saumâtre. Ces doléances trouveront leur solution dans le cadre du projet d'appui au PND qui sera conjointement financé par le Fonds Français pour l'Environnement Mondial (FFEM) et l'Agence Française de Développement (AFD) qui ont fait de cette idée de construction de barrage sur le N'thiallakh une conditionnalité suspensive de leur subvention conjointe.

Les villageois de Ziré Takhridient qui souhaitaient que la digue de Ziré soit carrossable afin qu'elle soit praticable pendant l'hivernage avaient manifesté une certaine hostilité au Parc en menaçant ses employés et en cadenassant l'ouvrage de Berbare. Ce conflit, qui n'a pu être résolu qu'en ayant recours aux autorités administratives, a suscité un certain respect des villageois envers l'administration locale du Parc et relancé leurs relations sur des bases privilégiant le dialogue et la concertation.

Ces mêmes villageois avaient "vandalisé" le grillage et les piquets d'une mise en défens estimant que ceci constitue une tentative d'étendre les limites du Parc. Aujourd'hui, grâce aux succès de certains sites de mise en défens installés dans les abords immédiats des bâtiments du Parc, ces villageois sollicitent le Parc pour favoriser la régénération naturelle de *Acacia tortilis* sur les dunes intérieures.

Plusieurs attitudes négatives à l'égard du Parc ont été réglées grâce aux succès des activités de restauration. Des demandes de mise en défens et de fixation des dunes qui menacent certaines infrastructures parviennent assez souvent au PND. Certaines collectivités demandent même une extension des limites du Parc, sachant que l'aire protégée est la meilleure garantie pour la poursuite de leurs activités extractives traditionnelles.

Aussi, le Parc est alerté par les populations à chaque fois qu'une action non concertée est menée par des personnes résidentes ou étrangères à la zone, notamment, la récolte de *Sporobolus* avec une faucille, la pêche nocturne dans les bassins du Parc, l'utilisation d'engins de pêche prohibés, etc. Cette attitude diminue les besoins en matière surveillance pour l'administration.

CONCLUSIONS

La création d'une aire protégée dans les zones où les ressources naturelles sont limitées constituent assez souvent un sujet controversé. En effet, la création du PND n'a pas échappé à cette règle. Mais la crise écologique qui a sévi dans la zone (sécheresse, barrage, endiguements, mise à sec des plaines inondables) a permis à la population de saisir la portée des efforts consentis par le PND pour restaurer les écosystèmes du bas-delta. Ces efforts, qui ont fini par convaincre plus d'un, ont été dès le départ sapés par des individus le plus souvent étrangers à la zone.

Toutes les sources potentielles de conflit et menaces de dégradation environnementale étaient étroitement liées aux questions de régime foncier et d'accès aux ressources. Les systèmes traditionnels, prévoyant généralement une forme de propriété collective n'ont aucun statut juridique. En principe la législation prévoit que la terre appartient à celui qui l'exploite. Dans le contexte actuel, seule une aire protégée peut garantir à la population locale qu'elle pourra continuer à jouir de ses droits traditionnels. Il en reste pas moins que les 11'000 hectares du Parc, après exclusion du réservoir de Diama, paraîtront bientôt insuffisants pour subvenir aux besoins de toute la population sédentaire locale et de tous les nomades ayant traditionnellement utilisé ces pâturages. L'intégration du PND dans une vaste réserve de biosphère couvrant l'ensemble du bas-delta et la partie du haut delta peu propice à l'agriculture irriguée pourrait être une bonne stratégie pour éviter que le Parc ne soit envahi par des exploitants externes.

REFERENCES

Baillargeat, J. 1964. Hydrologie du Delta du Sénégal. Rive droite du fleuve. Rapport de synthèse des campagnes 1961, 62, 63, entre Rosso et Saint Louis. Sogréah, Grenoble.

Diagana C. H. 1997. Premières observations sur l'écologie du peuplement ichtyologique de la zone inondée et de l'estuaire du Parc National du Diawling (Mauritanie). Dans: Colas, F. (éd. scient.). Environnement et littoral mauritanien. Actes du colloque, 12-13 juin 1995, Nouakchott, Mauritanie. CIRAD, Montpellier: 135- 142.

Diawara, Y. 1997. Formations morphopédologiques et les unités floristiques du bas-delta mauritanien. Dans: Colas, F. (éd. scient.). Environnement et littoral mauritanien. Actes du colloque, 12-13 juin 1995, Nouakchott, Mauritanie. CIRAD, Montpellier: 47- 52.

Gannet Fleming. 1986. Etude de factibilité pour la création d'un estuaire artificiel dans le bas-delta mauritanien. 66 pp + 165 pp annexes.

Hamerlynck, O. & Cazottes, F. 1998. Le Parc National du Diawling: Infrastructures hydrauliques pour la restauration d'une plaine d'inondation et la création d'un estuaire artificiel. Sud-Sciences et Technologies. Bulletin semestriel de l'Ecole

Inter-états d'Ingénieurs de l'Equipement Rural, Ouagadougou, 1: 28-38.

Hamerlynck, O., Samba E. ould, Messaoud B. ould & Diagana C.H. 1997. Valeurs ornithologiques du bas-delta mauritanien. Dans Colas, F. (éd. scient.). Environnement et littoral mauritanien. Actes du colloque, 12-13 juin 1995, Nouakchott, Mauritanie. CIRAD, Montpellier: 57- 63.

Hollis, G.E. 1996. Hydrological inputs to management policy for the Senegal River and its floodplain. Dans: Acreman, M.C. and Hollis, G.E., Water management and Wetlands in Sub-Saharan Africa, IUCN, Gland et Cambridge, pp. 75-84.

Messaoud, B. ould, Hamerlynck, O. & Diagana, C.H. 1998. Liste commentée des oiseaux du bas-delta Mauritanien et du Parc National du Diawling. PND - UICN, Nouakchott, 30 pp.

Naurois, R. de 1969. Peuplement et cycle de reproduction des oiseaux de la côte occidentale d'Afrique. Mémoire du Musée d'Histoire Naturelle série A. Zoologie, 57: 1-312.
Reizer, C. 1971. Contribution à l'étude hydrobiologique du bas-Sénégal: Premières recommandations d'aménagements halieutiques. Centre Technique Forestier Tropical. 142pp.

Salem-Murdock, M. 1996. Social science inputs to water management and wetland conservation in the Senegal River Valley. In Acreman, M.C. and Hollis, G.E., Water management and Wetlands in Sub-Saharan Africa, IUCN, Gland and Cambridge, pp. 125-144.

Triplet P., Yésou P., Sylla I, Ould Samba E., Tréca B., Ndiaye A. & Hamerlynck, O. 1995. Oiseaux d'eau dans le delta du Sénégal en janvier 1995. Bulletin Mensuel de l'Office National de la Chasse 205: 8-21.

Triplet, P., Sylla, I., Mouronval, J.-B., Benmergui, M., ould Messaoud, B., Ndiaye, A., Diouf, S., Hamerlynck, O., Hecker, N. 1997. Oiseaux d'eau dans le delta du Sénégal en janvier 1997. Bulletin Mensuel de l'Office National de la Chasse 224: 28-37.

Verhoef, H. 1996. Health aspects of Sahelian floodplain development. Dans: Acreman, M.C. and Hollis, G.E., *Water management and Wetlands in Sub-Saharan Africa*, IUCN, Gland et Cambridge, pp. 35-50.

Vincke, P.-P. 1996. The integrated development programme for the left bank of the Senegal River Valley. Dans: Acreman, M.C. et Hollis, G.E., *Water management and Wetlands in Sub-Saharan Africa*, IUCN, Gland et Cambridge, pp. 145-153.

Yésou, P., Triplet, P., Sylla I., Diarra, M., Ndiaye A., Hamerlynck, O., Diouf, S. & Tréca B. 1996. Oiseaux d'eau dans le delta du Sénégal en janvier 1996. Bulletin Mensuel de l'Office National de la Chasse 217: 2-9.

PARTICIPATION OF LOCAL COMMUNITIES IN MANGROVE FOREST REHABILITATION IN PATTANI BAY, THAILAND: LEARNING FROM SUCCESSES AND FAILURES

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ABSTRACT

The approach and achievements of a project on community participation in mangrove forest rehabilitation in Pattani Bay, a wetland of international importance in Southern Thailand, are described. By working together with local communities in three villages around the bay, this project aimed to restore severely degraded sites of former mangroves. This three-year project followed an approach of combined environmental rehabilitation and socio-economic improvements, placing greater emphasis on the process than on outputs, and facilitating initiatives of the community, rather than ideas of the project team.

Local ownership of the project and effective community participation were considered crucial to achieve sustainable impacts. The project focussed its main activities on strengthening community organisation, building environmental awareness, mangrove rehabilitation through hydrological restoration and replanting of seedlings, support to alternative livelihood initiatives, and information dissemination. Although far from completely successful, the project has been able to support several income-generating activities of the communities, has successfully enhanced their environmental awareness, and has received their cooperation in the replanting of 30 ha of community mangrove forest for which a community-based management plan has been prepared. The paper discusses the successes and failures during the first two years of project implementation, and draws conclusions from the lessons learned from the participatory process.

INTRODUCTION

Rapid economic development in Thailand during the past three decades has led to widespread environmental degradation, and to marginalisation of rural communities (OEPP, 1997). Along the coast, commercial logging for charcoal, large-scale conversion for intensive shrimp aquaculture, and industrial and urban development have been responsible for the loss of 50% of Thailand's mangrove forests since 1970. At the same time, the fish catch and the income of many coastal fishing communities have drastically declined over this period (Platong, 1998). Logging, shrimp farming and industrial development have brought immediate economic benefits to the country, but much of the mangrove reclamation for land-use conversion has been illegal, as a result of weak law enforcement by the responsible government agencies.

Moreover, the loss of mangroves also represents a grave loss of biodiversity and source of income for thousands of coastal fishing communities which traditionally use mangroves as a source of food, timber and other products on a sustainable basis (Platong and Sitthirach, 1997). The lack of involvement of local communities in land-use planning, issues related to resource ownership and land-tenure rights, the open-access nature of coastal resources, and limited awareness of the benefits and functions of mangroves have all contributed to this problem (Erftemeijer and Sayaka, 1998).

The long-term environmental and socio-economic impacts of the widespread mangrove degradation are now gradually emerging, and the urgent need for rehabilitation of the degraded forests and proper management of the remaining forests is generally recognised. Although detailed information on the techniques for mangrove reforestation is available (ITTO, 1994; Field, 1996), and the government as well as the private sector appear willing to invest substantial amounts of funds into mangrove rehabilitation, the success of these efforts varies greatly, and is often limited in scale and time.

Besides technical, institutional and financial constraints, the success of coastal wetland restoration efforts may be hampered by issues related to:

- land ownership
- multiple land-use conflicts
- poor follow-up after initial replanting
- lack of involvement of local communities, and
- the absence of economic incentives for community-support (PMBC, 1998).

Local communities have become increasingly aware of the negative impacts of major macro-economic developments on their resource base, and are now rising up in defense of their user rights or resource ownership to sustain their livelihoods.

In response to the ongoing deterioration of the coastal environment from various forms of unsustainable land use, an increasing number of small but promising initiatives involving local communities in the planning and implementation of mangrove restoration efforts have emerged throughout Thailand. Usually initiated by local NGOs or grassroots organisations, in some cases with external donor funding and technical support from universities, these efforts recognise the user rights of the communities in sharing the benefits of rehabilitation and sustainable management of mangrove forests and their resources. Through the granting of community forest status, these initiatives provide an important incentive for the active involvement of the community in replanting and follow-up, which in turn ensures high rates of survival and success.

The strong emergence of community forestry in Thailand has been more of a people's movement than a governmental programme It has ultimately led to the drafting of a Community Forestry Bill, still under discussion two-and-a-half years after it was first drafted (Luangaramsi, 1998). Thailand's experience in community forestry has been mostly in dryland forest areas rather than in mangroves, but the general ideas and lessons learned from these efforts can be applied to mangrove forests and other (non-forest) resources as well.

The Yadfon Association in Trang has been among the first non-governmental organisations in Thailand to trigger these grassroots initiatives in mangrove forest areas in Southern Thailand (Rittibhonbhun *et al.*, 1990; Rittibhonbhun *et al.*, 1993; CESVI/Yadfon, 1996; Charnsnoh, 1998). Established in 1985, the association has been operating in coastal villages in Trang Province strengthening people's organisations and self-reliance in local fishing communities as a means to promote a model of sustainable development compatible with the ecological carrying capacity of the ecosystem. Their focus on enhancing community solidarity, establishing savings and credit schemes, and inter-village networking, in addition to community-based resource management and mangrove rehabilitation has proven successful over the years. Although sometimes slow in progress, the process clearly demonstrates the value of community participation in the wise use and sustainable management of coastal wetland resources (Jaipleum *et al.*, 1998).

A similar initiative was started in 1994, in Hua Khao village at the edge of Lake Songkhla (also in Southern Thailand), initiated by the Coastal Resources Institute (CORIN) of the Prince of Songkla University in collaboration with a local NGO (CORIN, 1996; CORIN, 1997). Though following a more academic integrated coastal zone management type of approach, and relying on substantial outside financial support from government and private sector, this project again has demonstrated the potential success of following a community-based participatory approach in mangrove rehabilitation.

Wetlands International (formerly as Asian Wetland Bureau) and the Prince of Songkla University have been working together in wetlands conservation activities in Thailand for over 13 years. A substantial proportion of this collaborative work has focused on Pattani Bay in Southern Thailand. The initial work concerned mainly the study of migratory waterbirds and waterbird hunting, and over the years, these studies enabled the staff to build up a good relationship with the local communities around the bay. As the emphasis of the work gradually shifted towards broader environmental problems facing the bay, the friendship and cooperation with the villagers was strengthened (Ruttanadakul *et al.*, 1998). In June 1996, with funding support from the European Community, Wetlands International and the Prince of Songkla University launched a three-year collaborative project on "Community Participation in Mangrove Forest Management and Rehabilitation in Southern Thailand", with emphasis on a case study at Pattani Bay.

The wider goal of this project is to sustain and restore the mangrove forest resources in Southern Thailand through the development of community-based resource management practices and by improving the cross-sectoral coordination of development planning. The project aims to demonstrate, in the case study of Pattani Bay, the ability of mangrove forests to strengthen regional prosperity, particularly for local people, who in turn will be able to manage the mangrove forest resources themselves.

The present paper elaborates on the approach taken in this project, and presents the achievements that were made during the first two years of its implementation. The paper emphasises both successes and failures that were made during the implementation, by illustrating the difficulties and unforeseen circumstances encountered, and by discussing the lessons learned from the process that may be of value to others planning similar initiatives elsewhere in the world.

MATERIALS AND METHODS

The project has been working in a number of villages around Pattani Bay on community participation in mangrove forest management and rehabilitation since June 1996. Activities included: promoting community organisation, mangrove rehabilitation, supporting alternative livelihood initiatives, and environmental awareness and information dissemination.

The rehabilitation project was guided by the following four main principles:

1) Environmental and socio-economic improvements should go hand-in-hand.
2) Local ownership of the project by facilitating the ideas of the community, rather than those of the project staff.
3) Effective community participation is crucial for the sustainability of changes initiated.
4) Focus on the process rather than on outputs.

A team of five full-time field workers and six part-time consultants (university lecturers) was employed to carry out the various activities in the target villages according to time

schedules agreed in annual workplans. An additional team of four part-time staff and one consultant, based at the university, worked on an intensive information dissemination programme, and facilitated various training activities. Ideas, methods and tools described in the FAO Community Forestry Field Manual (Davis-Case, 1990), and discussions with staff from Yadfon Association and RECOFTC were particularly helpful in giving shape to the field approach of community participation.

The approach followed was one of learning by trial and error, based on building trust and relationships within the community members. From the start, the project involved community members, local environmental NGOs and local government offices in the planning, implementation and review of the project, thereby creating a strong sense of local ownership.

Both the management and the field team made special effort to listen to the comments, criticisms, and suggestions from individual community members, local environmental NGOs, grassroots organisations, and other institutions involved. By taking a flexible approach, the project allowed for changes in objectives, approaches and activities at any stage during the implementation. This was particularly important, as the involvement of local stakeholders in the early stages of needs assessment and project design had been far from adequate.

The project team has encouraged the local communities themselves to come up with ideas for project implementation and reserved a key role for them in the project's decision making process.

The progress and plans of the project have been reviewed and approved by a Project Steering Committee, which meets twice a year and is composed of representatives of major local governmental and non-governmental institutions and three community representatives. Detailed information about the project has been widely and frequently disseminated using various media, as an integral part of the project activity framework. The project was completed in June 1999.

The Study Area: Pattani Bay

Pattani Bay, situated along the southernmost part of Thailand's east coast along the Gulf of Thailand, is an estuarine wetland of international importance. The bay is protected on the northeast side by a sand spit 12 km long, and covers an area of 74 km^2. Areas of mangrove forest, salt marsh and mudflat are found along the shores of the bay, interspersed with salt pans, shrimp ponds, and areas of small private holdings. Valuable seagrass beds occur in the northeastern section.

The bay is important in sustaining the region's fisheries production, as well as for thousands of migratory shorebirds and other wildlife. Two major rivers drain into the bay from the south (Pattani River) and the east (Yamu River). It is a shallow bay, with a maximum depth of 5 m at high tide, and provides the resource base that supports the livelihoods of approximately 80'000 local villagers who live in 14 villages scattered in three districts around the bay.

Threats to the coastal wetlands of Pattani Bay are characteristic of most of Thailand's coastal areas, and include: reclamation for intensive shrimp aquaculture (and related conversion and pollution), major port developments (and related dredging), industrial expansion (and pollution), and destructive fishing by commercial trawling and by boats equipped with pushnets (Ruttanadakul *et al.*, 1993). Most of the project activities were concentrated in three target villages around Pattani Bay (Bang Tawa, Dato, and Tanjung Lulo), which were selected on the basis of formerly established relationships, similarity in socio- and environmental problems, and/or potential for community forest establishment.

RESULTS

Promoting Community Organisation

A range of initiatives was employed with the intention to organise the local communities in the three target villages for common environmental action. These started with loose gatherings, and informal meetings and discussions in the villages, largely building on existing friendships with individual villagers, which had been established previously in the scope of earlier projects by the university.

Many of these meetings were held for reasons related to specific project activities, such as for discussing and planning the mangrove replanting or alternative livelihood activities, or as part of building the villagers' environmental awareness, but they offered opportunities to group together the community members who had an interest in the project. In the case of the discussions pertaining to alternative livelihood activities, this led to the formation of an (informal) "Alternative Livelihood Activities Committee" in Bang Tawa village in June 1998. For participation in meetings of the project management team and project steering committee, the informal groups of interested villagers had to appoint their representatives, which highlighted the need for self-organisation. The role of the villagers in these committees secured their participation in project management and decision-making.

The team further strengthened the commitment and self-confidence of interested community members from the three target villages by facilitating their participation in peaceful demonstrations in Bangkok of the *Forum of the Poor*, and in public hearings, seminars and workshops on local and national environmental issues. The team also arranged meetings for the villagers with the Prime Minister, Pattani Governor, Royal Forest Department and Harbour Department officials to discuss environmental threats facing Pattani Bay and its fishing grounds. In addition, the project organised a one-week study tour (attended by 21 villagers) visiting various good and bad examples of community-based coastal resource management in Malaysia and Singapore.

Several of the project activities that were identified by the villagers themselves offered opportunities to establish more coherent groupings within the community. An operational group of 13 community members for the protection of the coastal waters was set up in Bang Tawa village to patrol up to 3 km from the shoreline against illegal destructive fishing activities by trawlers and pushnet fishermen. A village development fund that was set up with support from the project was used to purchase a boat and engine for this group. The group received recognition and support from the local government and police, and within the first few months of its existence several illegal fishermen were arrested (in close cooperation with local police officers), and punished for causing environmental destruction. Furthermore, two income-generating groups were set up at Tanjong Lulo village, one concentrating on a fish-feeding initiative (five members), and another forming a goat- and sheep keepers cooperative (15 members).

These substantial efforts to promote community organisation for joint environmental action and resource management yielded some success. However, overall progress on this issue was slow, and at times reversed towards disintegration of established groupings. Various factors contributed to the setbacks in community organizing. Against a background of severe national economic problems and the frequently changing political environment, conflicts within the community related to inequity, and political and religious matters also played a considerable role, sometimes further aggravated by inappropriate efforts of intervention by the project team.

The initial approach by the field team of working directly with the villagers clearly underestimated the powers and pivotal role of the existing local administrative structures and government-appointed leaders. A lack of involvement and understanding among the local administrators resulted in a lack of institutional support and poor sustainability of the project's efforts.

Although friendships with selected individual villagers established during earlier projects certainly helped to get the process of village organisation started, this did not necessarily include the key persons of the village. Failure by the largely Buddhist project team to build an understanding and win the support among key Muslim religious leaders and scholars (e.g. imam, ulaman, masjid committee, tadikaa committee) also contributed to the limited progress in community organisation. In addition, opportunities for fruitful cooperation and networking with existing grassroots organisations in the region (e.g. the Southern Thailand Small-scale Fishermen Federation) were missed, largely as a result of personality conflicts.

The project recently addressed some of these problems through training of field workers in conflict resolution techniques and gender aspects at a regional community forestry training centre (RECOFTC). In addition, a renewed and more positive attitude towards the local administration (now involving them intensively in the implementation and evaluation of project activities), although late in the process, is gradually proving its worth.

In establishing effective participation, therefore, it is not necessary to choose sides with the influential and most powerful persons in the village, but it is crucial to make an effort to ensure they are always informed and aware of why and what the project is doing to gain their understanding, and as such, their indirect support.

Mangrove Rehabilitation

Substantial achievements in mangrove rehabilitation were made in one of the three target villages, Bang Tawa. At this village, an area of approximately 80 ha of severely degraded mangroves, completely clear-felled in most of the area, was available for the community. After discussions with the regional office of the Royal Forest Department (RFD), informal approval was given for the establishment of a community forest. The formal request documents were forwarded to the RFD headquarters in Bangkok, pending the final approval of the proposed Community Forestry Bill.

Initial trials of experimental replanting by the villagers in collaboration with university staff and field workers of an area of approximately 5 ha were largely unsuccessful, with survival rates of the seedlings below 20%. Drought and grazing by goats and sheep were identified by the villagers as the primary causes of this failure.

Learning from these experiences, the project team assisted the villagers in drawing a detailed map of the area, and in designing a thorough land-use and rehabilitation plan for the Bang Tawa Community Forest site. Central to the plan was the decision to improve the tidal flooding of the site (altered by the construction of the shrimp ponds, a road, and a protective sea wall) by digging a meandering channel, for which permission was obtained from local administration and Royal Forest Department. The channel was dug with the use of a backhoe bulldozer rented from a nearby shrimp farm. Meanwhile, mangrove seedlings were grown in nurseries at the Royal Forest Department, the university, and the village for later use in large-scale replanting.

Since then, a total of nearly 30 ha have been planted with seedlings of several mangrove tree species at this community forest site. This time, strong fences were constructed around the replanted plots to keep out the grazing livestock. The establishment of a goat- and sheep-keepers cooperative, initiation of feeding trials within fenced confinements, and training of the members contributed to a better livestock management in the village, further reducing the damage by grazing.

The survival and growth of the replanted mangrove seedlings improved greatly, the best results being achieved with

Avicennia marina (the species most tolerant to high salinity). Some further attempts by the villagers to improve the inundation of the revegetated plots during the dry season, by the construction and use of a windmill (as used traditionally at salt pans in neighbouring villages) were not successful, and after the windmill broke down this initiative was abandoned. Despite the construction of the channel and the efforts with the windmill, most of the mangrove species other than *Avicennia* showed relatively low rates of survival and growth.

More recently, with the advice of an outside mangrove restoration expert, small-scale hydrological improvements were made to the channel and topography of the replanting site. These micro-scale corrections resulted in an improved drainage connection, allowing for increased tidal flushing by seawater, and proper drainage and run-off of rainwater to rinse out the excessive amounts of salt, which had accumulated in the soil after years of seawater evaporation at the site. These improvements are expected to reduce the soil salinity over time, and gradually lead to improved survival and growth of mangrove species other than the high-salinity tolerant *Avicennia marina*.

Besides mangroves, the villagers also replanted several hundred *Casuarina equisetifolium* trees on a nearby sandbar, and planted indigenous plants and fruit trees in small gardens near their houses.

Community participation in mangrove rehabilitation and management has been less successful in the two other villages, because the communities in these villages, plagued by a complex web of local political conflicts, have not yet reached the stage in which they were ready for environmental action and community-based resource management. Some initial trial mangrove replanting of approximately 5 ha was done at Tanjong Lulo in early 1996, but abandoned due to poor success and lack of community support. Most of the project effort in this village has focussed on other project activities (especially awareness, livelihood support, and community organizing).

In Dato village, an area of 44 ha of mangrove forest was replanted by the villagers in 1993 within the scope of a previous university project. This area was informally awarded a community forest status, but there is no plan for co-management of the area by the villagers and the regional Royal Forest Department (RFD) office. Meanwhile nearly 7 ha of the area have been reclaimed by villagers for housing. Morale, stability and willingness to cooperate was low among the community in this village during the first two years of the project, but have improved recently. Meetings aimed at facilitating the villagers to draw up a co-management plan with the RFD are now scheduled for November 1998.

Supporting Alternative Livelihood Initiatives

Realizing the discrepancy between the outsiders' long-term interest in wetland rehabilitation and the immediate development priorities of the local communities in the target villages, the project extended its support to more general aspects of community development in addition to its environmental rehabilitation objectives. By improving existing livelihood activities and supporting alternative livelihood initiatives that promoted the community's self-reliance and quality of life, the project placed the emphasis on local benefits for the community. In this way, the project was able to capture their interest and enthusiasm for cooperating in other activities with less immediate (more indirect) benefits associated with the long-term objectives of rehabilitation and sustainable resource use.

Existing livelihood activities (e.g. fish crackers and shrimp paste production) were improved by value-adding processes (chemical-free), and by improving marketing strategies of products and commodities, by eliminating unnecessary middlemen, and expanding the markets to include other towns and cities.

The management of livestock rearing at the village level was improved by the establishment of a goat- and sheep-keepers cooperative, which, through profit-sharing, supported the training of its members in animal husbandry practices, arranged for the vaccination of their goats and sheep against diseases, and initiated feeding trials within fenced confinements.

Alternative income-generating activities included small-scale crab farming by a youth group in Dato village, village gardening (initiating household gardens of vegetables, fruits and flowers) in Bang Tawa, a cooking course on making deserts from seafood products for sale at the market to generate extra income by women, fish-feeding experiments in Tanjong Lulo, and fish-pond culture of catfish at Dato village. Several other ideas have been discussed or proposed but not yet implemented or followed up. All these initiatives were identified by the villagers themselves during meetings and discussions in the villages. A special village development fund was set up with assistance of the project to establish a sustainable source of funding through profit-sharing, and to provide incentives for the initiation of collective community development initiatives.

These alternative livelihood activities have certainly raised the interest of the communities in the project, and, to a moderate extent, raised the communities opportunities of self-reliance. More recently, as a direct spin-off from the increasing involvement of local administrators, some of the other villages around Pattani Bay (Laem Poh and Tala Kapor) – who have followed these developments with great interest – submitted their own proposals for community development initiatives for consideration for support under the project. Although these villages fell beyond the intended scope of the current project, this demonstrates the widespread potential for incorporation of community development initiatives in future environmental conservation projects.

At times, however, the project has fallen short of meeting its objectives, or the villagers' expectations from these activities

and plans, as a result of which, several community members lost interest in the project or trust in the team's capabilities and promises. Early in the third and final year of the project, the project management team, field staff, and community representatives agreed to reduce the number of livelihood activities to selected priority initiatives that showed the most promise, and that were most likely to reach successful results within the remainder of the project duration. This decision has helped to give more focus to this project component, and to maintain the overall balance between community development and environmental rehabilitation in the project.

Environmental Awareness and Information Dissemination

In order to catalyse the community's interest in the long-term sustainability objectives of the rehabilitation and wise use of the coastal wetland in the wider study area, a large number of environmental awareness and educational activities were developed to run parallel to the other project activities right from the beginning. Awareness was raised through villager-to-villager exchanges of experiences in community-based coastal resource management during study tours to Malaysia/Singapore and Trang. Inventories by the villagers themselves of the natural resources around their villages, and of the fisheries activities in Pattani Bay – with the help of university students, staff of the Department of Fisheries and the National Institute of Coastal Aquaculture – also enhanced the environmental awareness of the villagers.

With help from the field team, villagers made a detailed replica model of Pattani Bay, which has been on display on numerous occasions. Furthermore, well-organised environmental entertainment shows with actors and music (*Dikir Hulu*), interpretation boards on Pattani Bay's natural resources, and production of various awareness materials in Thai language further contributed to the environmental awareness among the target communities. Hundreds of school children from around the bay participated in the mangrove and *Casuarina* replanting and monitoring activities, started an environmental campaign on village cleanliness, and featured in a special environmental edition of the popular youth TV programme *Tung Seang Tawan*. Groups of school children were taken out on field excursions to other wetland sites and to a mangrove education centre. The team also established an informal network for cooperation among schoolteachers and religious Muslim teachers, who were encouraged and assisted to incorporate environmental education into their teaching curriculum. A special teacher's education kit on mangroves is currently being prepared to assist in these efforts.

In addition to these specific awareness-raising activities, the project has been implementing a strong information dissemination component. Regular project newsletters in Thai language (11 issues to date, up to 5000 copies), local press releases, three TV documentaries, and daily radio broadcasts (400 issues to date, reaching out through network stations to 17 Thai provinces) have featured reports on progress and specific information regarding project activities, stories on local resource use in the target villages, feed-back comments by the villagers on the project, educational information on mangroves, and regional environmental news and events. The newsletter, which also has a special children's column and a summary translation into the local Malay dialect (Yawi), has been distributed widely throughout Southern Thailand. Not only have all these awareness and information dissemination activities generated the interest and support by the communities to participate in the mangrove rehabilitation and other project activities, but they are also expected to contribute to the prevention of further degradation of the mangroves and other coastal resources in Pattani Bay and beyond.

DISCUSSION

The efforts of this project to establish local community involvement in coastal wetland management and rehabilitation in Pattani Bay have not been totally successful, nor have they been a complete failure. Not surprisingly, the project took off with a whole range of different expectations among the participating groups and institutions involved, some of which were unrealistic, or were incompatible with each other.

Over time, however, awareness and understanding have grown, leading to more realistic and compatible attitudes and expectations. It is important to realise that the kind of work presented in this paper is a process of learning by doing – where it is crucial to share with others working in the same field, experiences of both successes and failures (Claridge and O'Callaghan, 1997). There is no single correct way to establish effective local community involvement in coastal wetland resource management. The approach followed in the current project was tailored to the prevailing ecological and socio-economic situation at Pattani Bay, and to the capabilities of the project team members, and to those of participating communities and other stakeholders. It would therefore be an over-simplification to regard the present project as the replication of a model approach established earlier by Yadfon Association in their work in Trang Province.

The emphasis on the process rather than the outputs of the project undoubtedly has its merits, and is expected to contribute to a longer-lasting, sustainable change in attitudes towards the management and wise use of the rehabilitated mangroves at the target villages in Pattani Bay. At the same time, however, the lack of clear and measurable indicators of progress has contributed to some degree of uncertainty, scepticism, and even opposition among the target communities, government officers and academic staff.

The project has taken a flexible and open approach, putting considerable effort into the creation of a strong sense of local ownership of the process and allowing them to play a major role in the planning and decision-making of the project. This has demonstrated clearly to the community that their knowledge, concerns, and ideas are taken seriously, thus strengthening their trust in the participatory process. At the same time, however, this has led to diffusion of the project

objectives, with a lack of clarity on priorities, and a gradual shift in preference towards activities of immediate benefits rather than to broader long-term solutions to the problems. The project has placed perhaps too great an emphasis on the local community (in awareness building, education, participation and management), resulting in a lack of understanding, involvement and commitment from other stakeholders, such as the regional government institutions and the local administration. This is characteristic of the general lack of mutual trust between local environmental NGO workers, and government officials in Thailand.

However, as stated by Claridge and O'Callaghan (1997), user communities managing resources in isolation are unlikely to be able to solve problems that originate outside the community. The project has recognised this, and is currently placing great emphasis on the full incorporation of local administration staff in the project process. The importance of involving local government units in community-based mangrove rehabilitation programmes was also stressed by Primavera and Agbayani (1997), who reviewed four model approaches used in the Philippines.

The general principle of people's participation in governance, resource management, and development planning has been fully recognised in the new revised Constitution of Thailand, adopted in May 1998. There still are, however, major cultural barriers to effective grass-roots participation in the strongly stratified, hierarchical Thai society. Though the concept of participation is generally understood and given lip service support among government officials, whole-hearted acceptance of – and genuine commitment to – community involvement as a basic element of their management approach is rare. However, not all the blame can be placed on the government, as many communities (including in the study area) as well as some of the NGOs that support them, appear sceptical and reluctant to accept government institutions as partners in co-management. Involvement of government agencies in project steering committees and ceremonial replanting events alone, however, will not suffice.

In the present case study, external assistance to the local communities in the development of their capacity to participate effectively in resource rehabilitation and management has come in three different ways. Besides the financial assistance from the European Union, and the technical advice, administration and coordination by senior Wetlands International (WI) staff, the project staff from WI and the Prince of Songkla University have played a crucial facilitation role of support to the communities. They have been an ongoing source of independent advice, ideas, and expertise for developing community involvement in wetland resource management.

The project team has also contributed by acting as intermediate between the government and the local community, by regularly reviewing achievements, and documenting the experiences of the project.

Weaknesses in the facilitation process include:

- the reluctance of academic staff to effectively incorporate the lessons learned from other similar initiatives documented elsewhere in the world
- poor cooperation with some local environmental NGOs and with a network of small-scale fishermen (largely due to personality conflicts and an atmosphere of competitiveness), and
- difficulties in overcoming the wide gaps in expectations and working style between the different stakeholders in the project (from EU via WI, government, and university to villager).

The pace of progress as experienced in the present project has been slower than initially anticipated by the participating institutions and the funding agency. It has become clear that building trust and achieving effective participation takes a considerable amount of time, patience, and flexibility.

One of the key lessons to date is the importance of facilitation, rather than implementation, for the role of the project team. The establishment of sustainable and meaningful community involvement in coastal resource rehabilitation and management cannot be achieved through a single project, which is – inevitably – restricted in scope and area, and which has a limited timeframe and deadlines (Claridge and O'Callaghan, 1997). Rather, effective community participation in environmental and socio-economic rehabilitation and management is a long-term process that can only be achieved through large-scale programmes with an incremental approach. A project, such as the one described in this paper, should be seen as part of a step-by-step process leading in the direction of improvement. Follow-up and continuation of some form of external support is therefore crucial to avoid the gradual collapse of the positive impacts achieved by the project within such a short time.

The building of confidence and understanding within the community may have been time-consuming, and it did hamper immediately measurable progress in mangrove restoration. This investment, however, is expected to pay off in the long term, because it has built a strong sense of ownership and commitment within the community, and therefore increases the chances of the long-term sustainability of the rehabilitation. This was demonstrated clearly by the work of Yadfon Association in Trang Province (Southern Thailand), where 512 ha of mangrove forest that was replanted by the villagers is now successfully managed as community forest (Jaipleum *et al*. 1998). The sustainability of the work by Yadfon Association has been achieved by a process of gradual expansion of their approach over the 13 years of programme operation from a few villages at the start, to 17 villages in the late 80s, and to over 30 villages by the late 90s. The scope of their work also expanded to include more general aspects of coastal resource management, rural community development and sustainable fisheries. Perhaps the best proof of the sustainability of their work is the fact that the villagers themselves are currently promoting the concept of community capacity building for self-reliance and wise use of coastal

resources to other villages in Trang Province, essentially without any substantial involvement of Yadfon staff.

The recent changes in Thailand's Constitution and the proposed Community Forestry Bill (currently under discussion in Parliament) provide further indirect policy support to the sustainability of these and similar initiatives, and are indicative of a growing recognition of the need for people's participation in managing wise use of natural resources in Thailand.

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REFERENCES

CESVI/Yadfon. 1996. Sustainable development of small scale fisherfolk communities on the Andaman Sea coast of Thailand and support to the local NGO Yadfon Association. Interim Project Review, draft technical report (project 216/EU), November 1996. 42 pp.

Charnsnoh, P., 1998. Saviours of the Sea. Thai Development Support Committee (TDSC), CUSO and DCF, Bangkok. 64 pp.

Claridge, G.F. and B. O'Callaghan (Eds.), 1997. *Community Involvement in Wetland Management: Lessons from the Field.* Incorporating the Proceedings of Workshop 3: Wetlands, Local People and Development, of the International Conference on Wetlands and Development held in Kuala Lumpur, Malaysia, 9-13 October 1995. Wetlands International, Kuala Lumpur, 278 pp.

CORIN, 1996. Mangrove Rehabilitation and Development in Target Areas of Songkhla and Pattani Provinces. Work in Progress - Project Overview. Coastal Resources Institute, Prince of Songkla University, Hat Yai. 19 pp.

CORIN, 1997. Mangrove Rehabilitation and Development in Target Areas of Songkhla and Pattani Province. A Summary Report. Coastal Resources Institute, Prince of Songkla University, Hat Yai. 7 pp.

Davis-Case, D.J., 1990. *The Community's Toolbox. The Idea, Methods and Tools for Participatory Assessment, Monitoring and Evaluation in Community Forestry.* Community Forestry Field Manual 2, FAO, Rome, 146 pp.

Erftemeijer, P.L.A. and A. Sayaka (Eds.), 1998. Towards Better Mangrove Management in Southern Thailand. Summary Report of Two Workshops on Mangrove Forest Management in Southern Thailand, 29-30 September and 27 November 1997, Hat Yai, Thailand. Wetlands International - Thailand Programme/PSU, Publication No. 4, 48 pp.

Field, C.D. (Ed.), 1996. *Restoration of Mangrove Ecosystems.* International Society for Mangrove Ecosystems, Okinawa, Japan. 250 pp.

ITTO, 1994. Proceedings of the Workshop on ITTO Project "Development and Dissemination of Re-afforestation Techniques of Mangrove Forests". 18-20 April 1994, Bangkok, Thailand. ITTO, JAM, Thai NATMANCOM/NRCT. 216 pp.

Jaipleum, N., A. Jaipleum and P. Thongpan, 1998. Second-Year Monitoring and Evaluation Report (1997-1998) on Sustainable Development of Small Scale Fisherfolk on the Andaman Sea Coast of Thailand. Technical Report. Rajamangala Institute of Technology and YadFon Association, March 1998. 16 pp.

Luangaramsi, P., 1998. Reconstructing nature: the community forest movement and its challenge to forest management in Thailand. *In:* Victor, M., Lang, C. and J. Bornemeier (Eds.), 1998: *Community Forestry at a Crossroads: Reflections and Future Directions in the Development of Community Forestry.* Proceedings of an International Seminar, Bangkok, Thailand, 17-19 July 1997. RECOFTC Report No. 16, pp. 45-55.

OEPP, 1997. Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality, 1997-2016. Office of Environmental Policy and Planning (OEPP); Ministry of Science, Technology and Environment. Bangkok, Thailand, 92 pp.

Platong, J. (Chulek), 1998. *Status of Mangrove Forests in Southern Thailand*. Wetlands International - Thailand Programme/PSU, Publication No. 5, 128 pp.

Platong, J. (Chulek) and N. Sitthirach, 1997. *Traditional and Current Uses of Mangrove Forests in Southern Thailand*.

Wetlands International - Thailand Programme/PSU, Publication No. 3, 91 pp.

PMBC, 1998. International Workshop on the Rehabilitation of Coastal Degraded Systems. Phuket, Thailand, 19-24 January 1998. Book of Abstracts. Phuket Marine Biological Center (PMBC), Phuket, 56 pp.

Primavera, J.H., and R.F. Agbayani, 1997. Comparative strategies in community-based mangrove rehabilitation programmes in the Philippines. *In:* P.N. Hong *et al.* (Eds.), 1997. *Community Participation in Conservation, Sustainable Use and Rehabilitation of Mangroves in Southeast Asia*; Proceedings of the ECOTONE V, 8-12 January 1996, Ho Chi Minh City, Vietnam. pp. 229-243.

Rittibhonbhun, N., P. Chansanoh, S. Tongrak and R. Suwannatchote, 1990. Management of Mangrove by Village Organization: A Case Study from Trang Province, Southern Thailand. Research Report, November 1990 (Supported by UNCRD/RES/555/90), 42 pp.

Rittibhonbhun, N., P. Chansanoh, S. Tongrak and R. Suwannatchote, 1993. Community-based mangrove rehabilitation and management: a case study in Sikao District, Trang Province, Southern Thailand. Regional Development Dialogue 14 (1): 111-124.

Ruttanadakul, N., S. Chuntadesh and N. Srichai, 1993. Development and conservation issues affecting Pattani Bay, Southern Thailand. Wallaceana 70: 13-90.

Ruttanadakul, N., L. Manakarn, N. Srichai, S. Chuntadej and S. Laochareonsuk, 1998. Community participation in mangrove forest management and rehabilitation around Pattani Bay, Southern Thailand: solutions towards sustainable resource utilization and lessons from the field. Paper presented at the Conference on Asian Wetlands, Indian Environmental Society, New Delhi & Bharatpur, India, 29-31 January 1998 (unpublished).

CO-MANAGING THE BANGWEULU FISHERY

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ABSTRACT

The Bangweulu fishery, situated in north-eastern Zambia, covers an area of about 7'500 km^2. It consists of five large lakes and a number of smaller ones, together with a vast floodplain system of about 5'000 km^2. The fishery contributes about 10,000 metric tons, or approximately 20%, of the total national fish production. Starting in 1996, the Department of Fisheries realised that involving relevant stakeholders would be necessary for successful management of the fishery, and – together with other stakeholders – put into motion a process to develop fisheries co-management. A series of Participatory Rural Appraisals were carried out, and the concept of co-management is now understood and supported by many.

This paper addresses the problems that have been encountered in developing fisheries co-management in the context of the Bangweulu, i.e.: the essentially political character of co-management, opposed ethnic interests, undemocratic decision-making processes, reluctance of the local government to decentralise some of their powers, limited capacity in the Department of Fisheries in both training and funding, the organisational capacity of many of the stakeholders, the limited economic alternatives, and the difficulty of women to participate.

An important lesson from initial work in the Bangweulu is that in this complex context, the development of fisheries co-management must be a gradual process for which tangible results must not be expected too soon. Initial developments, however, give reason for optimism.

INTRODUCTION

The Bangweulu is a large swampy area with a few lakes. The area is fed mainly through the Chambeshi from the southeast, and drained by the Luapula River in a southwesterly direction, on to Lake Mweru in the North. The Bangweulu supports a swamp fishery, and a lake fishery of lesser importance. Soils in and around the area are generally acidic and sandy, and therefore unfit for large-scale agricultural production. Annual fish production stands at approximately 10-15 tons (about 20% of the nation's fish production), and – although the size of fish caught has declined and catch composition has changed – fish production has remained remarkably stable over the years (Ticheler *et al*., 1996).

The population using the resources belong to different Bemba speaking ethnic groups. The Unga and the Twa people from the swamps can be considered full-time fishers. The others, notably Kabende, N'gumbo, Ushi and Bisa, have their homes on the mainland where they practice agriculture from October/November to March/April. However, outside the agricultural season most are involved in fishing, either near their homesteads on the lakes, or in the swamps, to which whole families, including women and children, migrate on a seasonal basis. This seasonal migration to the swamps has been increasing over the last decades, to the point where now during much of the year the autochthonous swamp population is outnumbered by migrant fishers.

The fishery is highly artisanal in the sense that it is characterised by extensive small-scale fishing from dugout canoes. Although fishing licenses are officially required and issued through the Department of Fisheries in Samfya, few of the fishers bother to get one. As there is no traditional access regulation mechanism in place either, the Bangweulu is *de facto* an open access fishery.

Commercial fishing in the Bangweulu is done predominantly by men. Women fish at a subsistence level using baskets, fishing hooks and mosquito nets. Women are also heavily involved in fish processing, fish marketing, and farming. According to estimates, more than 90% of the catch is processed, either through sun drying or smoking. Fish marketing is not centralised. The usual practice is that fish traders, most of whom are women, enter the swamps with goods and foodstuffs to barter for bundles of dried fish. Thereafter these bundles are put on transport for sale in urban centres in the Copperbelt and elsewhere. The population in the swamps is heavily dependent on this barter trade system for essential commodities such as firewood and staple foods.

For every kilogram of fresh or dried fish leaving the fishery, a levy is due to the District Council. As the Council has not ploughed back any of this money for district development, there is massive unwillingness to pay the levy and widespread smuggling of fish. It is estimated that more than 80% of all fish caught does not pass the Council's checkpoints.

In the early sixties the lake fishery came under severe pressure due to the introduction of commercial gill net fishing. Catch per Unit Effort (CpUE) decreased from 9.1 kg in 1961 to 1.9 kg in 1968 at similar levels of production (Evans, 1978). Since then, the fishery has hardly picked up. In 1992, the Department of Fisheries estimated CpUE at 2.1 kg (Ticheler and Chanda, 1992). CpUE for the swamp fishery has remained more or less stable over recent years at around 3.5 kg. According to Ticheler *et al.* (1996) this fishery is not biologically over-fished, but can not sustain any more pressure.

Under the present Fisheries Act (Government of the Republic of Zambia, 1974), the Department of Fisheries is solely responsible for the management of fishery resources. However, the only (more or less) effective management measure it has put in place is the annual fishing closure from 1 December to 1 March, when the majority of fish species migrate for breeding. This measure, however, is greatly disliked by the fishing population because it paralyses the barter trade system at a time of food shortages, thus leading to near starvation. A telling illustration of the ineffectiveness of (official) fisheries management is the fact that the huge majority – some say more than 90% – of the fishing gear that is used is illegal; in addition, hardly any fishers are in possession of the required fishing licence.

The recognition of the ineffectiveness of the management system has made the Department change its approach. It came to realise that the only way forward would be a management system in which all stakeholders share the management responsibilities and authority, i.e., a system of fisheries co-management. The new course was begun in 1996, when SNV - Netherlands Development Organisation provided a co-management support project to the Department of Fisheries in Samfya.

CHALLENGES IN DEVELOPING CO-MANAGEMENT

Due to the history of top-down law enforcement, resulting in the highly disliked fishing ban and the regular harassment of fishers, the Department of Fisheries was typically seen as an enemy. As a first step to build a relationship of mutual respect and trust, a series of Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) field visits were organised (Dept. of Fisheries, 1997). The purpose was to enter into fruitful dialogue with the fishing community and other stakeholders, to learn about their way of life, to understand their problems, to spread information about the new approach the Department had embarked upon, and to learn about people's views and perceptions. At the same time these appraisals served as a feasibility study from which a number of bottlenecks and lessons surfaced.

Reluctance of the Samfya District Council to decentralise authority and responsibility

We felt that the Councils are very important stakeholders, and should by all means be involved in any proposed co-management arrangement. A substantial part of the levies that the Council does not manage to obtain could in fact be collected at the community level. The extra funds thus raised could be shared amongst stakeholders and used to sustain the co-management system, particularly as a means to compensate for short-term losses that may occur in the initial stages.

Unfortunately the Samfya District Council told us straightforwardly that, as far as they were concerned, fisheries co-management was a non-starter. We realised, however, that the position they took was circumstantial, and it could change if a new Council were in place, and efforts were taken to convince them.

Lack of capacity within government institutions

It became apparent that the staff of the Department was not well equipped to cope with their new role as a process facilitator and equal stakeholder, instead of law-enforcer. A period of almost one year in this new capacity was too short to change the way of enforcing the 1996-1997 fishing ban, i.e., to manage the fishery in a spirit of togetherness. The following reasons, amongst others, were cited:

1. Staff felt insecure about new tasks in which they had no experience, and they easily tended to fall back into their old roles.
2. Fishers found it difficult to understand that the same person who confiscated their nets and catches yesterday, behaved in a supportive and understanding way today. The new role didn't lead to any immediate results, and was looked upon with suspicion.
3. The Department did not immediately embrace the concept of co-management wholeheartedly. Many officers needed more time to fully externalise the old top-down confrontational approach, and did not see the benefits of shared management responsibility, and decentralised decision making.

In addition, we did not receive the back up we would have liked. The head office in Chilanga did not seem to fully understand the concept of co-management, which they considered synonymous with the example from Kariba. We studied the co-management approach in Kariba in 1997, and came to the conclusion that in many respects it would be far from ideal as a model for the Bangweulu. First, in Kariba almost all fishers were aliens, and as such could be controlled fairly easily; the resettlement scheme that was executed in Kariba would be unthinkable in Bangweulu. Second, it seemed that the co-management arrangements were particularly beneficial for the large-scale commercial fishers, and did not sufficiently honour the interests of the small-scale fishers. Third, the Kariba project seemed to rely quite heavily on the traditional chiefs – a situation we think should be avoided in the Bangweulu area. Fourth, we wanted our co-management arrangement in Bangweulu to be less centrist and more participatory. On the other hand, we welcomed the idea of Village Management Committees and Zonal Committees, and noted the advantages of receiving

substantial funding, in the case of Kariba through the Southern African Development Community (SADC).

Lack of structures

Most fishers, but also other stakeholders such as processors, traders and transporters, were barely organ**ise**d. Associations and co-operatives, which had existed under the previous United National Independence Party (UNIP) government, generally collapsed, mostly because they lacked a sense of ownership, which often led to irresponsible financial management. Moreover, most of the stakeholders operate in small independent units. Fishing, for example, is done in autonomous units of no more than five people, and solidarity does not generally reach beyond that level, where relations are often character**ise**d by outspoken mistrust, jealousy and suspicion.

On the other hand the traditional political structures seem somehow to be operating in bringing people together, although the Zambian State and Christianity have heavily eroded the powers the chiefs enjoyed in the past. Also, church organisations do not restrict themselves to religious matters only, but constitute important socio-economic binding forces. For example, church groups supply agricultural labour to women farmers in the swamps, when the men have gone out for fishing.

Area to cover too big

We came to understand that – given the available financial and human resources – it would be impossible to effectively bring about any co-management arrangement at the scale of the whole fishery. A huge part of the area consists of swamps that are hardly penetrable during much of the year, when channels are choked and one has to paddle long distances to get through. Moreover, the fishing population is not concentrated, but scattered over many communities and fishing camps.

Co-management did not enjoy high priority

Although fishing has very strong cultural roots in the area, and fishers feel responsible for the custody of the fishery and possess extensive knowledge on many elements of the fishery, most did not perceive fisheries management as an urgent need. Fishers were convinced that the fish stocks would remain intact despite high fishing pressure, and were in fact "God given". Declining catches were usually attributed to the increased number of fishers, and less so to declining stocks.

Nevertheless, some fishers definitely real**ise**d the need for sustainable fisheries management. Most of these expressed the wish to play a major role, sometimes to the extent that they wanted the government to completely hand over the responsibility for management to them. Others believed that fisheries management would never work without strong external control, and wanted government to assume that role.

Ethnic division and conflict

The seasonal migration of fishers from the mainland to the swamps was identified as a major problem. The migrants, who belong to different ethnic groups, were accused of taking the best fishing grounds, making use of bad fishing methods, and lacking respect for traditional customs and beliefs. On the other hand migrant fishers indicated that they would not like to work together with the Unga people, who they consider to be backward and primitive. Thus the real issue –competition over a scarce resource – was wrapped in ethnic terms, which is a potentially volatile situation that needs to be handled with great care and tact. It is clearly quite a task to bring about co-management in such an atmosphere of discord.

Co-management and democracy

Co-management should be democratic, and each and every stakeholder should be free to give his or her view and be represented properly. In the Bangweulu this principle is not always adhered to. Tradition dictates that important decisions are left to the traditional chief, who is expected to rule in the interest of all. As a result "representatives" are not automatically elected but rather selected. The traditional chief usually establishes his rule through the use of force and by generating fear, and functions rarely as an opinion leader who facilitates and consults. As a result, the traditional leadership is not automatically in the interest of all. It is of the utmost importance, in any co-management arrangement, to ensure that measures are in place to effectively control the powers of the traditional chiefs, and to structurally empower the powerless.

Women's participation in co-management

Although women – as traders, processors and fishers – play a crucial role in the fishing industry, they are not likely to be involved in discussions on co-management. Co-management is perceived as an essentially political process, and hence as a male preoccupation. There is certainly a risk that the process of co-management will be monopolised by men, and will have a negative impact on the position and interests of women.

Difficult communication

It became obvious that communication would be the most essential element in the development of co-management for the Bangweulu Fishery. People would have to come together to sort out their many differences, to agree on management principles, to remove sentiments of suspicion and distrust, and to set up effective and efficient organisational structures that would require continuous monitoring, at least in the initial stages. But effective communication and monitoring are enormous challenges in an area that has hardly any roads, badly maintained waterways, almost non-existent public transport, and very few telephones.

Inappropriate legal framework

The present Fisheries Act (Government of the Republic of Zambia, 1974) does not support the principle of fisheries co-management and puts all management responsibilities in the hands of the Department of Fisheries. Therefore, there is at present no legal backup for developing fisheries co-management. Fortunately, the 1974 Act is presently under revision, and the new legislation proposed fully endorses the principle of co-management. In the meantime the project received (oral) assurance from the Ministry that fisheries co-management could be pursued pending the enactment of the new Bill.

THE NEED FOR CO-MANAGEMENT

All the above challenges and obstacles did not seem to provide a very solid basis upon which to build a co-management system. However, a few considerations made us choose to continue with the process.

First, the financial situation of the Department of Fisheries had worsened, and was not likely to improve in the near future. As the old "top-down" approach had failed already during times of relative fiscal abundance, it was unlikely that the Department would perform better with declining financial means.

Second, the hostile relationship between fishers and Departmental staff had led to the killing of five officers in Mweru-Wa-Ntipa during the 1996-1997 fish ban. This highlighted the urgent need to improve the relationship between fishers and the Department, to start working together to build mutual trust and respect.

Third, it was expected that Samfya District Council would soon be dissolved because of malfunctioning and mismanagement, and this finally happened in February 1998. It was considered likely that a new Council would be more supportive to co-management.

Fourth, and most importantly, the major stakeholders (the fishers) – although badly organised, opportunistic, and divided – highly valued the fishery. Fishing is part of the people's cultural identity, and as such meant much more to them than solely an economic opportunity. We were convinced that once the fishers had become aware of the need for sustainable fisheries management, they could become strong and valuable partners.

INITIAL DEVELOPMENTS AND ACHIEVEMENTS

First of all, it must be pointed out that this co-management project started only 2 years ago. We chose first to strengthen understanding of the social context in the area, in order to avoid implementation by trial and error, which, according to our view, carries great risks. We strongly believe that the development of fisheries co-management for Bangweulu must be a lengthy, gradual and complex process in which tangible results must not be expected too soon. Initial developments, including some achievements, are the following:

- After the previous District Council was dissolved, a Council Administrator was appointed. Under his administration co-management has become an issue that can be discussed. Now we are awaiting the new Council to be in place to work out modalities of revenue sharing and jointed fisheries management responsibilities.

- Efforts were made to increase the capacity of government institutions with regard to fisheries co-management. Fisheries assistants were trained in participatory extension methods, and were involved, together with personnel of the District Council and the Department of Community Development, in the PRA/RRA exercises.

- The understanding of co-management processes in the Department's headquarters in Chilanga also improved, and we expect more support from the headquarters in the near future. This development is a direct result of headquarters' involvement in the drafting of the new Fisheries Bill (Government of the Republic of Zambia, 1998).

- Another positive development beyond the control of the project has been the materialisation of the new government structure under the Agricultural Sector Investment Programme. This new structure is more receptive to the integrated approaches needed for developing co-management. (Kalyati *et al.*, 1994).

- Stakeholders were encouraged to set up organisational structures for the purpose of fisheries co-management, and Village Management Committees (VMCs) are now established in almost every corner of the project area. The main task of the VMCs is to initiate internal discussions on possible ways to conserve the fishery in their areas, and to develop decentralised co-management regimes. However, in this initial phase, not all VMCs are functioning as they should.

- The institutional basis of the project has been broadened by incorporating a component to specifically support new and embryonic organisational structures. This new component will be executed through the Department of Community Development.

- Although we realise that the fishery should ideally be managed as one inseparable entity, particularly from a biological point of view, we decided to concentrate on a smaller project area comprising approximately one third of the total fishery. Given the limited resources of the project, we were convinced that this was the only way to achieve real impacts, particularly in the socio-political realm of co-management, which is most

important in the initial stages. Other areas will be included in the project as soon as resources allow.

- Since initially co-management was not seen as a priority, an early aim was to raise conservation awareness through regular field visits, workshops, and study tours. Now, after two years, many more people see the need for conservation and proper management of the fishery.

- Ethnic differences, of course, have not been solved. However, in our approach we are continuously aware of their existence, and when they surface they do not take us by surprise. As we continue to develop co-management, it is likely that ethnic issues will become more and more prominent. Therefore, it is important to recognise and anticipate ethnic issues, and to control them and mediate where possible.

- In order to secure genuine co-management in an area in which democracy is not very well developed, we endeavour to monitor all the election/selection processes that take place within the context of co-management. For example, in general decision making processes, and in the participants chosen for workshops and study tours. One of the main concerns is to ensure that the traditional authorities do not take too much control. Because of these complexities, developing effective co-management structures will require additional time. This is, however, essential so that the less powerful elements of the community, including women, are properly represented. Although the traditional chiefs in particular at first perceived this with suspicion, the importance of democratic structures is becoming increasingly accepted. People who were silent in the beginning, especially women, have started speaking up, because they feel supported. On the other hand, gaining the support of the chiefs has been difficult, because they thought that they should automatically take the lead. It is a challenge to limit the powers of the chiefs, and at the same time to keep them on board.

- The physical aspects of communications remain extremely difficult: channels are still choked; telephone lines are still either bad or non-existent, and roads are not maintained. On the human side, however, people now sit together and talk over the issue of fisheries management spontaneously, and the Department of Fisheries is approached to facilitate and assist. This represents an enormous leap forward. It would have been unthinkable before the start of the project, when people did not see the need for such meetings, and the Fisheries Department was perceived as an opponent with dubious intentions.

- It seems likely that the new fisheries bill will pass parliament without much difficulty, which will provide the legal basis for the project's endeavours.

CONCLUSIONS AND CHALLENGES FOR THE FUTURE

These initial experiences in developing co-management give reason for optimism. In addition, the mainstream in the Zambian government seems to be moving towards democratisation and decentralisation, and away from centralist top-down approaches. It is important to make use of these favourable developments as much, and as quickly, as possible.

For the near future, the priorities for developing co-management are to:

- continue with programmes to raise awareness of the need for fish conservation
- incorporate more stakeholders, such as traders and processors in the process, and to expand activities beyond the present pilot area as quickly as possible
- widen the institutional set-up where possible, starting with the District Council, and possibly with an NGO partner such as WWF - WorldWide Fund for Nature
- build up organisational structures for co-management implementation
- further improve communication between stakeholders, through workshops, seminars, meetings, exchange visits and the like
- train all stakeholders, but particularly the weaker ones like poorer fishers and women, to perform as required in the co-management development process
- provide special training for the Department of Fisheries staff, to enable them to play their role properly as conflict mediators and process monitors and facilitators
- integrate a strong biological component in our co-management approach: fisheries research is particularly needed to complement (or where necessary correct) indigenous knowledge on proper conservation practices, and to empower the Department of Fisheries to become a strong stakeholder itself
- build the capacity of the Department of Fisheries to formulate clear policies, guidelines, and procedures regarding co-management, so that the Department can function as a strong stakeholder representing the national interest
- develop alternative sources of income to compensate for immediate losses that individuals may incur as a result of co-management.

All of these elements require substantial funding, which exceeds the present resources of the Government of Zambia and SNV. Initiating decentralised fish levying could provide some of the required funds, but more will be needed. We hope that a donor will be forthcoming to help with this encouraging and important work.

REFERENCES

Evans, D.W., 1978. Lake Bangweulu: A study of the complex and fishery. Fishery Service Reports Zambia. Fisheries Research Division, P.O. Box 350100, Chilanga, Zambia.

Department of Fisheries, 1997. Rapid Rural Appraisals in the Bangweulu Fishery for Community Based Fisheries Management: Results. Department of Fisheries, P.O. Box 720047, Samfya, Zambia.

Government of the Republic of Zambia, 1974. Fisheries Act.

Government of the Republic of Zambia, 1998. Draft Fisheries Bill.

Kalyati, T., H.G. Mudenda, C.T. Maguswi, V.R. Mubanba, E.K.W. Chilimunda, T. Zulu, J.C.K. Maluti and J. Lupikisha. 1994. Agricultural Investment Programme Appraisal, Fisheries Sub-programme. Ministry of Agriculture Food and Fisheries, Zambia.

Ticheler, H.J., J. Kolding, and B. Chanda. 1996. Assessment of the Bangweulu Swamps Fishery. WWF Bangweulu Wetlands Project. WWF Zambia Office, Lusaka.

Ticheler, H.J. and B. Chanda. 1992. Frame Survey of the Bangweulu Fishery 1992. Department of Fisheries, P.O. Box 720047, Samfya, Zambia.

L'APPROCHE PARTICIPATIVE POUR LA GESTION DES PÊCHERIES DANS LES ZONES HUMIDES DU SUD-BÉNIN

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MOTS-CLES : pêcheries, Bénin, communautés

RESUME

Les pêcheries fluvio-lagunaires du sud-Bénin, bien que très productives, sont confrontées à des contraintes tant écologiques qu'anthropiques, qui menacent gravement leur pérennité:

- La pression de pêche augmente d'année en année.
- Les végétaux flottants (*Eichornia crassipes* et *Pistia stratiotes*) envahissent les plans d'eau, rendant difficiles toutes activités.
- Les frayères naturelles (mangroves) sont détruites.
- L'emploi d'engins et méthodes de capture prohibés s'est généralisé.

Malgré l'existence de textes réglementaires et d'une police de pêche, la gestion des ressources halieutiques reste difficile. Soucieuse de pérenniser la pêche dans les zones humides, l'Administration adopta en août 1996 un Plan de Gestion dont la stratégie de mise en œuvre repose sur l'implication des communautés de pêcheurs. Dans ce cadre, des Comités de Pêche ont été créés dans toutes les localités riveraines des plans d'eau. Ils sont chargés de veiller à l'exploitation des ressources et constituent les interlocuteurs privilégiés des populations vis-à-vis de l'Administration. En 1997, un Arrêté Interministériel portant institution, organisation, attributions et fonctionnement de ces Comités a été pris afin de leur donner une base juridique. A travers l'approche participative, l'Administration des Pêches et les pêcheurs ont désormais des rapports fonctionnels permettant d'entretenir une confiance réciproque.

POTENTIALITES HALIEUTIQUES DANS LES ZONES HUMIDES DU BENIN

Le Bénin est doté d'un dense réseau hydrographique comprenant des fleuves (2'000 ha), des plaines inondables (100'000 ha), des lacs (environ 2'500 ha) et un système lagunaire constitué de deux grands complexes couvrant 40'000 ha. Sur cet ensemble s'est développé une pêche artisanale très active. La valeur exceptionnellement élevée des rendements des plans d'eau du Sud-Bénin est due au fait que:

- les eaux sont chaudes (28-29°C), bien aérées et ont une faible profondeur, ce qui facilite la pénétration de la lumière
- la communication des lagunes avec la mer provoque un enrichissement des eaux intérieures en éléments minéraux et permet d'utiliser les migrations des espèces marines et
- les techniques de capture (*acadja*) employées sont ingénieuses et bien adaptées aux conditions locales.

La pêche sur les eaux intérieures du Bénin joue un rôle socio-économique capital. Elle est pratiquée par 40'000 pêcheurs professionnels, utilisant 37'229 pirogues monoxyles auxquels s'ajoutent environ 13'000 saisonniers. Elle fait vivre en amont et en aval près de 300'000 personnes (vendeurs de matériels de pêche, fabricants de pirogue, femmes transformatrices et vendeuses de poisson). Le poisson constitue la principale source de protéines animales dans l'alimentation de la population béninoise en général et de celle du sud du pays en particulier. Les captures des pêches continentales représentent 40% de la consommation totale de protéines animales et 66% de la consommation totale de poisson (Tableau 1).

Tableau 1: Production de protéines animales au Bénin (en tonnes)

Pêche maritime	= 7 000	
Pêche intérieure	= 39 000	
dont pêche lagunaire	= 36 000	
Total		= 46 000
Elevage et chasse	= 50 000	
Total protéines animales		= 96 000
Exportation de viande	= 6 000	
Importation viande	= 3 500	
Importation poisson	= 12 000	
Consommation nationale		= 105 500
dont: poisson	= 58 000	
et viande	= 47 500	

Source: Statistiques/Direction des Pêches

La production nationale ne suffit pas à satisfaire les besoins nutritionnels de la population de sorte que le Bénin a importé en 1996, 12'000 tonnes de poisson congelé. C'est dire que l'apport des captures des eaux intérieures à la nutrition des populations à faible revenu décroît.

PROBLEMATIQUE DE GESTION DES RESSOURCES HALIEUTIQUES

Globalement, la contribution des captures des eaux continentales dans la génération des revenus est restée la même depuis une dizaine d'années. Par contre, les revenus, tirés de la pêche par les pêcheurs pris individuellement décroît d'année en année. Bien que très productifs, les lacs et lagunes du Bénin aient commencé à souffrir de problèmes écologiques et anthropiques menaçant gravement ces écosystèmes ainsi que les ressources vivantes qu'ils recèlent. L'augmentation du nombre de pêcheurs a engendré une augmentation de l'effort total de pêche. Dans les communautés riveraines des principaux plans d'eau du Sud-Bénin, on est pêcheur de père en fils. Une analyse des statistiques des pêches continentales au cours des dix dernières années révèle une stabilisation des captures annuelles autour de 30'000 tonnes (voir figure ci-après).

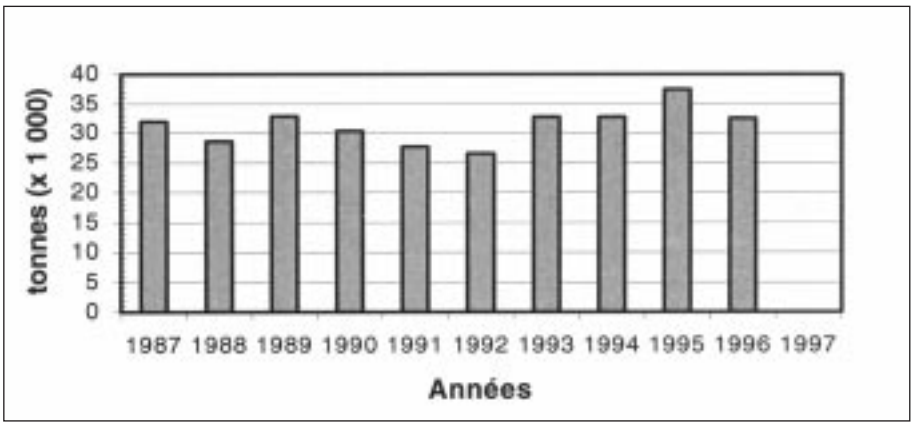

Figure 1. **Pêche continentale au Bénin** (captures / an)

Les ressources halieutiques sont en train d'être exploitées à leur maximum d'équilibre (en moyenne 1 t/ha/an). Les principaux facteurs observés sont:

- augmentation du nombre de pêcheurs, donc de l'effort
- stagnation du niveau des captures
- diminution des captures par unité d'effort
- accentuation des conflits entre divers groupes professionnels.

A ces causes, il faut ajouter les contraintes naturelles qui menacent les écosystèmes aquatiques continentales béninoises; il s'agit entre autres:

- du comblement des lacs et lagunes
- de l'invasion des plans d'eau par la jacinthe
- et la dégradation des conditions physico-chimiques de l'eau (pollution).

ANCIEN MODE DE GESTION: LA TRADITIONNELLE

Il y a environ quatre décennies, les pêcheurs respectaient les règles simples de protection du milieu physique et des ressources halieutiques qu'avaient établies leurs aïeux voici plus de trois siècles. Ces règles coutumières basées sur des tabous interdisaient toutes techniques capturant des alevins ou des juvéniles. On observait des jours de repos pendant lesquels nul n'a le droit d'aller sur l'eau pour pêcher sous peine d'encourir la colère des dieux. Par exemple, il existe encore sur la lagune côtière de Ouidah un secteur dénommé "*VODOUNTO*"[1] entre les localités de Hio et de Avlékété, où la pêche est strictement interdite afin de permettre la reconstitution du stock. Cette frayère protégée est sous la garde du grand prêtre féticheur de la région appelé "*DAGBO HOUNON*" qui amende sévèrement tout contrevenant.

Mais avec l'importation des religions exogènes, il y a eu une érosion de l'autorité des chefs traditionnels, ce qui ne permettait plus de maintenir un équilibre entre l'accroissement du nombre de pêcheurs et les ressources halieutiques disponibles. C'est ainsi que les pêcheurs ont perturbé l'équilibre écologique, multiplié la pratique d'engins et méthodes de pêche prohibés, détruit les frayères naturelles et soumis les plans d'eau à une exploitation exagérée. Malgré l'existence d'une police de pêche et de textes réglementaires officiels traçant le cadre juridique pour l'exercice de la pêche, la gestion rationnelle des pêcheries du Bénin est restée difficile.

AUTRES MESURES DE GESTION

Outre l'implication des pêcheurs à la gestion des pêcheries, les mesures qu'entreprend l'Administration pour améliorer, à court terme, la contribution des captures des lacs, lagunes et fleuves béninoises, peuvent être résumées comme suit:

- appliquer les mesures réglementaires interdisant

[1] *Lagune sacrée habitée par les divinités selon la tradition et qui sert de refuge aux poissons*

l'utilisation des engins de pêche destructeurs des stocks (à cet effet, la Police de Pêche effectue le contrôle et le suivi des activités sur les pêcheries)
- mettre en œuvre des actions visant la protection des frayères naturelles et le reboisement des berges des plans d'eau (un programme de reconstitution de la mangrove est actuellement en cours)
- créer des sources de revenus alternatifs pour les pêcheurs telle que la pratique de la pisciculture extensive en trous à poissons.

A moyen terme, l'Administration Publique envisage de:
- réduire la pression de pêche sur les plans d'eau continentaux en orientant les pêcheurs vers d'autres activités de production telle que l'aquaculture villageoise
- améliorer les conditions de travail des pêcheurs en leur facilitant l'accès au crédit à très faible taux d'intérêt
- réhabiliter les écosystèmes aquatiques (lutte biologique contre les végétaux flottants, restauration des bonnes conditions physico-chimiques de l'eau)
- appuyer les femmes dans l'amélioration de la collecte des huîtres
- améliorer les systèmes de conservation et de transformation des produits de la pêche
- assainir les circuits de distribution et de commercialisation du poisson.

EXPERIENCE BENINOISE DE GESTION COMMUNAUTAIRE: L'APPROCHE PARTICIPATIVE

Au Bénin, l'expérience a montré qu'en matière de gestion des ressources naturelles (forêts, faune), la participation des populations qui les exploitent est un facteur essentiel de succès. Face à la multiplicité et à la gravité des problèmes auxquels sont confrontés les écosystèmes fluvio-lagunaires d'une part et aux limites de l'efficacité de la police de pêche d'autre part, l'Administration des Pêches a initié depuis 1993, l'idée de la gestion participative des ressources halieutiques à travers l'installation de Comités de Pêches dans les villages riverains des principaux plans d'eau du Sud-Bénin.

Chaque Comité est constitué des représentants des pêcheurs démocratiquement élus pour un mandat de trois ans renouvelable par les pêcheurs réunis en assemblée générale sur l'initiative des autorités locales. Pour être membre du Comité de Pêche, il faut être pêcheur professionnel, de bonne moralité et avoir une bonne pratique sociale. La fonction essentielle du comité est de veiller à l'exploitation rationnelle du plan d'eau en vue d'assurer la préservation des ressources et de sauvegarder l'écosystème. A ce titre, le Comité de Pêche est chargé de:
- sensibiliser et informer les riverains sur les dispositions légales et réglementaires en vigueur en matière de pêche
- veiller au respect des pratiques traditionnelles visant la protection des ressources et du milieu aquatique
- faire appliquer, en collaboration avec l'Administration des Pêches, la réglementation ainsi que les décisions issues de l'Assemblée Générale des pêcheurs
- servir de cadre de concertation, d'analyse et de conciliation pour le règlement des conflits entre pêcheurs
- appuyer les programmes d'aménagement et de gestion des plans d'eau jugés nécessaires par l'Administration.

Les Comités n'ont pas la faculté d'exercer une quelconque répression mais plutôt sont appelés à jouer le rôle de formateur et d'éveilleur de conscience au sein de leur communauté sur les dangers que pourrait engendrer la non-observation de la réglementation des pêches en vigueur. Chaque comité compte entre neuf et quinze membres. Il est dirigé par un bureau exécutif de cinq personnes élues en son sein. Toutes les activités des Comités de Pêche bénéficient de l'appui de l'Administration des Pêches tant qu'elles sont conformes aux dispositions réglementaires. La fonction de membre de comité n'est pas rémunérée. Pour le fonctionnement du Comité, il est institué au niveau de chaque localité de pêcheurs, une cotisation obligatoire minimale de cent cinquante francs CFA (environ 0,30 $US) par mois et par pêcheur.

Soucieuse de pérenniser l'activité de pêche sur les eaux intérieures du Bénin, l'Administration des Pêches a adopté en août 1996, un Plan de Gestion dont la stratégie de mise en œuvre privilégie:
- la mise en place de mécanismes institutionnels de gestion participative
- la gestion des ressources halieutiques basée sur un cadre juridique approprié
- l'identification et la promotion d'activités destinées à favoriser le développement de sources de revenus alternatifs.

Le but des mécanismes institutionnels de gestion participative des plans d'eau, reste la nécessité et la volonté de l'Administration des pêches d'associer étroitement les communautés de pêcheurs à la gestion des ressources naturelles. Cette approche participative implique pour les comités de pêche les rôles et responsabilités suivants:
- faciliter la participation des populations à la gestion rationnelle des plans d'eau
- veiller à la mise en œuvre et au suivi du plan de gestion
- être l'interlocuteur des populations vis-à-vis de l'Administration des pêches.

Mais ces Comités de Pêches, pour être opérationnels, ont besoin, en dehors des équipements nécessaires à leur bon fonctionnement d'un instrument juridique qui légalise leur existence et leurs activités. Ainsi donc, le 11 septembre 1997, le gouvernement béninois a pris un Arrêté Interministériel N° 312 portant institution, organisation, attributions et fonctionnement des Comités de Pêche en République du Bénin pour donner une base juridique aux Comités de Pêche.

A ce jour 95 Comités de Pêche sont créés pour cogérer les principaux plans d'eau des trois départements du Sud-Bénin. A travers cette approche participative, l'Administration des Pêches et les pêcheurs ont désormais des rapports fonctionnels permettant d'entretenir la confiance réciproque.

COMMUNITY DEVELOPMENT INCLUDING ECOTOURISM AT TASEK BERA, MALAYSIA'S FIRST RAMSAR SITE

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ABSTRACT

Tasek Bera is a freshwater wetland system in central peninsular Malaysia, consisting of a mosaic of wetland habitats dominated by peat swamp forest, extensive reedbeds, *Pandanus* stands, and open water bodies. Lowland dipterocarp forest surrounds the wetland, and the catchment has been converted mainly to oil palm and rubber plantations. The indigenous Semelai people have occupied the Tasek Bera area for hundreds of years, and while livelihoods are changing, natural resources still provide a source of supplementary income.

Tasek Bera was designated Malaysia's first Ramsar Site in 1994, and an integrated management project, financed by the Danish government (DANCED), is assisting the government to establish management arrangements. The project aims to integrate the Semelai into site management and tourism services at Tasek Bera through a community development programme.

This process has identified the needs and aspirations of the Semelai population, and proposes a range of actions detailed in a strategic plan. The plan aims to raise the Semelai's capacity for socio-economic development, whilst ensuring the sustainability of natural resource use. This includes the establishment of a mechanism for community participation in site management, training in guiding tourists, and the development of pilot projects on community-based ecotourism and handicraft production.

Issues such as the sustainability of community-based tourism activities, the involvement of women and other local inhabitants, and sharing benefits are being addressed by the project. The project is integrating community development into the site management plan to formalise the involvement of the Semelai people.

INTRODUCTION

Ecological characteristics of Tasek Bera

Tasek Bera is a lowland freshwater swamp system with an area of approximately 6'150 ha in a catchment of 61'000 ha (Furtado and Mori, 1982). Situated in the central lowlands of the Malay Peninsula, it lies in the basin of the River Pahang, the Peninsula's largest river. The swamp drains northwards into the River Bera, which continues to flow northwards to join the River Pahang, eventually discharging into the South China Sea.

The wetland takes the form of a flooded stream valley system, with narrow sinuous arms linked to a main channel along which lie a series of permanent waterbodies. It extends some 25km at its widest point (east-west) and almost 35km at its longest point (north-south). Tasek Bera consists of a mosaic of wetland habitats, including rivers and streams, open waterbodies, swamps and lowland forest. The swamps can be further subdivided into *Pandanus-Lepironia* swamp, peat swamp forest, freshwater swamp forest on mineral soil, and secondary swamp forest (Giesen, 1998). This habitat mosaic is a result of centuries of disturbance by indigenous Orang Asli people, who have cleared swamp forest, and traditionally burn patches of sedges and *Pandanus* for hunting turtles, and to maintain waterways. This process is ongoing, and is thought to have converted about one third of the swamp forest to open *Pandanus-Lepironia* swamps (Furtado and Mori, 1982). The catchment was largely converted to intensively managed oil palm and rubber plantations in the 1970s and 1980s. However, immediately around the wetland an area of largely disturbed lowland dipterocarp forest remains, and this connects to a large forest block to the north-east, which includes Chini Forest Reserve and Bukit Ibam proposed Forest Reserve.

Open water bodies have an average depth of about 2.5m extending to a maximum of 7m, whilst the extensive littoral areas are about 0.8m deep (Furtado and Mori, 1982). The wetland is hydrologically dynamic, with marked fluctuations in water level according to local rainfall. Average annual rainfall is around 2'000-2'500mm per year, most of which falls in two wet seasons, the pronounced north-east monsoon, which can bring heavy rains between October and January, and April-May. In years of extreme rainfall such as 1971, the fluctuation in water depth can exceed 5m (Furtado and Mori, 1982). The water is slightly acidic with a pH range of 5.6-6.5, and low conductivity and turbidity (Tong *et al.*, 1997). Although some localised pollution problems occur as a result of agricultural activities in the catchment, the water quality remains generally good (Tong *et al*., 1997), and can be considered mesotrophic in terms of nutrients (Giesen, 1998).

The ecology of Tasek Bera was studied in detail in the early 1970s (see Furtado and Mori, 1982), and relatively complete descriptions of the aquatic flora and fauna are available. More recent studies have sought to assess the current flora and fauna present at the site, including: Chong and Lim (1998), Department of Wildlife and National Parks (1998), Forest Research Institute of Malaysia (1997), Giesen (1998), Lim (1998), Lopez (1999), Murugadas (1998), Phang and Murugadas (1997), Simpson *et al*. (1997), and Zakaria-Ismail (1997).

Conservation Values of Tasek Bera

Tasek Bera was designated as Malaysia's first Ramsar Site in November 1994, when Malaysia became a Contracting Party to the Ramsar Convention, and the conservation values of Tasek Bera are described in the Ramsar Wetland Information Sheet for the site. Tasek Bera is internationally important for a variety of reasons including the following:

- **It is an excellent example of its type of wetland**: Tasek Bera is a natural freshwater wetland system, which is significant in regional terms for the size, variety and quality of wetland habitats represented. Overall, it has a high ecological diversity, and supports a large number of plant and animal species, some which are endangered and/or endemic. Thus the area is of great importance as a gene pool, besides being of interest from scientific, recreational, educational, and socio-economic points of view.
- **Unique habitat**: As far as is known, Tasek Bera's peat swamp forest is unique – its development, structure, and composition differs from other peat swamp forests in Peninsular Malaysia (Giesen, 1998).
- **Plant biodiversity**: 19 noteworthy plant species have been identified at Tasek Bera, of which seven are wetland species including the aquatic aroid, *Cryptocoryne purpurea*, which may now be restricted to this site, and the rare sedge, *Scirpus confervoides* (Giesen, 1998).
- **Endangered species** that have been recorded from Tasek Bera include the Asian Arowana (*Scleropages formosus*), and the Silver Shark (*Balantocheiros melanopterus*), last recorded here in 1969 (Zakaria-Ismail, 1997). The rare crocodile, *Tomistoma schlegelii*, remains in small numbers, and one critically endangered and four vulnerable turtle species occur. At least three endangered, and seven vulnerable mammal species, together with five vulnerable bird species have been recorded (Lopez, 1999)
- **Endemic species**: Ten plant species have recently been recorded from Tasek Bera that are endemic to peninsular Malaysia (Giesen, 1998). The Dusky Leaf Monkey (*Presbytis obscura*) and Malayan Peacock-pheasant (*Polyplectron malacense*) are also endemic to the Malay Peninsula. Endemism in other taxonomic groups requires clarification, although the majority of fish species at Tasek Bera are indigenous to peninsular Malaysia (Furtado and Mori, 1982).
- **Biodiversity**: At least 94 species of fish, 10 turtles, 19 frogs, 67 mammals, 224 birds, 374 higher plants, and 328 species of algae have been recorded from Tasek Bera to date (see references listed above).

The Semelai at Tasek Bera

Tasek Bera has been inhabited for over 600 years by indigenous peoples (Furtado and Mori, 1982), and is currently inhabited by the Semelai. The Semelai have a strong cultural attachment to Tasek Bera, and still depend on its natural resources to an extent, although there is a trend of increasing outside employment away from the community. Amongst others Hood Salleh (1978) and Gianno (1990) have studied their culture and traditions, while Mohd Shahwahid and Nik Mustaffa (1991) and Mohd Shahwahid (1996, 1997) describe recent socio-economic studies of the Semelai at Tasek Bera.

The Semelai form one of the indigenous Orang Asli peoples of the Malay Peninsula. They are referred to in earlier ethnological literature as Proto-Malays, and their language has an affinity to Mon-Khmer (Gianno, 1990). A recent government census (unofficial 1996 figures) recorded 238 families or 1'266 individuals at Tasek Bera, living in 12 settlements which can be grouped into five larger villages (Mohd Shahwahid, 1996). The central village is Pos Iskandar, which was established during the Communist Emergency in Peninsular Malaysia in 1948-1960 for security purposes. The population has grown considerably since this congregation occurred. Gianno (1990) quotes Morley (1949), who estimated the population of the Tasek Bera area to be about 200 in 1948.

Prior to the Emergency, and the later large-scale clearance of forests for agricultural plantations, the Semelai lived in scattered communities practising hill rice swidden cultivation, hunting, forest product collection, and fishing. Customarily, the Semelai were widely dispersed and shifted habitation each year as the family followed the agricultural cycle, and they resided in the current year's swidden once the crops were planted. Following congregation at Pos Iskandar, they now have to commute to swidden fields, or live far from the comforts of the main settlements. The swiddens are cultivated for a number of years and then abandoned, allowing the forest to regenerate. Gianno (1990) describes the agricultural traditions of the Semelai in detail.

Following the initial congregation during the Communist Emergency, the Malaysian Government has encouraged the resettlement of outlying villages to the Pos Iskandar area, in order to provide development and welfare assistance to the community. At present, virtually the whole Semelai population at Tasek Bera is resident in three areas set aside for their use by the Government. The Pos Iskandar Resettlement Scheme is a systematic agricultural land development scheme, where the Government provides the basic infrastructure and facilities such as clinics and schools. In the resettlement area, the Rubber Industry Smallholders Development Association (RISDA) has coordinated development of a smallholders' rubber plantation. This consists of two phases, the first totalling 233 ha and the second 564 ha. (Mohd Shahwahid,

1996). The government now plans to allocate 6.25 acre plots of rubber trees to each household in the resettlement scheme, providing a regular source of income for participating families. One third of the scheme's area will be set aside to support future generations.

The level of education is limited, in that in 1996 some 23% had no education, 32% had attended the first 3 years of school only, 30% had completed primary school, 6% had completed secondary school and 3 individuals had attended higher education. The need to leave the area and stay in a hostel to attend secondary school is one constraint. Recent efforts to improve the primary school environment and facilities at Pos Iskandar should help to raising the level of education in the community.

As shown in Table 1, the main economic activities of the Semelai are outside jobs, rubber tapping, and farming. Only a few households (5.2%) now engage in the role of natural resource collecting (forest and wetland products) as an economic activity. This represents a major shift from the results of a similar survey conducted in 1991 (Mohd Shahwahid and Nik Mustaffa, 1991), when 47% were engaged in rubber tapping, 27% collected forest and wetland produce and 11% were involved in farming, while outside jobs and running sundry shops did not figure significantly.

Differences exist between members of the households involved in main economic activities. For instance, the husband of the household tends to be engaged in rubber tapping, outside jobs and farming, while few are involved in collecting natural resources and running sundry shops. Rubber tapping and farming are important activities for the wives, who are also involved in collecting natural resources. There is a clear trend that the younger generation in particular is looking for work opportunities outside Tasek Bera.

Assessment of supplementary economic activities reveals that collecting of natural resources, fishing and handicraft production are still of considerable importance to the community (see Table 2). Whilst reliance on natural resources has declined as a main economic activity, it remains important as a supplementary activity. This is particularly the case for the more outlying villages. Supplementary economic activities are mainly undertaken by the men, including collecting natural resources, fishing and making handicrafts. Women are involved in farming as well as subsistence and non-commercial activities such as mat and basket-making for domestic use. Sons undertake various activities including collecting natural resources and doing outside jobs.

The households surveyed in 1996 had an average annual income of RM5'593, although this varied among the villages. This is higher than the poverty level of RM4'860 in Peninsular Malaysia, although it is estimated that about half of the households surveyed had incomes below this poverty level. Of this, little is earned by the women, whose income averages RM355 per year. The income earned by the youth varies between villages, but is equal to or exceeds that of the husbands in four villages (Mohd Shahwahid, 1996). In conclusion, supplementary income from natural resources still plays an important economic role in the Semelai community at Tasek Bera, given the low annual income of many households.

Table 1. Main economic activities of the Semelai population at Tasek Bera (after Mohd Shahwahid, 1996)

Main economic activities	No. respondents	Percentage
Outside jobs	87	41.0
Rubber tapping	62	29.3
Farming	39	18.4
Natural resource collecting	11	5.2
Shop	10	4.7
Others	3	1.4
Total	212	100

Table 2. Supplementary economic activities of the Semelai population at Tasek Bera (after Mohd Shahwahid, 1996)

Supplementary economic activities	No. Respondents	Percentage
Collecting natural resources	12	25.5
Farming	12	25.5
Fishing	8	17.0
Handicraft	7	14.9
Rubber tapping	5	10.6
Outside job	3	6.4
Total	47	100

The Tasek Bera Project

The current legal status of Tasek Bera is that the Ramsar Site (*ca* 31'120 ha) is state-owned land that has been identified for gazettement as a Forest Reserve, while a buffer zone (*ca* 77'380 ha), which is currently dominated by cash crops like palm oil and rubber, has been identified for planning purposes in order to maintain the ecological condition of the Ramsar Site. The boundaries are currently being finalised. The buffer zone is also government-owned land, which is managed by FELDA Plantations Sdn Bhd, except for the forest reserve (and proposed forest reserve) land to the north-east of the site, which is under the management of the Forest Department. The three Orang Asli areas, which are currently state-owned land, are also part of the site's buffer zone.

Following Tasek Bera's designation as Malaysia's first Wetland of International Importance under the Ramsar Convention, the project "Integrated Management of Tasek Bera, Support for the Implementation of Obligations under the Ramsar Convention" was started in May 1996. It was established through a Government Project Agreement between the Government of Denmark and the Government of Malaysia. The Pahang State Government is the implementing agency for the project, with technical assistance from Wetlands International - Asia Pacific, and it is wholly financed by DANCED. The Ministry of Science, Technology and Environment is the Malaysian administrative authority for the Ramsar Convention, and is represented on the project steering committee.

The goal of this project is: ***to conserve and enhance the biodiversity of Tasek Bera Ramsar Site and its catchment area, and ensure the wise use of its wetland resources***. This is being pursued through a wide range of cooperative activities over the three years of the project, which will prepare the basis for the long term management of the Ramsar Site by the Malaysian Government.

The project includes several components: management planning; training, education and public awareness; applied research; nature-based tourism development; and community development. The purpose of the community development programme is to:

- ensure full and formalised integration of local communities, especially the Semelai, into management, wardening and tourism services
- establish sustainable natural resource use involving the Semelai in particular and
- promote the equitable sharing of benefits from development activities at Tasek Bera.

In order to implement the community development programme at Tasek Bera, a planning process was carried out, using socio-economic surveys, consultation meetings, and the establishment of small pilot projects involving the community. This programme has also participated in training, education and public awareness activities, and has contributed to baseline surveys concerning local use of natural resources and local environmental knowledge of the area.

COMMUNITY DEVELOPMENT STRATEGIC PLAN

The project has produced a Strategic Plan for Community Development at Tasek Bera to guide community participation and development (Zaiton Surut, 1999).

Aims

The overall goal of the Strategic Plan for Community Development is:

> *To develop the capacity of local communities, especially the Semelai, in order to enhance their socio-economic status, and ensure their active participation in the management and wise use of Tasek Bera.*

The long term objectives of the Strategic Plan for Community Development are:

1. *to raise the socio-economic status of local people by developing their capacity for income generation and creating local employment opportunities*
2. *to ensure the involvement of local people in planning processes concerning Tasek Bera Ramsar Site and its buffer zone*
3. *to ensure the active involvement of local people in the management of Tasek Bera Ramsar site and its buffer zone*
4. *to ensure that utilisation of natural resources by local people is ecologically sustainable*
5. *to promote, sustain and document the Semelai culture and traditions, especially those that support the conservation of Tasek Bera*
6. *to upgrade the level of education among the Semelai community.*

Scope of the Strategic Plan

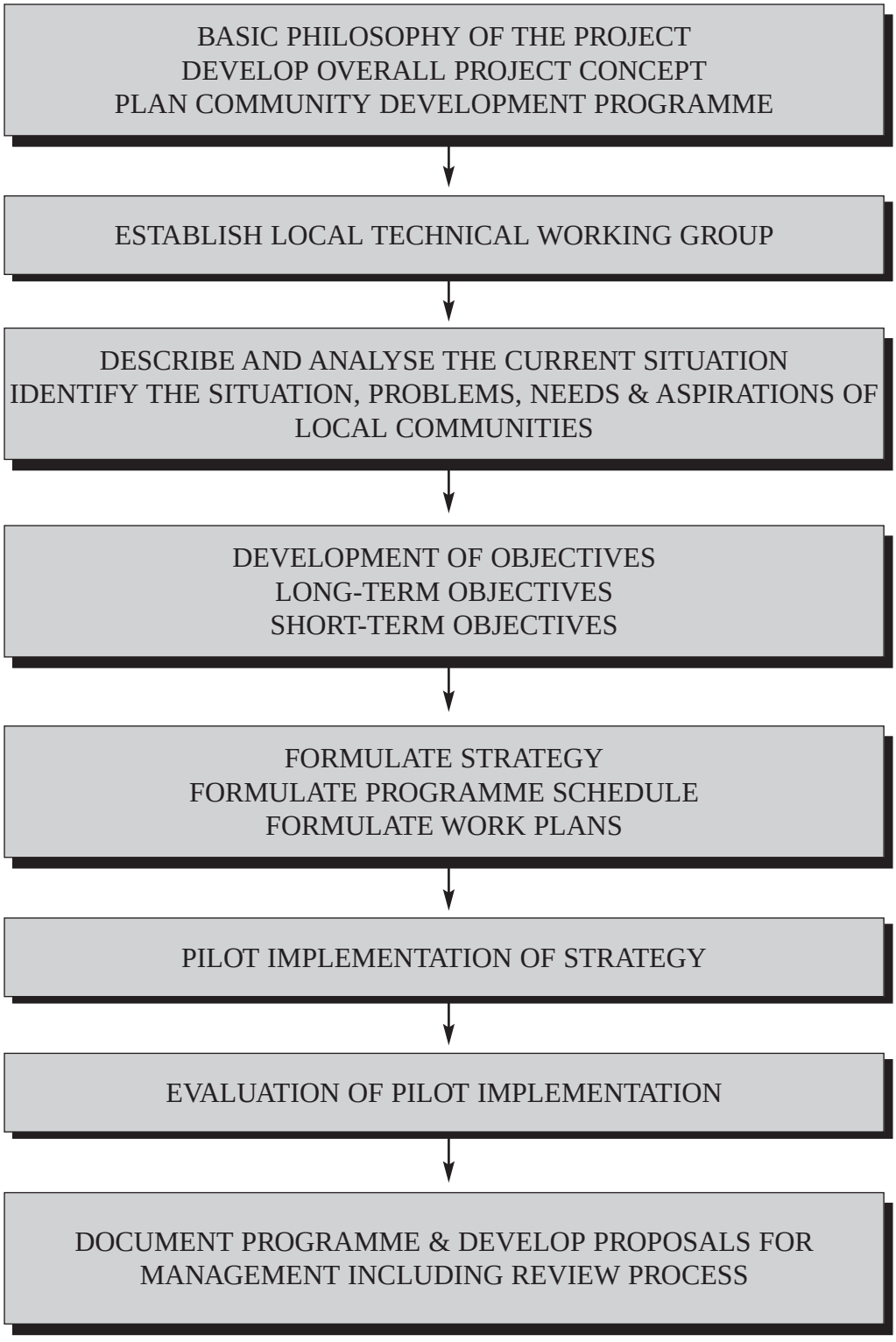
Although there are various local stakeholders at Tasek Bera, the community development programme has focused on the Semelai. This is because of the overall project objectives in the Government Project Agreement, the disadvantaged status of the Semelai in relation to other groups in terms of education level and economic situation, their needs for various forms of development, and their close cultural and socio-economic affinity with Tasek Bera and its natural resources.

The Strategic Plan addresses the needs identified by the Semelai community, and the resource management issues in relation to the conservation of Tasek Bera. It identifies a wide range of measures to uplift the socio-economic status of the Semelai, and proposes a mechanism for their future participation in the wise use and management of Tasek Bera.

Mechanism for community participation in management of the Ramsar Site

The methodology used for preparation of the strategic plan for community development at Tasek Bera is based on a consultative approach, involving both formal meetings and informal discussions with members of the Semelai community. In addition, consultation workshops were held involving relevant government agencies, NGOs, academic experts, and representatives of the community. The overall process is shown in Figure 1.

Figure 1: Planning Process for Community Development Programme



Following an extended consultation exercise involving 228 Semelai representing all the villages at Tasek Bera, the community indicated that they wanted to be involved in the decision-making process for the management of the Ramsar Site. The institutional structure proposed for this was the Village Development and Security Committee (JKKK) for Pos Iskandar, which meets every one to two months. This was proposed with the following conditions:

1. The chair of the JKKK should be selected from the Semelai who are educated, and can be actively involved in the management of the Ramsar Site.
2. The community should elect the members of the JKKK.
3. Every village at Tasek Bera should be represented on the JKKK.

The Department for Orang Asli Affairs endorsed this proposal, and recommended that those Semelai stakeholders who are not represented on the JKKK at present could be included as observers.

The role of this committee in the management of Tasek Bera would be to provide a mechanism for problems and issues affecting members of the community to be raised with the community leadership. The JKKK representatives to the Ramsar Site management authority could then raise these issues. Similarly, problems or issues being discussed by the site management authority could be channelled back to the JKKK for further consultation among the community before decisions are taken. The JKKK also has other functions besides its proposed role in the management of the Ramsar Site.

The effectiveness of this mechanism depends on the institutional links between the JKKK and the Ramsar Site management authority. At the present time, this management body has not yet been identified so structures are not in place. One proposal currently under consideration includes the establishment of a consultative committee upon which all relevant stakeholders would be represented. This committee would advise the management authority on site management issues prior to decisions being taken. The project's Technical Working Group is the main forum at present in which the Semelai community is able to participate in local government discussions concerning the management of Tasek Bera.

PILOT PROJECTS FOR COMMUNITY DEVELOPMENT

The project is now implementing a limited number of pilot projects in line with the objectives of the Strategic Plan for Community Development at Tasek Bera, in order to establish and test organisational arrangements, build local capacity, provide benefits to the local community, and be sustainable in the longer term. Two main pilot projects are outlined below, on ecotourism and handicraft production. In addition to these pilot projects, the potential involvement of local people in site management activities such as habitat management, wardening, and monitoring is being assessed, and training will be provided as appropriate during the remainder of the project.

Ecotourism Pilot Project

According to the 1996 Malaysian National Ecotourism Plan (NEP), the Malaysian Government's intention is that tourism should be promoted as an industry that contributes to creating new sources of growth for socio-economic development. The NEP was prepared for the Ministry of Culture, Arts and Tourism in order to assist the government in the development of Malaysia's ecotourism potential. The plan is intended to "serve both as an appropriate instrument within the overall sustainable development of Malaysia and economy as a whole, and as an effective tool for the conservation of the natural and cultural heritage of the country (NEP 1996, part 1). The NEP notes that the Sixth Malaysia Plan (1991-5) states that the direct involvement of the local population will be emphasised in the development of tourism. The NEP also recognises that local communities living near ecotourism sites typically have low incomes and limited options for obtaining income. Therefore, ecotourism could represent an important economic option for such people.

The project at Tasek Bera includes the development of a nature-based tourism development plan, which is currently in preparation. This takes a strategic view of tourism development at the Ramsar Site, including identification of suitable tourism markets, and proposals for development of facilities. It also gives full consideration to the role that the Semelai can play in tourism development at Tasek Bera. The potential for tourism at the site has yet to be realised, as there are constraints in terms of access, accommodation, information, and services available. Once these are in place, promotion of the site as an ecotourism destination can proceed.

Following an initial study of the potential for community-based ecotourism at Tasek Bera (Christensen and Singh, 1998), a pilot project is now being established to provide practical experience. The benefit of involving local communities in both ecotourism and management of wetlands has often been highlighted, but it is important that the involvement is meaningful and appropriate, in order to match the capabilities and characteristics of the community, and of the administrative and ecological situation. To achieve this, it is essential to develop appropriate ideas for community-based ecotourism enterprises at Tasek Bera.

These should be kept in line with the organisational, financial and managerial skills available in the Semelai community. The aim is to build up capacity and to develop skills so that the community will gradually become able to handle more visitors, offer more sophisticated services, and appeal to a broader spectrum of visitors.

The goal of the pilot project is to develop participatory mechanisms through which the Semelai population around Tasek Bera can benefit directly from the establishment of

ecotourism enterprises in and around their home area. The development of Semelai-run tourism services will improve their socio-economic status, reduce dependency on limited natural resources, and help compensate for possible loss of revenue from traditional extractive activities, which may be limited by new conservation regulations imposed on the area in line with its status as a Ramsar Site. It is also hoped that this will help to create an awareness of conservation issues and possibly create a constituency for conservation action among the Semelai and potential visitors.

The main objectives of the pilot project are to:

- raise the capacity of the Semelai to participate in the tourism services sector at Tasek Bera
- provide an economic alternative for the Semelai to exploitation of natural resources and encroachment of limited forest habitats in and around Tasek Bera Ramsar Site
- promote the ability of the local population to manage tourism enterprises independently at Tasek Bera in order to become true beneficiaries
- ensure that the Semelai will be able to participate in determining zoning and regulation of tourism activities at Tasek Bera, through adequate representation on management committees
- create motivation and awareness of conservation issues amongst the Semelai
- avoid economic leakage, minimise negative impacts, and concentrate the benefits locally
- secure a sustainable tourist development at Tasek Bera
- ensure that as many Semelai as possible benefit from tourism activities and thus support the conservation of Tasek Bera

The pilot project intends to accomplish the above by establishing a local organisation for tourism services, to be managed by the Semelai themselves. It will build local capacity through study tours and tourist guide training. Different sets of tourist guidelines will be developed to protect the area and the Semelai community, and will be incorporated into relevant plans. Partnerships will be developed with relevant organisations, including external tourism agencies, and options will be determined for distribution of income from ecotourism. Finally, pilot operations will be undertaken to provide experience for the Semelai.

The work has been planned in four phases. The first phase aims to secure the participation of the Semelai in the planning process, by holding meetings with the community, creating workshops, and using a series of rapid rural appraisal (RRA) and participatory rural appraisal (PRA) techniques. Using this approach will give a better understanding of the area and of the different sub-community groups, and will make it possible to decide on which group or groups will be involved in the pilot project. This phase will also allow for discussion of various ideas for tourism development, such as formation of a tourism organisation, guided tours based on Semelai livelihood activities, homestay programmes for visiting tourists, a cultural village, etc. Constraints for tourism development will be also identified, as well as potential partner organisations.

The second phase will focus on community organisation for tourism services, including the establishment of partnerships, improvement of cooperation amongst the community and a system for sharing benefits. Training will be undertaken based on identified needs (e.g., basic English, boat handling, etc.).

The third phase will develop a visitor programme for the local area, draw up guidelines for tourism operators and guides, and initiate tourism activities in order to test partnerships and provide experience. The fourth phase will evaluate the experience gained, including a seminar for those involved in the tourism activities.

Training of local people as tourist guides has commenced, with about 30 Semelai and other local residents participating in a course organised jointly by the project, the Department of Wildlife & National Parks and the Ministry of Culture, Arts and Tourism. Tourist guide licences are issued to successful participants, allowing them to practise professionally.

Handicrafts Pilot Project

According to Mohd Shahwahid (1996), a significant proportion of the Semelai community at Tasek Bera have annual incomes below the official poverty level. This pilot project is being undertaken to develop the capacity of the local community to increase their supplementary income through the production and marketing of handicrafts. This is related to the development of tourism at Tasek Bera, as tourists provide a ready market for such products, and the culture of the Semelai is one of Tasek Bera's features of interest.

While the Semelai have a tradition of making household objects, and tools such as mats, baskets, fish traps, animal traps, etc., these have played a very minor role as a source of supplementary income, being mainly used in the home. No marketing system has been developed, and there is no organisation of producers or sellers. Recently, additional products have been developed which are more ornamental than utilitarian, such as model boats and traditional houses. A survey of potential products came up with a list of 73 different items. Consultation with the community has indicated that they would be more actively engaged in handicraft production if a marketing system could be established.

Initial efforts have been made to sell Semelai handicrafts during environmental events such as World Wetland Day in 1997 and 1998, and a national cultural exhibition in September 1998. The successful sale of the handicrafts at these events has indicated that the handicrafts have market potential, and the revenue gained can supplement the income of the Semelai.

The pilot project has established a "handicraft group" currently consisting of 26 women and 19 men, who will be

involved in the production and marketing of handicrafts. Special attention is being given to the involvement of women, who are already the main producers of certain products such as mats, baskets and recently artificial flowers. Secondly, a "handicraft committee" is being established, which will continue the coordination of the work after the end of the project.

Marketing links are currently being established through retail outlets in Kuala Lumpur that sell handicrafts to tourists, a local tourist resort at Tasek Bera, and through government-supported tourism promotion events. Experience so far shows that better sales and prices are possible in the international tourist market than through local sales. Further marketing opportunities are being investigated at present.

A handicraft centre is being established at the site, in order to provide a facility for the storage of stock and materials, and to provide a local sales outlet. Also, training is being organised through relevant local bodies, such as a centre for the blind for the manufacture of rattan products, and the Malaysian Handicraft Corporation for rattan, bamboo and wood handicrafts. It is intended that the selected participants will then provide training to other members of the community in order to raise skill levels.

CONCLUSIONS

The project has operated in a relatively difficult situation, where there is no experience of local communities being involved in protected area management, a top-down government-led approach being the traditional *modus operandi*. The project has, therefore, provided a rare opportunity for local community involvement in the governmental planning process, and has perhaps started to raise awareness of the value of this participatory approach. The management authority for the Ramsar Site has yet to be established, and this has made it difficult to formalise a mechanism for co-management, and to confirm local involvement in future site management. The momentum for the continuation of community development and participation in management of the wetland needs to be assured, by engaging individuals with commitment and ability to work with both the community and the relevant government agencies, as well as to locate funding.

Actual local benefits from the development of the site are required so that expectations are realised; inevitably expectations have been raised during the project period. Benefits should be distributed equitably if possible – but there are difficulties here in terms of the roles of different social groups, and the lack of a prevailing overall sense of community in this kinship-based society.

Successful partnerships with outside companies are essential for tourism and handicraft marketing. However, protection of local interests is important, through mechanisms such as restrictions on the activities of outside tourism operators' on site, and licensing of local operators.

The project can be considered to be in the early stages of pilot implementation, therefore there are few concrete results to learn from at this stage. However, the work so far in the overall approach has yielded valuable experience and some insights into important factors. Independent assessment has indicated that the consultation process has been effective in raising awareness and understanding of the project's aims, and has achieved both trust and local support for the project.

REFRENCES

Chong, H.N. and Lim, K.C. (1998). *A Survey of Birds of Tasek Bera.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Christensen, P.C. and Singh, V. (1998). *The Potential of Ecotourism at Tasek Bera*. Report for Wetlands International - Asia Pacific. Unpublished report.

Department of Wildlife and National Parks. (1998). *Baseline Bird Survey at Tasek Bera Pahang.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Forest Research Institute of Malaysia (1997). *Tasek Bera - Forest Cover and Forest Types*. Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Furtado, J.I. and S. Mori (Eds.) (1982). *Tasek Bera: The Ecology of a Freshwater Swamp*. Dr. W. Junk Publ. The Hague, Boston, London.

Gianno, R. (1990). *Semelai Culture and Resin Technology*. The Connecticut Academy of Arts and Sciences. New Haven, Connecticut. 238pp.

Giesen, W. (1998). *The Habitats and Flora of Tasek Bera, Malaysia: An Evaluation of their Conservation Value and Management Requirements.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Hood Salleh (1978). *Semelai Rituals of Curing*. Unpubl. D.Phil. thesis submitted to St Catherine's College, University of Oxford. 446pp.

Lim, B. L. (1998). *A Baseline Study on the Reptilian and Amphibian Fauna of Tasek Bera*. Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Lopez, A. (1999). *A Checklist and Conservation Status of the Fauna of Tasek Bera.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Mohd Shahwahid, H.O. (1996*). Community Profile Survey of the Semelai Population at Tasek Bera*. Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Mohd Shahwahid, H.O. (1997). *Economics of Fishing, Natural Product Exploitation and Shifting Cultivation at Tasek Bera.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Mohd Shahwahid, H.O. and Nik Mustaffa R.A. (1991). *Economic Valuation of Wetland Plant, Animal and Fish Species of Tasek Bera and Residents' Perceptions on Development and Conservation*. AWB publication No. 77, Kuala Lumpur.

Morley, D.C. (1949). Some notes on the health of the Semelai in southern Pahang. *Bull. Raffles Museum* Ser. B. 4:133-34.

Murugadas, T.L. (1998). *Aquatic Macrophytes in Tasek Bera.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Phang, S.M. and T.L Murugadas (1997). *Phytoplankton and Aquatic Macrophytes in Tasek Bera.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Phillips, S. and R.M. Bustin (1995). *Accumulation of organic rich sediments in a dendritic fluvial/lacustrine mire system at Tasik Bera, Malaysia: implications for coal*. Department of Earth and Ocean Sciences, University of British Columbia, Vancouver, B.C., Canada, 39 pp. (unpublished report)

Simpson, B.K., Lopez, A., Sharun, A.L. and Alias, M.Y. (1997). *Project Tomistoma: Report on the Malayan False Gharial (*Tomistoma schlegelii*) at Tasek Bera, Peninsular Malaysia.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur

Tong, S.L., Norhayati M.T., and W.H. Kok. (1997). *Water Quality of Tasek Bera, Pahang.* Integrated Management of Tasek Bera Technical Report Series. Wetlands International - Asia Pacific, Kuala Lumpur.

Zaiton Surut (1999). *Strategic Plan for Community Development at Tasek Bera (1999-2004).* Tasek Bera Technical Report Series, Wetlands International - Asia Pacific.

Zakaria-Ismail, M. (1997). *Baseline Fish Survey for the Tasek Bera Project.* Integrated management of Tasek Bera Technical Report Series No.1. Wetlands International - Asia Pacific, Kuala Lumpur.

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NETWORKING IN EAST AFRICA FOR THREATENED COASTAL WETLANDS

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KEYWORDS: Rufiji, Tanzania, mangrove, delta, Kenya, community outreach, media

ABSTRACT

Following a regional workshop convened by the East African Wild Life Society (EAWLS) in February 1998 at Mombasa, the EAWLS was mandated to set up an environmental network to monitor threats to wetlands and coastal resources in Eastern Africa. This network is supporting two advocacy projects aimed at conserving the Rufiji delta in Tanzania:

- mass media campaigns by the Journalists for the Environment in Tanzania (JET)
- community outreach and public education at the Rufiji delta.

This advocacy work was prompted by the approval by the Tanzanian government of an industrial shrimp farm project that will privatise a third of the Rufiji delta. Over 2000 residents of the delta have filed a petition at the high court suing the government, arguing that the decision to develop the project was taken without their involvement. The network has opened dialogue among stakeholders and supporters, including WWF-Tanzania, JET, PREPARE-India, Mangrove Action Project-USA, Lawyers Environmental Action Team (LEAT), EAWLS, and others.

While concentrating on the Rufiji delta, the network is also looking at other programmes working with communities along the coast to promote collaboration in conserving threatened wetlands. One such initiative is the Integrated Coastal Area Management project in Kenya. A multi-institutional planning team in Kenya established this process in 1994 following a pilot study in Mombasa, with the aim of providing a starting point for addressing the urgent coastal issues facing the area, and informing and enriching the dialogue on how to address coastal management problems nation-wide.

The pertinent coastal issues being addressed by this networking include: urbanisation, declines in fisheries production and water quality, shoreline erosion, degradation of coastal ecosystems, and resource use conflicts. The network organised a workshop in Tanzania to involve all stakeholders, to create a consultative forum for governmental institutions, non-governmental organisations, the private sector, and local communities to discuss the salient issues relating to conservation and development in the Rufiji delta. Dialogue and networking are key factors in conflict resolution, community projects, implementation of government policies, and in ensuring the overall sustainability of any programme.

INTRODUCTION

East Africa – a region that includes the highest mountains in Africa, the three Great Lakes of Africa, the Nile Basin, the Rift Valleys, high rainfall areas, savannahs, arid and semi-dessert areas, coastal plains, and intertidal systems – has a rich variety of marine, estuarine, soda, and freshwater wetlands. These include: mangroves, sea grass beds, coral reefs, rocky shores, mud flats, estuaries, marine deltas, soda lakes, seasonal lakes, pools, depressions, salt marshes, swamps, springs, soaks, perennial rivers, inland deltas, seasonal streams, waterfalls, riverine flood plains, freshwater lakes and ponds, peatlands, montane wetlands, thicket wetlands, and swamp forests.

The East African Wild Life Society (EAWLS), a non-governmental organisation based in Kenya, whose mission is to protect and conserve the environment in East Africa, has been extensively involved in advocacy for wetland conservation. This paper addresses the experiences and conservation and development initiatives by the EAWLS at the Tana and Rufiji deltas in Kenya and Tanzania respectively, and highlights its advocacy and networking activities protesting against industrial and unsustainable shrimp aquaculture.

The River Tana, 1000 km in length, is an important river in Kenya, with an average annual discharge of about 5.6 billion m^3/year. Its catchment covers about 17% of Kenya's land area, while the floodplain spreads into a network of channels and tidal inlets, which form a delta 40 km wide. The wetlands have a variety of habitats, which support important wildlife populations, including the Tana River species of topi, waterbuck, zebra, lion, and hyena, as well as providing breeding grounds for crocodiles, amphibians, and fishes. The delta also supports agriculture, fishing, and grazing activities by the local communities, whose livelihoods are closely linked to the dynamics and functioning of the river.

The Rufiji delta in south-eastern Tanzania is one of the largest blocks of mangrove forests in East and Southern Africa, covering an area of 53'255 ha. This largely unspoiled mangrove forest supports a large number of people, as well as aquatic and terrestrial biodiversity. The delta, about 20 km wide and 65 km long, is linked to the interior of the river system by an extensive flood plain, and to Mafia Island to the east through ocean currents and the surrounding coral

reefs. Because of the northerly flow of marine currents, the Rufiji delta is endowed with the greatest fisheries potential along the Tanzania coast, and supports 80% of all the prawn fisheries in the country. It has 20 islands and 31 villages, and has been used for many years by the Rufiji people, who rely on it for fish, mangrove poles, and rice farming.

Although they harbour rich, unique, and highly diverse wetlands, Kenya and Tanzania do not yet have national wetland policies. On the other hand, neighbouring Uganda succeeded in developing a national wetlands policy, which was approved in 1995, and is implemented at national, district and community levels. Kenya and Uganda are signatories to the Ramsar Convention, which mandates governments to maintain the ecological character of wetlands in their territories, and promotes the wise use of these wetlands. Without national wetland policies, land tenure systems, and management plans, threats to these deltas are increasing.

Both deltas are suitable for development, and imbalances in these ecological systems threaten their sustainability. Some of the most significant threats are:

- unplanned human settlements
- upstream development, and
- industrial shrimp aquaculture.

Local communities along the coastal strip do not own the land. In most cases the land is under trust from the government, and the people living in the area can settle anywhere. They do not have identification or ownership of the land they occupy. The government, however, can allocate parts of this land in trust to individuals or organisations, as long as they have entered into a lease agreement, most of which are for 99 years. In the Tana delta, plots at the beach have been allocated to individuals who do not live in the area. Over 26’000 ha have been allocated to the Tana Development Irrigation project of the Tana River Development Authority for commercial rice farms. In 1992 20’000 ha were allocated to the Coastal Aquaculture Company without the consent of the people living in the area. The government of Kenya has declared part of the Tana delta a land adjudication area. In the Rufiji delta, over 10’000 ha have been allocated to the African Fishing Company, again without the consent of the local communities.

Hydro-electric power (HEP) dams can both create and destroy wetlands. Five HEP dams already exist upstream of the Tana delta, and have altered flooding patterns, reduced water levels downstream, and modified the amount and quality of sediments deposited at the delta – thus threatening wetland biodiversity, as well as the local food production systems that depend on the river’s annual floods. Proposals to build two more dams, with artificial systems to regulate the flooding of the Tana River, while increasing HEP supply to the country, and offering more employment to the local communities, have recently created controversy. Those in favour of the project consider that artificial flooding and sediment release would repair some of the damage already done, by restoring water and improving agricultural and pastoral activities. Those against the project are concerned about further altering of the river flooding pattern.

In 1992, 20’000 ha in an ecologically sensitive area of the Tana delta were allocated to a private developer for industrial prawn farming. The government, through a presidential directive, then nullified the allocation, and instructed that a committee be set up to produce a management plan for the area. To date, however, the committee has released no findings or recommendations. The potential threat for industrial shrimp aquaculture is still present, especially since the private developer won the land allocation case, plus two court appeals against the Commissioner of lands.

At the Rufiji delta, the government of Tanzania approved an industrial prawn farm, which would privatise one third of the delta, thus posing irreparable threats to the ecology of the delta, and to the livelihoods of thousands of local fishers and farmers.

Problems known to be associated with industrial shrimp aquaculture include:

- habitat loss due to clearing of mangroves to create prawn ponds
- land and water salinisation
- organic and chemical pollution from chemicals used in the prawn ponds
- loss of land and property of the local communities, causing social dislocation
- depletion of fisheries and reduction of food and income, thus exacerbating poverty
- use of child labour and human rights abuse, including murders of protesters and
- lack of legal access for local fishers to the shores and the sea.

NETWORKING FOR THE CONSERVATION OF THE TANA AND RUFIJI DELTAS

Experiences at the Tana delta

As an NGO using advocacy as one of its main tools to question policies that could cause environmental degradation, EAWLS believes in collaborating with all stakeholders, interested parties, and supporters, be it local communities, the government, or local and international organisations. The EAWLS led protests against the establishment of the prawn farm at the Tana delta in 1992. The Society gathered relevant information regarding the issue, such as the agreement to the sale of the land by Kondertu Ranch Committee, the Land Policies and Rights Act, effects of industrial shrimp farming, and reports on why the Tana delta should be conserved. This research verified that the land sale had been illegal, in that the ranch committee sold the 20’000 ha without the consent of its members. In addition, industrial prawn farming threatened the endemic flora and fauna of the Tana delta, endangering animal the species, and all species of mangroves found along the Kenya coast.

The EAWLS tried to solve the issue through negotiations and meetings with government institutions on the land allocation, in collaboration with other conservation organisations such as IUCN, together with professional organisations and committed individuals. In addition, the issue was publicised in the local dailies and other news media like African Wildlife News Service. The EAWLS mobilised the community at Kondertu ranch to oppose this project through:

- awareness meetings with the ranch leaders
- national awareness forums, and
- by visiting the local communities at the site of the proposed project to raise awareness on the effects of industrial shrimp farming, and on the communities' land rights.

In 1992 Kondertu Ranch, with the help of EAWLS, and after consulting with legal experts, filed a suit against the developer for acquiring 20'000 ha illegally. Through a press, EAWLS publicly announced its opposition to the project. This was followed by counter-actions by the developer to verify the land allocation, and the viability and benefits of the proposed industrial shrimp farm. EAWLS wrote an open letter to the Commissioner of lands to express its opposition. Another open letter was targeted at the private developer. The public outcry by local conservationists was backed by that of international conservationists, the media, and consulates in the country.

In response to these concerns, the government of Kenya, through a presidential directive in 1993, nullified the land allocation, and directed that a management plan for the delta be formulated in close collaboration with the local communities. A Tana Delta Wetlands Steering Committee (TDWSC) was formed for this purpose, in which EAWLS was a member. The work agenda was agreed, but to date – despite efforts by TDWSC through visits to the delta and meetings to develop a consensus statement on the land issues – no management plan, findings, or recommendations have been released.

Seeing the need for more public education on environmental conservation, the EAWLS set up a task force to implement a Tana Delta Environmental Awareness Campaign through public meetings and workshops, and by establishing Village Environmental Councils. Despite this, the court ruled in favour of the developer in 1995. Furthermore, the developer also won two court appeals against the Commissioner of Lands. Thus the potential threat of industrial shrimp farming remains very real. In October 1998, EAWLS in collaboration with Kipini Community Conservation & Development Programme (KCC&DP) held a workshop involving all stakeholders and interested parties to define an environmental development strategy for the Tana delta.

Integrated Coastal Zone Management in Kenya

The Coast Development Authority in Kenya is heading a multi-institutional team including stakeholders and interested parties such as fishers, the Kenya Wildlife Service, hotel owners, local communities, and government departments in a pilot study on Integrated Coastal Zone Management (ICZM) of part of the Kenya coastline. The aim is to identify the urgent problems the area, together with proposed solutions. Some of the activities of the ICZM study include:

- demonstration projects, e.g., water conservation measures in public institutions and beaches
- capacity building for leaders of the project
- producing media programmes and newspaper articles to highlight coastal management issues in the study area and actions being taken to solve them
- conducting public awareness meetings for various coastal resource user groups, and
- publicising the ICZM strategy through national and international workshops, seminars and other international forums.

Mass Media Campaigns for the Rufiji Delta

Following the approval by the government of Tanzania of the prawn farm project at the Rufiji delta, mass media campaigns against the project began, led by the Journalists for the Environment in Tanzania (JET). Activists travel to the delta every month for updates on the project, and carry out interviews with the local communities and their leaders. The information obtained is then used for press articles, and distributed to local and regional dailies.

Another strategy has been letter writing campaigns against the project on the Internet. As a result, international pressure against this project is building up. For example, the Swedish Society for Nature Conservation wrote a letter to the President of Tanzania asking him to consider reversing the decision to approve the prawn project. Sign-on letters from Mangrove Action Project (MAP) and Lawyers in Environmental Action Team (LEAT) have been distributed to those interested and affected by this proposed prawn farm.

The East African Wild Life Society publishes a bimonthly conservation magazine, *Swara*, which is sent to over 2,000 people world-wide. Recent issues have featured coastal resource conservation and threats from industrial shrimp aquaculture. Other conservation magazines such as JET News have regularly been publishing articles on the prawn project, and the concerns raised by both local and international organisations.

East Africa's industrial prawn farming issues are new, compared to other parts of the world such as Asia and Latin America. Collaboration with other organisations doing parallel work provides chances to share information and experiences and learn from these, and also strengthens international networks and campaigns against industrial prawn farming developments.

Community Outreach at the Rufiji Delta

JET and the Southern Regions Development Association – a local organisation, led by and belonging to the local communities – are collaborating in order to increase public

awareness on threats from industrial shrimp aquaculture. Awareness strategies include:

- open public meetings at villages in the Rufiji delta, which create a forum where the local communities can ask questions and seek clarification on issues of concern
- videos on industrial shrimp farming from Asia and Latin America, converted to the local language and shown in the villages, thus enhancing the communities' understanding of the repercussions of industrial shrimp aquaculture
- poster campaigns in the local language, though these have not started yet
- a panel discussion on television, bringing together the owner of the prawn project (the African Fishing Company) with JET and LEAT, which provided a good tool for disseminating information on the issue to all parts of Tanzania.

Recent Recommendations

The EAWLS convened a regional workshop in February 1998 on industrial shrimp farming, and the following declaration emerged.

The Mombasa Declaration on Mangrove Conservation and Industrial Shrimp Aquaculture (6 February 1998)

We, the DELEGATES from East Africa (Kenya, Tanzania), North America and Asia having gathered at Mombasa as participants at the workshop on the Eastern Africa Mangrove conservation and Shrimp Aquaculture, during Feb. 1998, under the auspices of East Africa Wild Life Society (EAWLS), ACKNOWLEDGE that:

- the Governments of Eastern Africa region under the Africa Convention on the Conservation of Nature and Natural Resources in 1968, committed themselves to undertake to adopt measures to ensure conservation, utilisation, development of soil, water, flora and fauna resources in accordance with scientific principles and with due regard to the best interests of the people;
- the Governments of Eastern Africa region at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro Brazil 1992, committed themselves to the principals of sustainable development including the protection of coastal environments to ensure sustainable use of natural resources, and
- the Governments of Eastern Africa region committed themselves under the Arusha Resolution in 1993 to promote sustainable development and integrated management of coastal areas for the primary benefit of coastal communities.

WHEREAS our concern over the increasing environmental destruction evident world-wide, and in particular the destruction of mangrove forests, estuaries, sea grass beds, coral reefs and lagoons, in general the conversion of coastal wetlands and areas to industrial shrimp units, an unsustainable activity that is growing in an uncontrolled manner through out the tropics and sub-tropics;

WHEREAS our concern over imminent deprivation, displacement and marginalisation of local communities that depend on coastal wetlands in the event of the establishment of industrial shrimp units in these areas (particularly as proposed for Tana Delta, Kenya and Rufiji delta, Tanzania);

RECOGNIZING the Governments' efforts to alleviate poverty, increase food security and generate revenue;

We therefore RESOLVE and RECOMMEND that:

1. the Governments ENSURE that the development and operation of aquaculture, in particular shrimp aquaculture does not in the short, medium or long term adversely affect biotic and abiotic environments and artisanal fisheries and the communities which depend on them;
2. the Governments ENCOURAGE sustainable natural and/or traditional shrimp aquaculture which includes an emphasis on the carrying capacity of the environment as well as the real and effective participation of all groups that benefit from coastal resources particularly the local communities;
3. the Governments ENHANCE efforts to integrated coastal zone management plans and promulgate appropriate environmental laws with provisions for independent environmental impact assessments;
4. the Governments CONSERVE and PROTECT wetland areas in particular mangrove forests, rivers, lagoons, inlets, bays, estuaries, swamps, marshes and tidelands through a joint management system with the local communities;
5. East African Wild life Society (EAWLS), together with local, regional and international Non-Governmental Organisations (NGOs), ESTABLISH an Alert Network System to monitor destruction of coastal habitats especially through industrial shrimp aquaculture.

FURTHER, we the participants wish to:

- APPEAL to the government of the United Republic of Tanzania to RECONSIDER the decision to approve the proposed large scale industrial shrimp aquaculture project in the Rufiji delta;
- URGE the Government of the United Republic of Tanzania together with a consortium of local and international individuals and agencies to CONSIDER commissioning an independent Environmental Impact Assessment Team to conduct a comprehensive EIA with special emphasis on environmental, social, cultural and economic considerations for the Rufiji delta;
- ENCOURAGE the local, regional and international NGOs to sustain a campaign among the local communities and other stakeholders, and to promote the wise use of coastal ecosystems and the governments' commitment to sustainable development.

We UNDERTAKE by signing this DECLARATION to provide support and encouragement to all of the actions required in order to successfully execute the MOMBASA DECLARATION.

The following organisations support this declaration: Kipini Community Conservation Programme, East African Wild Life Society, Mangrove Action Project USA, Society for the Protection of Environment in Kenya, WWF - Kiunga Project, PREPARE India, Jomvu Women Project, Journalists Environmental Association of Tanzania, Forest Action Network, Ngomeni Prawn Farm Malindi, Moi University Eldoret, National Museums of Kenya, Tsunza Conservation Programme.

The EAWLS, in collaboration with Kipini Community Conservation & Development Programme, organised a workshop on defining an environmental development strategy for the Tana delta in October 1998, which involved all stakeholders and interested parties. Some of the recommendations from the workshop were that:

1. The Tana delta should not be made a Ramsar site or a national reserve; instead, the local communities and all stakeholders should be its custodians.
2. The Chair to the Tana Delta Wetlands Steering Committee should be held by a neutral organisation.
3. While planning the management for the delta, upstream development should also be taken into account.
4. Since it has diverse flora and fauna, the delta should be considered for ecotourism activities, to provide income generating activities for the local communities.
5. Dialogue and collaboration with the local communities should be the key means to implement the recommendations of this workshop and the management strategies.

In Tanzania, a similar workshop was held in the November 1998 with the aim of creating a consultative forum for governmental organisations, the private sector, and local communities to discuss the pertinent issues on conservation and development of the Rufiji delta.

As a next step, the proposed management plan for the Tana delta, and the workshop document for the Rufiji delta will be circulated and publicised.

PECHE ARTISANALE ET CONSERVATION DU LITTORAL DE LA MAURITANIE A LA GUINEE BISSAU

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MOTS-CLES : pêche, artisanal, littoral, Mauritanie, Guinée Bissau

RESUME

L'influence exercée par la pêche artisanale sur l'évolution de la zone côtière et de ses ressources s'est considérablement accrue depuis une vingtaine d'années, l'utilisation du moteur et du froid permettant de mieux maîtriser l'espace et le temps. A une époque où l'on comprend mieux le rôle stratégique des zones côtières vis à vis de la conservation et du développement dans des pays tels que la Mauritanie, le Sénégal, la Gambie et la Guinée Bissau, il paraît nécessaire d'évaluer la nature et l'intensité de l'impact exercé par la pêche artisanale. On remarque que les efforts de développement consentis par les communautés, le secteur privé, les gouvernements et les agences de cooperation ont souvent abouti à des situations de pénurie, de conflits ou de dégradation des zones de reproduction et de nurserie. Aux problèmes propres au secteur de la pêche artisanale viennent s'ajouter ceux qui sont provoqués par les interférences de la pêche industrielle et par la dégradation progressive de l'environnement côtier. La présente communication évoque quelques unes des initiatives les plus marquantes pour tenter de mieux adapter l'impact de la pêche artisanale par rapport à l'ensemble des fonctions du littoral dans le cadre d'une approche planifiée – et si possible régionale – de la zone côtière.

INTRODUCTION

En Afrique comme ailleurs, les pêcheurs artisans représentent une des principales catégories d'utilisateurs de l'espace littoral. Bien que certaines ethnies de la côte ouest-africaine possèdent des traditions anciennes en matière de techniques de pêche, d'embarcations ou de migrations, la pêche artisanale était jusqu'à une époque récente essentiellement une activité saisonnière, de subsistance et de proximité géographique. Depuis une vingtaine d'années des transformations profondes sont intervenues, notamment en relation avec la généralisation des moteurs hors-bord et une utilisation plus large de la refrigération, à bord des embarcations comme à terre, entraînant ainsi une plus grande maîtrise de l'espace et du temps. Il est donc intéressant aujourd'hui de chercher à mieux comprendre les relations entre la pêche artisanale et les ressources de la zone côtière, de la Mauritanie à la Guinée-Bissau, et d'analyser l'impact de quelques unes des initiatives en cours visant à encourager une utilisation durable de ces ressources.

DESCRIPTION DU LITTORAL

Les eaux côtières d'Afrique de l'ouest sont influencées par l'existence du courant froid des Canaries et la présence d'un *upwelling* permanent, notamment en Mauritanie, à l'origine d'une importante production planctonique. D'autre part les eaux plus chaudes du courant sud-équatorial accompagnent le front intertropical de convergence jusqu'au Cap Blanc de façon saisonnière. La présence successive de ces masses d'eau explique la rencontre au niveau de la Mauritanie d'espèces appartenant à des aires biogéographiques distinctes aussi bien au niveau de la végétation que chez les poissons, les cétacés ou les oiseaux.

Le Nord du littoral océanique mauritanien est constitué de côtes à falaises où vit encore la seule colonie de Phoques moines (*Monachus monachus*), considérée comme viable à long terme, et dont les effectifs sont passés de près de 300 individus à une centaine d'individus suite à une mortalité massive, probablement consécutive à un *bloom* d'algues toxiques en mai et juin 1997. Au large du Cap Blanc et jusqu'au Cap Timiris s'étend le Banc d'Arguin où la houle vient briser et en arrière duquel on remarque une vaste zone de hauts fonds abrités, tapissés d'herbiers aquatiques à *Zostera* et *Cymodocea*, bordés par endroits des mangroves les plus septentrionales de la côte occidentale africaine, avec *Avicennia germinans* comme espèce unique. La présence d'une quinzaine d'îles permet à des colonies d'oiseaux, représentant environ 50'000 couples (*Pelecanidae, Phalacrocoracidae, Ardeidae, Treskionithidae, Phenicopteridae, Laridae* etc.) de se reproduire. Près de 400 km^2 de vasières intertidales accueillent par ailleurs plus de deux millions de limicoles paléarctiques en période d'hivernage, considérée comme la plus grande concentration mondiale de ces espèces. La présence de ces oiseaux et de cétacés, particulièrement le Dauphin à bosse (*Sousa teuszii*), le Grand dauphin (*Tursiops truncatus*) et l'Orque épaulard (*Orcinus orca*), traduit l'abondance des ressources halieutiques, le Golfe d'Arguin constituant dans la région la principale zone de reproduction et de nurserie pour de nombreuses espèces de poissons d'intérêt commercial. Ces caractéristiques sont à l'origine de la création, en 1976, du Parc National du Banc d'Arguin, classé site du Patrimoine Naturel Mondial par l'UNESCO et qui, avec 11,700 km^2, constitue le plus vaste parc marin d'Afrique. Une communauté de pêcheurs de près de 1000 personnes, répartie en huit villages le long du littoral, réside à l'intérieur du parc.

Au sud du Cap Timiris les eaux sont plus profondes et moins abritées et le littoral, bordé de plages sableuses, de dunes et de sebkhas, s'étend de façon à peu près rectiligne jusqu'au delta du Sénégal. L'écologie du bas-delta dépendait autrefois directement de la pluviométrie du massif du Fouta Djalon, en Guinée, considéré comme le "château d'eau" de la région. En période de déficit des pluies, les eaux marines pouvaient remonter jusqu'à 300 km de l'embouchure, tandis que de fortes précipitations provoquaient des crues inondant tout le bas delta. La construction du barrage anti-sel de Diama, achevée en 1985, a profondément altéré la dynamique estuarienne (voir aussi Diouf et Ba *et al.*, ce volume). Les effets cumulés des ouvrages hydrauliques, des activités humaines et de la sécheresse ont exercé un impact considérable sur les sols, la végétation et la faune. La réduction des échanges d'eau douce et marine a entraîné une diminution drastique des ressources halieutiques en termes d'abondance et de diversité. Des aires protégées, l'une en Mauritanie et deux au Sénégal ont été implantés dans le bas delta: le Parc National du Diawling, d'une superficie de 35'600 ha situés sur la rive droite, couvre des milieux principalement halophiles; le Parc National des Oiseaux du Djouj, d'une superficie de 16'000 ha, accueille d'importants peuplements ornithologiques en période de reproduction (*Pelecanidae, Ardeidae, Anatidae*) ou d'hivernage (*Phenicopteridae, Anatidae*) ; plus au sud, dans la partie la plus marine du delta, les 2000 ha du Parc National de la Langue de Barbarie accueillent une avifaune composée essentiellement de Laridés.

Au sud du delta du Sénégal le littoral est constitué d'une plage battue jusqu'à la presqu'île du Cap Vert, puis à nouveau, mais sur un mode plus abrité et présentant des zones de nurserie, jusqu'au delta du Saloum. Ce dernier marque le début du littoral des "Rivières du Sud" comme l'ont dénommé les Portugais au XV°, qui s'étend jusqu'à la Sierra Leone et se compose essentiellement de rias bordées de mangroves à *Avicennia* et *Rhyzophora*. Le régime hydrologique du Saloum, comme de la Casamance, dépend des précipitations au niveau local, contrairement au fleuve Gambie qui prend sa source dans la zone très arrosée du Fouta Djalon, en Guinée. Le déficit pluviométrique actuel conjugué aux aménagements hydro-agricoles a entraîné une forte élévation des salinités, le Saloum et la Casamance fonctionnant désormais comme des estuaires inverses, avec une salinité qui croît de l'aval vers l'amont. L'impact sur les mangroves et sur les ressources halieutiques, tortues marines et Lamantins (*Trichechus senegalensis*) inclus, s'avère particulièrement négatif. Une partie du delta du Saloum, principalement du côté sénégalais, a été érigée en Parc National (76'000 ha) au sein d'une Réserve de la Biosphère (180'000 ha), tandis que du côté Gambien 4'940 ha du delta étaient classés, auxquels viennent s'ajouter les 11'000 ha du Parc de Kiang west plus en amont.

Le littoral de Guinée Bissau est profondément découpé par une succession de rias bordées de grandes superficies de mangroves qui couvrent environ 250'000 ha, soit 7% du territoire national. L'étendue considérable du plateau continental et la morphologie du littoral sont à l'origine de marées et de courants relativement forts, tandis que les apports de sédiments et de matières organiques expliquent la turbidité des eaux. Au large on note la présence de l'Archipel des Bijagos déclaré Réserve de la Biosphère en 1996. On y trouve le plus grand site de ponte de Tortues vertes (*Chelonia mydas*) de l'Afrique de l'ouest, avec une population reproductrice comprise entre 5'000 et 10'000 femelles et, comme sur l'ensemble du littoral du pays, des populations encore relativement abondantes de Dauphins à bosse, Lamantins, Hippopotames (*Hippopotamus amphibius*) qui vivent en eau salée dans les bras de mer, Loutres à joues blanches (*Aonyx capensis*) et Crocodiles (*Crocodylus niloticus* et *Osteoleamus tetrapsis*).

LA PECHE ARTISANALE

Jusqu'à une époque récente, la pêche artisanale sur le littoral mauritanien était pratiquée uniquement par les Imraguen du Banc d'Arguin. Ces derniers entreprenaient la pêche à pied avec des filets en fibre végétale, pour capturer les bancs de Mulets jaunes (*Mugil cephalus*) en migration, qu'ils faisaient sécher ensuite pour les conserver. Cette pêche, qui se déroule parfois en collaboration avec les Grands dauphins, existait déjà au XV° siècle comme en attestent les témoignages des explorateurs portugais.

L'exploitation des Mulets jaunes s'effectue aujourd'hui à une échelle semi-industrielle avec l'utilisation de filets tournants par des pirogues sénégalaises, lorsque les bancs quittent le Parc National vers les lieux de ponte situés plus au sud. Les captures annuelles sont ainsi passées de quelques centaines de tonnes dans les années 1980 à 7000 tonnes en 1994. De plus, seuls les oeufs sont conservés pour être commercialisés vers l'Italie sous forme de *poutargue*, tandis que les carcasses de poissons sont abandonnées derrière la plage où elles pourrissent dans d'immenses charniers. Ce mode de pêche, interdit par arrêté ministériel suite à l'échouage en décembre 1995 de 130 dauphins (*T. truncatus*, *S. teuszii* et *Delphinus delphis*), puis à nouveau autorisé, a donné un coup d'arrêt presque définitif à la pêche traditionnelle des Imraguen.

Par ailleurs, il est probable que le delta du Sénégal constitue un lieu de ponte principal pour ces mulets, que le barrage de Diama rend aujourd'hui en partie inaccessible. Les pêcheurs Imraguen se sont donc progressivement tournés vers la capture d'autres espèces, encouragés en cela par l'établissement d'infrastructures frigorifiques à Nouakchott et le passage régulier de commerçants, rendu possible par la généralisation des véhicules tout terrain. Simultanément le développement du marché des ailerons de raies et de requins, dont le prix de vente dépasse 100$US/kg à Hong Kong ou Singapour et peut atteindre 550$US/kg, a encouragé les Imraguen à cibler leurs activités sur ces espèces au point de les menacer gravement. En effet, la stratégie démographique des Elasmobranches, qui se caractérise par un faible taux de recrutement, ne se prête guère à une pêche intensive. De plus l'utilisation de filets à grandes mailles a augmenté de manière considérable les captures de tortues (estimation de 300 tortues par jour à

certaines périodes) et de dauphins à l'intérieur même du Parc National.

En dehors des limites du Parc, la pêche artisanale s'est considérablement développée depuis une vingtaine d'années. Il s'agit essentiellement de pêcheurs venus du Sénégal avec des pirogues motorisées dont le nombre dépasse aujourd'hui 2'750 embarcations. L'épuisement des ressources en poissons démersaux, provoqué en grande partie par les chalutiers industriels, a conduit les pirogues à s'orienter vers la capture de céphalopodes à l'aide de filières de pots cylindriques en matière plastique, à l'origine de nombreux conflits avec la pêche industrielle et d'une pollution durable des rivages. La pêche pratiquée par les pirogues en bordure immédiate des falaises du Cap Blanc peut représenter de son côté une menace à l'égard des Phoques moines, soit directement par compétition alimentaire, soit indirectement par la présence de nombreux filets dans leur espace vital. L'augmentation rapide du nombre de pirogues simultanément à l'épuisement des ressources démersales est à l'origine des pressions de plus en plus fortes exercées sur le territoire maritime du Parc National du Banc d'Arguin qui, en tant que zone de reproduction et de nurserie, représente pourtant la dernière garantie de vitalité du secteur de la pêche en Mauritanie.

Au Sénégal et en Gambie la pêche artisanale est pratiquée depuis des temps reculés et constitue une véritable tradition pour des ethnies telles que les Lébous de la presqu'île du Cap vert ou les Nhominkas du Saloum. Un recensement réalisé en 1989 fait apparaître la présence de près de 7'500 pirogues motorisées sur cette portion du littoral. La pêche pratiquée dans le bas delta du Sénégal connaît une récession importante simultanément à la mise en service du barrage de Diama, le potentiel de ressources halieutiques exploitables ayant diminué d'environ 75% par rapport aux années 1970.

Cette baisse des captures s'est vérifiée, mais dans une moindre mesure, dans les estuaires situés plus au sud et en général tout le long du littoral pour des raisons de surexploitation et de dégradation des conditions environnementales. Elle est associée à une perte de la valeur commerciale des prises par la diminution des tailles, notamment des crevettes, et par un appauvrissement du nombre d'espèces. Cette situation, loin de limiter la progression du parc piroguier, pousse à des comportements extrêmes tels la pêche à la dynamite pratiquée au large de Dakar, et conduit la pêche artisanale à étendre sa zone d'intervention vers le large et vers les pays limitrophes. Au Sénégal les pirogues contribuent ainsi pour 90% des débarquements des espèces pélagiques, surtout la Sardinelle ronde (*Sardinella aurita*) et plate (*S. maderensis*), pourtant traditionnellement exploitées par la pêche industrielle. Inversement les chalutiers pénètrent régulièrement dans la zone des six miles réservée à la pêche artisanale commettant des dégâts considérables à l'écologie des fonds, entraînant la destruction d'engins de pêche et de nombreux conflits avec les pirogues.

Des conflits sont également apparu avec d'autres secteurs d'activité tels que le tourisme balnéaire, difficilement compatible avec le traitement du poisson qui s'effectue sur les plages, ou encore la conservation des derniers massifs forestiers convoités pour la fabrication des pirogues. Conflits enfin entre différentes ethnies, surtout en Casamance où les Diolas, pêcheurs de subsistance occasionnels, voient désormais des pêcheurs originaires du nord venir prélever avec une efficacité supérieure des ressources déjà surexploitées, provoquant des affrontements qui font parfois des victimes.

La Guinée-Bissau présente une situation différente dans la mesure où les populations de la zone côtière n'ont qu'une faible tradition de pêche. Il s'agit le plus souvent de pêche pratiquée en dehors des saisons agricoles, soit à pied avec des éperviers, des harpons ou des nasses, soit à bord de pirogues monoxyles qui ne s'éloignent guère du rivage. Dans les zones de mangrove et dans l'archipel des Bijagos, la contribution des mollusques pêchés par les femmes, surtout les huitres sauvages (*Crassostrea gasar*), qui s'effectue parfois en coupant les racines aériennes des *Ryzophora*, les arches (*Anadara senilis*) et les murex (*Murex* sp.), dépasse largement celle de toutes les autres sources de protéines dans le régime alimentaire. Il existe en outre une tradition ancienne de migration saisonnière de la part de pêcheurs Nhominkas, qui viennent du Sénégal pour installer des campements temporaires sur le littoral des îles Bijagos pendant la saison sèche, et retournent vers le Saloum pendant les pluies pour la culture du riz. Ainsi, traditionnellement, la pêche intervenait peu à la saison des pluies qui correspond aussi à la saison de reproduction d'un grand nombre d'espèces de poissons.

Depuis une dizaine d'années ces campements ont tendance à se développer et à devenir permanents et les pêcheurs se consacrent de plus en plus à la capture des raies et des requins uniquement pour leurs ailerons. L'usage des filets à requins entraîne aussi la capture d'un nombre conséquent de tortues marines et de lamantins. L'abondance relative des ressources de cette portion du littoral a encouragé d'autre part la venue et l'installation dans le sud du pays de pêcheurs originaires de Guinée-Conakry, qui pratiquent également la pêche aux Sélaciens. Les témoignages et les recherches concordent pour constater la disparition presque totale de certaines espèces comme les Poissons-scie (*Pristis* spp.) et les Requins marteau (*Sphyrna* spp.). Ces mêmes pêcheurs exploitent les dernières forêts denses à la recherche de grands arbres pour la construction de pirogues, principalement les Fromagers (*Ceiba pentendra*), ainsi que les mangroves pour le fumage des carcasses d'élasmobranches et des ethmaloses (*Ethmalosa fimbriata*), ou l'approvisionnement en bois des villages de Guinée-Conakry.

LA RECHERCHE DE SOLUTIONS

En Mauritanie, l'un des problèmes qui se pose vient de la différence de pression exercée sur les ressources entre l'extérieur et l'intérieur du Parc du Banc d'Arguin: les quelques 2'750 pirogues prélevant à l'extérieur du Parc des

ressources déjà épuisées sont irrésistiblement attirées par les 6,000 km^2 de territoire maritime du Parc, où seuls les Imraguen avec une centaine de lanches à voile sont autorisés à pêcher. L'identification de ces deux ensembles se fait précisément au niveau des embarcations, celles des Imraguen ne fonctionnant qu'à la voile tandis que les pirogues sont équipées de moteurs hors-bords. Le vieillissement des voiliers, hérités des Canariens depuis plus de 50 ans, a failli se traduire pour les Imraguen par l'acquisition de pirogues motorisées, faute d'alternative. Or, non seulement les moteurs sont interdits dans le Parc, mais il deviendrait alors impossible de faire la distinction entre les Imraguen et les autres pêcheurs, et donc d'exercer un contrôle efficace.

Depuis 1988 le Parc du Banc d'Arguin, avec l'appui de la Fondation Internationale du Banc d'Arguin (FIBA), de l'Union Mondiale pour la Nature (UICN) et de l'aide bilatérale hollandaise, a mis en oeuvre un programme de restauration de la flottille et de construction de lanches neuves. Le programme avec ses différents volets – création d'un chantier naval et d'une coopérative des pêcheurs, formation des femmes à la voilerie et de charpentiers navals – est couplé à d'autres activités telles l'élaboration du nouveau plan directeur et la révision de la législation du Parc, ainsi que la mise en place de patrouilles de surveillance maritime. Ces dernières activités, financées par le WWF - Fonds Mondial pour la Nature, ont été réalisées avec la participation directe des Imraguen, ce qui a permis notamment de fixer le nombre maximum de lanches admissibles et les modalités d'exploitation des ressources. Cette participation leur a permis de mieux défendre leurs droits d'exclusivité de pêche dans le Parc, et de défendre *ipso facto* la plus importante zone de nurserie du pays. En d'autres termes le Parc a été amené à développer la force et l'identité de la communauté Imraguen, symbolisée par les lanches à voile, pour qu'elle puisse mieux faire valoir ses droits traditionnels vis à vis des ressources du Banc d'Arguin. Ce faisant le Parc s'est constitué des alliés directs qui, en protégeant leur zone de pêche, protègent en conséquence son territoire. Tous les problèmes ne sont pas résolus pour autant, loin s'en faut, car la pêche artisanale et industrielle continue à venir pirater les eaux du Parc, et parce que les Imraguen eux-mêmes exercent une pression excessive sur les Sélaciens et les tortues marines. La restauration des lanches permettra probablement de diversifier leurs activités à travers le développement de l'écotourisme, et ainsi d'alléger la pression sur les ressources.

Une autre initiative intéressante, conduite par le Ministère du Développement Rural de la Mauritanie en collaboration avec l'UICN et avec l'appui des aides bilatérales hollandaise et française, vise à restaurer en partie le fonctionnement de l'écosystème du bas-delta du Sénégal dans le cadre du Parc National du Diawling. Les activités sont orientées vers la reconstitution artificielle des mécanismes de crues du fleuve à travers des ouvrages hydrauliques. En dépit des difficultés de maîtrise de l'eau liées aux impératifs de gestion du barrage de Diama et, plus en amont au Mali, du barrage de Manantali, des améliorations sont déjà observées: les surfaces occupées par les mangroves d'*Avicennia germinans* se sont étendues, des peuplements de poissons estuariens (*Mugil* spp., ethmaloses) et de crustacés (*Penaeidae, Carcinidae*) ont pu regagner d'anciens lieux de frayère et de ponte, entraînant une augmentation sensible des captures opérées par les pêcheurs, ainsi que le retour de peuplements d'oiseaux d'eau (*Pelecanidae, Ardeidae, Phalacrocoracidae*) beaucoup plus abondants. La crue artificielle montre ainsi qu'il est possible de restaurer, au moins partiellement, les fonctions de l'estuaire tant au bénéfice de la pêche artisanale que de la conservation.

En Guinée-Bissau, dans le cadre du programme de Planification Côtière réalisé par divers partenaires nationaux avec l'aide de l'UICN et l'appui financier de la Suisse, le Rio Grande de Buba a été choisi comme site pilote pour la gestion des ressources halieutiques. Le site présente en effet un ensemble de caractéristiques qui englobent la plupart des problèmes auxquels la pêche artisanale est confrontée dans la région: c'est un important lieu de reproduction, notamment pour les Barracudas (*Sphyraena sphyranea*), que des pêcheurs étrangers viennent exploiter alors que les pêcheurs résidents, disposant de peu de moyens, se limitent à leurs besoins de subsistance.

Un programme de recherches et d'enquêtes, couplé à un processus de formation continue, a été mis au point avec le Centre de Recherches du Ministère des Pêches, pour comprendre le fonctionnement de la zone sous l'angle des ressources halieutiques afin de définir des mesures de gestion permettant leur exploitation durable. Un comité regroupant les pêcheurs résidents a été constitué et a formulé des propositions à l'intention du Ministère des Pêches, fixant les périodes et les modes de pêche ainsi qu'un quota de pirogues, et stipulant que les pêcheurs non-résidents n'ont accès à ce quota que si les pêcheurs résidents ne l'ont pas épuisé. Ces différentes propositions ont pour la plupart été acceptées et ont fait l'objet d'un arrêté ministériel. Elles confèrent donc aux pêcheurs résidents un droit d'accès prioritaire aux ressources. Comme chez les Imraguen, "l'appropriation" de l'usufruit des ressources (à la nuance qu'elle est ici prioritaire et non exclusive) est censée créer un sentiment de responsabilité vis à vis de leur devenir à long terme, et introduire ainsi le principe de la gestion. Parallèlement, des actions de développement sont entreprises, qui visent d'une part à améliorer progressivement la capacité de capture des pêcheurs résidents, tout en les associant aux enquêtes de débarquement et à la surveillance de la zone, et d'autre part à renforcer la capacité des femmes dans le traitement et la commercialisation du poisson à travers un système de crédit villageois. Grâce à l'esprit de collaboration qui règne entre les pêcheurs et les différentes institutions impliquées, notamment le Ministère des Pêches, cette initiative connaît déjà quelques succès: on assiste depuis trois années à une augmentation des peuplements de Barracudas, de leurs captures et des revenus générés par la pêche. L'expérience montre ici, comme sur le Banc d'Arguin et le Diawling, qu'il peut y avoir conjonction d'intérêts entre la pêche artisanale et la conservation.

CONCLUSIONS

Un ensemble de facteurs d'ordre social, économique et environnemental a conduit la pêche artisanale à la situation qu'elle occupe aujourd'hui. La surexploitation des ressources sur certaines portions du littoral a entraîné certains pêcheurs à étendre considérablement leurs zones d'intervention, en partie grâce à l'utilisation généralisée des moteurs. La nécessité de rembourser des crédits et l'implantation rapide de l'économie de marché ont poussé les pêcheurs à rentabiliser leur activité à court terme à partir de ressources renouvelables communes: l'exploitation des sélaciens uniquement pour leurs ailerons, des mulets pour leurs oeufs ou des barracudas pendant la période de reproduction sont révélateurs de cette situation. Toutefois, en dehors des espèces les plus sensibles (sélaciens, tortues, lamantins ou Phoques moines), la pêche artisanale provoque relativement peu de dégâts en comparaison avec les chalutiers démersaux qui pénètrent dans les zones réservées à la pêche artisanale et détruisent les fonds.

L'expérience acquise dans quelques pays d'Afrique de l'ouest permet de tirer un certain nombre d'enseignements concernant la gestion des ressources du littoral en relation avec la pêche artisanale:

- Les pêcheurs migrateurs ont une stratégie offensive, de conquête de nouvelles zones de pêche et de maîtrise des circuits de distribution. Ils sont beaucoup plus efficaces, et souvent destructeurs, que les pêcheurs résidents qui s'inscrivent dans une logique d'exploitation communautaire des terroirs. Cette stratégie de conquête entraîne des conséquences graves quand elle s'exerce aux dépens des zones de reproduction et de nurserie. L'expérience montre que dans cette situation il est efficace d'accorder des droits d'accès particuliers aux pêcheurs résidents qui, en défendant "leurs" ressources, défendent en même temps les fonctions écologiques de ces zones. Il est nécessaire simultanément d'appuyer les pêcheurs résidents dans le développement de leurs capacités afin qu'ils soient en mesure d'occuper leur zone, tout espace laissé vacant ayant pour effet d'attirer les pêcheurs étrangers.
- Il faut travailler en concertation étroite avec les administrations et les agences de coopération pour les sensibiliser aux contraintes écologiques et biologiques incontournables, aux spécificités propres aux ressources renouvelables, à la nécessité d'avoir une gestion spécifique des zones de nurserie, ce que même certains centres de recherche océanographiques de la région semblent ignorer, pour les amener à mesurer les conséquences des choix politiques, des emplacements et caractéristiques des infrastructures, puissance des moteurs, incitations fiscales etc. Les agences de coopération en général, et le Japon en particulier, devraient jouer un rôle plus exemplaire en la matière.
- La pêche artisanale s'inscrit dans un ensemble d'activités qui s'exercent sur la zone côtière: pêche industrielle, tourisme, agriculture, transports, urbanisme, conservation. Il est essentiel, pour une cohabitation plus harmonieuse de ces activités, d'adopter une approche intégrée à travers des exercices de planification côtière. Cela est en cours dans plusieurs pays de la région, notamment en Guinée-Bissau. Il est nécessaire non seulement d'encourager ces travaux, mais de leur permettre de s'étendre à une échelle régionale compte tenu de la nature des problèmes et de la mobilité tant des ressources que des pêcheurs. La création récente d'un réseau ouest-africain de planification côtière, sous l'impulsion de l'UICN, vise précisément à favoriser cette approche régionale.
- Par leur présence permanente dans la zone côtière et leur connaissance intime du milieu, les pêcheurs artisans sont des acteurs essentiels du littoral. Il convient de les considérer comme les gestionnaires les plus directs des écosystèmes littoraux et de leurs ressources, et ce n'est qu'en travaillant avec eux, et en contribuant à répondre à leurs préoccupations, que l'on pourra mieux gérer le littoral dans l'intérêt commun et réciproque des pêcheurs et de la conservation.

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LE PROCESSUS DE COGESTION DANS LE CONTEXE DU PROJET WAZA LOGONE

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MOTS-CLES : Waza Logone, cogestion, Cameroun, plaine d'inondation, restauration

RESUME

Le Projet de conservation et de développement de la région de Waza-Logone (PWL) a été mis sur pied dans le but de réhabiliter écologiquement et socio-économiquement une zone d'environ 800'000 ha à l'extrême Nord du Cameroun. L'un des objectifs du projet est de développer des systèmes d'exploitation durable des ressources aptes à maintenir la biodiversité des différents sous-zones (plaine d'inondation, parcs nationaux, surfaces boisées ou arides). Jusqu'à présent, le projet a déjà franchi plusieurs étapes prévues dans le processus de cogestion, notamment les études exploratoires; l'élaboration d'un modèle de structure de gestion incluant des parties prenantes; l'organisation de plusieurs ateliers de travail avec les parties prenantes; l'élaboration d'un plan cadre de gestion. La mise en place des comités de gestion est en cours. Le Projet Waza-Logone s'est inscrit entièrement dans la mouvance des responsabilités partagées et le respect de toutes les parties prenantes dans leur culture, leur pouvoir et parfois leur exigence. La plaine est en cours de restauration et les performances déjà réalisées ouvrent la voie sur les perspectives en vue d'une amélioration de la mise en œuvre de processus de cogestion.

INTRODUCTION

L'objectif de cette communication est de décrire le processus de gestion participative dans la plaine d'inondation de Waza Logone au nord du Cameroun et de présenter les leçons apprises pour ceux qui sont ou seront impliqués dans un même travail. La gestion participative est un processus d'apprentissage et une étude de cas supplémentaire ne peut qu'enrichir les enseignements des études existantes. Par ailleurs, la cogestion est reconnue comme étant une solution pour l'utilisation durable et équitable des ressources naturelles. La présente étude de cas s'inscrit dans cette logique.

La plaine de Waza Logone occupe dans la cuvette du Lac Tchad une superficie d'environ 8,000 km^2. Elle est délimitée à l'est par le fleuve Logone et ses bourrelets, au sud par le grand cordon dunaire Limani-Yagoua, à l'ouest par la frontière avec le Nigeria et au nord par l'El Beid, cours d'eau servant de vidange des eaux de la plaine vers le Lac Tchad. Il y a vingt ans, la plaine de Waza Logone recevait les eaux en provenance des Monts Mandaras et les débordements du Logone. Ces eaux, combinées à celles des précipitations provoquaient une inondation temporaire de la plaine. A cause de l'absence de pente, on notait les phénomènes d'accumulation et de stagnation des eaux. C'était une zone propice à:

- l'élevage transhumant grâce à ses pâturages riches et variés
- la pêche que le dépôt de débris organiques drainés par les eaux rendait chaque année captivante et
- l'agriculture traditionnelle pratiquée sur les terres alluvionnaires très fertiles.

Les populations riveraines, sans être fortunées, trouvaient de quoi se nourrir et subvenir aux autres besoins. Ainsi, les systèmes de gestion développés à travers les siècles étaient les plus aptes à l'écologie de la région.

En plus, cette plaine regorgeait d'une faune très diversifiée concentrée pour la plupart dans le Parc National de Waza et qui attirait environ 7'000 touristes chaque année. Il était facile d'apprécier le spectacle d'une avifaune riche dont le gros de la bande venait d'Europe pour traverser la rude période hivernale.

Dans le souci d'assurer davantage le bien-être des populations de la région, et surtout leur autosuffisance alimentaire, le gouvernement Camerounais a mis en place à Maga un projet de développement (SEMRY) dont le support principal est le barrage hydro-agricole supporté par une digue longue de 27 km, qui retient de l'eau pour l'irrigation des périmètres rizicoles situés en aval. En même temps, une série de digues a été édifiée pour empêcher aux eaux de crue du Logone d'inonder les casiers de riz.

L'effet du barrage et le déficit pluviométrique cumulé enregistré ces dix dernières années, en réduisant considérablement les quantités d'eau qui s'écoulaient vers la plaine, ont contribué à la dégradation écologique de la plaine d'inondation, traduite par:

- la baisse des stocks de poisson
- la rareté de bons pâturages en saison sèche
- la nette régression de l'agriculture traditionnelle
- l'émigration des populations locales vers des zones plus propices pour la pêche et l'élevage et
- la sortie de la faune sauvage du Parc National de Waza à la recherche des pâturages et de l'eau – hors de son habitat naturel, la faune est régulièrement menacée de braconnage et elle détruit les cultures, les habitations et porte parfois atteinte à la vie humaine.

La situation de la plaine était devenue préoccupante. C'est dans ce contexte que le projet Waza Logone a été mis en place pour assurer la restauration de la région sérieusement perturbée. Pour éviter les erreurs des projets qui excluent la contribution des bénéficiaires, le projet Waza Logone a opté pour une démarche à responsabilité collective. Les différents intervenants dans le projet sont: le Gouvernement Camerounais, la Coopération néerlandaise (NEDA), l'Union mondiale pour la Nature (UICN), l'Organisation néerlandaise pour le développement (SNV), et le Fonds mondial pour la nature (WWF).

L'étude de faisabilité pour la restauration de la plaine du Logone a été faite en 1988 et les activités sur le terrain ont démarré en 1992. Actuellement, le projet est à sa troisième phase, qui couvre la période 1999-2000. L'objectif global du projet est de concilier la conservation de la biodiversité de la zone avec le développement durable des populations qui y vivent. L'un des objectifs spécifiques est de développer des systèmes d'exploitation durable des ressources, aptes à maintenir la diversité biologique des différentes sous-zones: la plaine d'inondation, les parcs nationaux et surfaces boisées ou aride autour des parcs. Pour atteindre cet objectif, le projet Waza Logone s'est mis sur la voie de la cogestion. Il a constitué un groupe pour démarrer le processus de cogestion, à partir de l'équipe multidisciplinaire du projet, composée de socio-économistes, d'écologistes, d'hydrologues, d'experts en développement rural, etc.

Il convient de souligner que l'idée du projet a été acceptée par toutes les autorités traditionnelles de la zone et les Communautés Rurales sinistrées qui ont offert sans contrainte leur disponibilité à l'analyse diagnostique des problèmes de la plaine. Les populations et les autorités de la zone d'action avaient confiance aux actions du projet car l'un de ses objectifs principaux, à savoir restaurer l'inondation de la plaine, avait reçu un écho favorable auprès des bénéficiaires. En plus, le projet avait les ressources financières et humaines nécessaires pour démarrer une gestion participative. Fort de ces atouts, le projet Waza Logone a commencé le processus de cogestion, qui comporte les étapes itératives ci-après:

1. préparation du partenariat
2. mise au point de l'accord de gestion
3. exécution et révision de l'accord de gestion.

PRÉPARATION DU PARTENARIAT

Analyse du milieu

L'analyse du milieu a consisté en la collecte des informations sur les ressources naturelles en jeu, les systèmes de gestion existants, les groupes d'utilisateurs et les conflits de gestion latents ou ouverts. Pour faire ce travail, le projet a utilisé les outils tels que la Méthode accélérée de recherche participative (MARP), les enquêtes, les inventaires, les ateliers, les réunions, etc. Ce premier travail a permis d'identifier ou de connaître:

- les ressources naturelles
- les formes d'utilisation des ressources naturelles
- les procédures d'accès aux ressources
- les origines de la pression sur les ressources
- les conflits latents et ouverts.

Il est important de noter que l'analyse du milieu s'est faite avec la participation accrue des communautés rurales. En effet, depuis 1998, année au cours de laquelle les études de faisabilité du projet ont été effectuées, ce sont les éleveurs, les agriculteurs et les pêcheurs de la zone de Waza-Logone qui ont guidé les chercheurs du projet sur le terrain. Décrivant avec intelligence et expérience l'état de la végétation, les périodes prospères de la haute production halieutique, la disparition malheureuse de la culture du riz flottant et l'occupation anarchique des voies migratoires de la faune sauvage, ils ont soutenu inlassablement l'identification du projet.

Les communautés rurales ont participé à la planification et l'exécution de la plupart des études programmées. Les travaux topographiques et la reconstitution du réseau hydrographique de toute la zone ont été faites avec l'appui constant des communautés rurales dont l'état de connaissance a impressionné tous les experts impliqués sur le terrain. De dépression en dépression, de canal en canal, de butte en butte, les populations ont participé à l'élaboration d'une nouvelle carte topographique et hydrographique dont tous les hydrologues se servent actuellement.

Les informations fournies par les communautés riveraines du parc et les éleveurs nomades et transhumants ont permis de mesurer l'ampleur du braconnage et de la dégradation des pâturages. La planification et l'exécution de toutes les études de base ont été réalisées avec la participation remarquable et surtout l'implication profonde des communautés rurales. L'intérêt d'intégrer le savoir écologique traditionnel des communautés de la zone d'intervention dans la conception du projet constitue sans nul doute l'un des points forts du projet Waza-Logone.

Analyse des parties prenantes

Les résultats obtenus de l'analyse du milieu ont permis de faire ensuite une analyse des parties prenantes à l'aide des enquêtes spécifiques et des réunions avec chacune. Cette analyse recherchait:

- les réponses aux questions liées aux titres et au pouvoir des parties prenantes
- les intérêts des parties prenantes
- leurs critères de distinction
- leur organisation et
- le choix des représentants de chaque partie prenante.

L'analyse des parties prenantes a conduit à des résultats spécifiques qu'il convient de présenter en fonction de la zone d'action. Pour le Parc National de Waza et sa zone périphérique, les parties prenantes sont:

- les populations sédentaires de la zone riveraine

- le service de la conservation du Parc
- les éleveurs nomades
- les éleveurs transhumants
- les autorités traditionnelles et municipales
- le projet Waza Logone.

Pour la plaine d'inondation, les parties prenantes sont:
- les populations sédentaires
- les éleveurs nomades
- les éleveurs transhumants
- les commerçants
- les pêcheurs transhumants
- autorités traditionnelles
- autorités municipales et services techniques de l'État
- le projet Waza Logone.

La leçon principale tirée de cette analyse était que la majorité des parties prenantes n'était pas bien organisée, d'où la nécessité de planifier le travail lié à leur organisation dans les activités du projet. Avant de démarrer le travail d'organisation des parties prenantes en vue de les préparer aux prochaines étapes du processus de cogestion, une petite étude de faisabilité a été faite pour s'assurer que les conditions minimales étaient remplies pour avancer dans le processus de cogestion.

Cette étude a permis d'obtenir des résultats satisfaisants sur les plans socioculturel, légal/politique, institutionnel et économique. Sur le plan socioculturel il existe un besoin réel d'implication des parties prenantes dans la gestion des ressources naturelles, car les actions de gestion doivent être harmonisées. Les parties identifiées ont exprimé leur consentement à participer à la gestion des ressources naturelles. Il existe dans la zone d'action du projet Waza Logone, une tradition de gestion partenariale, notamment en matière de pêche artisanale. Les parties prenantes expriment un très grand intérêt pour le poisson, l'eau, et les pâturages, qui sont des ressources de grande valeur économique.
Le contexte légal et la stabilité politique du pays favorisent la cogestion. En effet le gouvernement Camerounais a signé

Etude de faisabilité

L'étude de faisabilité pour démarrer un processus de cogestion

L'étude a consisté en la recherche des réponses aux questions fondamentales ci-après :

Socioculturelle

- ❑ Y a-t-il un besoin d'implication des parties prenantes dans la gestion?
- ❑ Les parties prenantes consentent-elles à participer dans une structure de gestion, compte tenu de l'incapacité à gérer unilatéralement les ressources?
- ❑ Existe-t-il une tradition de gestion partenariale dans la zone? (question difficile dans les sociétés trop hiérarchisées et non démocratiques)
- ❑ La communication, est-elle facile entre les différentes parties prenantes?
- ❑ Les parties prenantes donnent-elles de la valeur ou alors ont-elles des intérêts sur les ressources à gérer?
- ❑ Quel est le poids d'une décision prise par un représentant d'un groupe d'utilisation des ressources?

Légale et politique

- ❑ Le contexte légal favorise-t-il la cogestion?
- ❑ La situation politique permet-elle d'avancer dans le processus?
- ❑ Y a-t-il une volonté politique de partager la gestion des affaires publiques?
- ❑ Existe-t-il des intérêts politiques commerciaux, industriels ou urbains opposés à la gestion participative?

Institutionnelle

- ❑ Les parties prenantes sont-elles suffisamment organisées?
- ❑ Les agences gouvernementales sont-elles capables de discuter et de négocier avec les autres?
- ❑ Existe-t-il des autorités capables de mettre en exécution les règles et les mesures de gestion?
- ❑ Existe-t-il des espaces de discussion et de communication sur les initiatives pertinentes?
- ❑ Existe-t-il des conflits d'ordre institutionnels pouvant affecter la gestion?

Economique

- ❑ Existe-t-il des financements pour démarrer le processus de cogestion (études, réunions, communication facilitation)?
- ❑ Les besoins économiques des acteurs sont-ils compatibles avec les besoins de conservation?
- ❑ Y a-t-il suffisamment de fonds pour financer les investissements?
- ❑ Les populations locales ont-elles confiance pour investir dans les activités génératrices de revenus?

(Adaptée de Grazia Borrini-Feyerabend)

le décret N° 95/466/PM du 20 juillet 1995 pour mettre en application la loi forestière N° 94/01 du 20 Janvier 1994. Cette loi ouvre la voie sur la gestion participative des forêts et des aires protégées.

Sur le plan institutionnel, il y a un grand travail à faire sur la sensibilisation et l'organisation des parties prenantes. Sur le plan économique, le budget du projet Waza Logone lui permettait de démarrer le processus. Par ailleurs la volonté des bailleurs de fonds de soutenir les projets de gestion des ressources naturelles était considérée comme un atout. L'étude de faisabilité a montré que les conditions minimales étaient remplies pour poursuivre le processus de cogestion. A cet effet, le projet Waza Logone a démarré le travail de sensibilisation et d'organisation des parties prenantes.

Organisation des parties prenantes

Il convient de distinguer deux pôles d'intérêt pour les utilisateurs des ressources de la zone d'action du projet: le Parc National de Waza et sa zone périphérique, la plaine d'inondation. L'intérêt écologique, économique et touristique du parc a été montré aux parties prenantes, qui se sont engagées à protéger les ressources de cette réserve de biosphère. Sur la base du type d'activité mené par les populations résidant dans la zone périphérique, quatre comités de sous–zone ont été constitués et des représentants élus pour chaque comité. De même les éleveurs nomades et transhumants qui exploitent les pâturages de la zone périphérique ont été organisés et leurs représentants élus. Au niveau du Ministère de l'environnement et des forêts, des représentants ont été désignés. Les grands chefs traditionnels (*Lamido*) et les autorités municipales ont été admis comme des membres sans droit de vote. Toutes ces parties prenantes ont formé le "Comité Parc", comité de concertation et gestion pour le Parc National de Waza et sa zone périphérique.

Dans la plaine d'inondation les utilisateurs des ressources sont souvent en conflit, lié à l'accès aux pâturages, à l'eau et au poisson. Il existe localement une commission de règlement des litiges agropastoraux. L'action du projet a consisté en la mobilisation et en l'appui de cette commission pour gérer les conflits latents ou ouverts. En général la commission adopte, en concertation avec les parties en conflit, des règles de gestion à respecter par tous les groupes d'utilisateurs des dites ressources. La vision du projet est de faire de cette commission un bon arbitre des conflits et de restaurer l'autorité des chefs traditionnels, qui ont un pouvoir indéniable sur de gestion des ressources naturelles. Ils sont capables de faire respecter les règles de gestion et de punir les utilisateurs indélicats. Par contre, ils peuvent ruiner tout le système s'ils ne sont pas bien impliqués.

Les populations ont également été organisées autour de certaines activités telles que l'approvisionnement en eau potable, la riziculture et l'embouche bovine.

MISE AU POINT DE L'ACCORD DE GESTION

La mise au point de l'accord de gestion décrite ici concerne surtout le cas spécifique du Parc National de Waza et sa zone périphérique. Elle a été facilitée par le projet Waza Logone, qui a d'abord fait de la consultation active pour rassembler les idées des différentes parties prenantes sur le plan cadre de gestion. Toutes ces idées ont permis d'élaborer une ébauche de plan cadre d'aménagement du Parc National de Waza.

Ensuite une première réunion a été organisée entre toutes les parties prenantes pour discuter du contenu du plan cadre de gestion. Au cours de cette réunion, des amendements ont été faits, notamment l'abandon de l'idée de création d'une zone tampon autour du parc, au profit de la zone périphérique dans laquelle les populations déjà installées continueront à mener leurs activités traditionnelles compatibles avec la conservation. Le plan cadre de gestion définit clairement la représentativité des parties prenantes, les procédures de légalisation des accords spécifiques de gestion, et de légalisation du Comité Parc, qui est la structure de gestion du Parc National de Waza et de sa zone périphérique.

Une deuxième réunion entre les parties prenantes s'est tenue pour définir les procédures de fonctionnement interne du Comité Parc, et la composition de l'institution de cogestion, qui est le bureau du Comité Parc. La troisième réunion entre les parties prenantes a permis de définir un programme annuel d'activité du Comité Parc pour l'année 1998/1999. Toute cette démarche a permis de jeter des bases solides nécessaires à la conduite du processus de cogestion. Cependant le projet devait encore appuyer le processus en renforçant le système de communication, en particulier la transmission des informations allant du Comité Parc jusqu'aux populations des villages riverains et vise versa.

Le projet devait également renforcer la capacité des femmes à jouer pleinement leur rôle de représentantes. En ce qui concerne la représentativité des femmes, il faut reconnaître qu'un travail de fond a été déjà fait pour négocier leur participation auprès des hommes, qui sont en général paternalistes à l'égard des femmes. En effet, lors des études de milieu dans les villages de la zone périphérique du parc, les équipes en charge de ces études ont négocié et obtenu des séances de travail dissociées avec les femmes et les hommes, et des séances de travail regroupant les deux. En plus, le projet a négocié auprès des hommes de chaque village pour que les femmes choisissent elles-mêmes leurs représentantes.

Le Comité Parc est une structure déjà mise sur pied et le processus de cogestion doit suivre son cours. Les étapes futures du processus concernent l'exécution et la révision de l'accord.

EXECUTION ET REVISION DE L'ACCORD

Les étapes citées ci-après seront exécutées par le Comité Parc, appuyé par un facilitateur:

- l'élaboration et la signature d'une convention cadre de gestion, qui permettra aux parties prenantes de s'engager à respecter les clauses du plan cadre d'aménagement du Parc National de Waza
- des accords spécifiques liés à l'apiculture et à la collecte de la paille dans le parc, en cours de préparation
- l'exécution, le suivi et l'évaluation des accords spécifiques.

Une autre étape sera la révision des accords spécifiques de gestion en fonction des changements écologiques et socio-politiques. La révision du plan cadre de gestion sera la dernière étape de ce processus itératif. Le processus de cogestion nécessite un suivi. Les indicateurs ci-après de suivi/évaluation ont été retenus pour le cas spécifique du Parc National de Waza et sa zone périphérique:

- le nombre de sessions du Comité Parc tenues
- les accords ("packages deals") négociés, signés et respectés
- le nombre de problèmes de gestion résolus.

L'expérience du projet Waza-Logone est assez intéressante mais il faut éviter tout triomphalisme. Des habitudes et valeurs acquises depuis longtemps ne peuvent être balayées d'un revers de la main. Pour que les acquis du projet en matière de gestion participative soient maintenus et renforcés, il faudra être très attentif aux points suivants:

- le respect des droits de l'homme
- le respect des critères démocratiques
- la prise en compte des groupes défavorisés
- l'accélération de la décentralisation du pouvoir constitutionnellement acceptée au Cameroun
- le soutien technique et financier des bailleurs
- le développement d'un mécanisme d'autofinancement des structures de gestion.

LES LEÇONS APPRISES

Cette participation développée dans la plaine d'inondation de Waza Logone a été jusqu'ici rendue favorable par :

- le respect du savoir-faire local qui a été longtemps bafoué
- la flexibilité qui offre la possibilité des changements utiles
- le respect des institutions locales et des personnes qui les incarnent (chefs traditionnels et leurs différents notables)
- l'appui financier des partenaires internationaux.

L'expérience du projet Waza Logone permet aussi de cerner quelques leçons apprises, notamment liées à l'inertie de certaines parties prenantes à partager le pouvoir de gestion, au genre et au temps nécessaire pour financer et faciliter le processus de cogestion. Du fait qu'il a longtemps assuré la gestion sans partage de la réserve, il y a une propension du service de la conservation à garder le pouvoir de gestion. En plus, la population a été écartée de la gestion dès la création de la réserve. Il y avait donc une difficulté d'amener l'administration à la table de négociation. Néanmoins, après plusieurs réunions et débats, elle entre timidement dans le processus.

Il y a aussi d'importantes contraintes liées au genre. Le principe d'implication de toutes les populations (hommes et femmes) est un acquis, mais dans la pratique deux faits sont constatés. Les hommes sont essentiellement paternalistes à l'égard des femmes et si on veut un changement radical, il y a risque de perturber les rapports sociaux. Il y a également la tradition religieuse qui n'autorise pas aux femmes à participer activement aux activités menées hors de la maison d'habitation, d'où la difficulté de travailler avec ce groupe. Néanmoins, la prise en compte du genre a ouvert la voie royale aux femmes pour accéder aux ressources et aux bénéfices. L'acquisition des parcelles de terre rizicoles, la production, la vente et la gestion du revenu sont des symboles d'un changement social heureux et inattendu dans ce milieu fortement conservateur. L'intégration des femmes et jeunes à des postes de décision dans les comités mixtes (hommes et femmes) renforce davantage l'idée d'institutionnalisation d'une responsabilité collective au bénéfice de tous.

La cogestion est un processus assez lent, car non seulement les aspects techniques (tels que la mise en place des structures et des activités d'accompagnement) prennent du temps, mais il y a aussi les aspects culturels (acceptation et mise en œuvre du genre, surmonter les barrières de la religion, etc.) dont le temps nécessaire pour les changer dépassent largement la durée d'un projet.

Un désengagement progressif allant de la phase actuelle du projet Waza Logone à l'appropriation des acquis par les communautés rurales et d'autres parties prenantes primaires est la voie souhaitée pour une gestion durable des ressources naturelles réhabilitées. L'idée de la mise en place des ONG locales de relève, essentiellement soutenue par les agents recrutés et formés dans la zone d'intervention, garantie une consolidation effective des différents comités de gestion encore fragilisés face à d'autres acteurs plus puissants et plus possessifs.

Les différents groupes d'utilisateurs des ressources étant accrochés à leurs intérêts, il faudra veiller dans le processus participatif engagé que les points communs soient toujours plus forts que ceux qui divisent des acteurs et que le consensus prévale à toute décision qui entraîne les changements notables dans la vie des populations.

CONSERVATION AND MANAGEMENT OF KAINJI LAKE FISHERIES: A COMMUNITY-BASED APPROACH

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KEYWORDS: Kainji, Nigeria, fisheries, community-based

ABSTRACT

Today there are approximately 12,000 fishers exploiting the fisheries of Lake Kainji, Nigeria's first artificial lake. The annual catch is approximately 30,000 to 40,000 tonnes. The Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project began in 1993 with the objective of achieving sustainable exploitation of the resources of the lake, and a fisheries management plan is now being implemented. From the beginning, the project aimed at mobilizing the self-help potential of the fisherfolk in order to manage the lake resources on community-based principles. To achieve this the Kainji Lake Fisheries Management and Conservation Unit (KLFMCU) was established by Government Decree. Membership in the KLFMCU includes the traditional institutions around the lake, fisher representatives, the Fisheries Divisions of the States bordering the lake, and the National Institute for Freshwater Fisheries Research. The KLFMCU has the mandate to decide on all matters related to fisheries management in Lake Kainji, and has succeeded in licensing about 80% of the fishing entrepreneurs.

This paper describes parts of the management plan for the Kainji Lake fisheries, and first steps of its implementation in participation with the fishing communities around the Lake. Two major problems have arisen during the implementation of the management plan, and both have found solutions thanks to the involvement of resource users in the decision-making process. According to a new Fisheries Edict, the use of beach seines for catching small freshwater sardines (clupeids) was banned because this fishing method also catches large proportions of juveniles of the most commercially important fish, thus threatening the entire fishery of the lake. The KLFMCU successfully mediated and facilitated agreements between the conflicting interest groups of beach seiners and non-beach seiners. Infestation of Lake Kainji by the water hyacinth posed another serious problem for exploiting the lake's resources. Again through communal efforts – and without pay – it has been possible to keep the lake relatively free of the weed since 1995.

INTRODUCTION

Kainji Lake, the first artificial lake in Nigeria, was created by damming the River Niger for electricity generation in 1968, and is located between latitudes 9°50' and 10°55'N, and longitudes 4°25' and 4°45'E. It lies within the Northern Guinea Savannah, with its northern limits extending into the Sub-sudanian vegetation zone. The lake has a maximum depth of 60 m, with surface area of approximately 1,300 km^2 at full volume, when the water level of the lake reaches an altitude of 142 m above mean sea level. The lowest water level occurs in August, and the lake refills between September and March. A survey of the lake in 1997 recorded a total of 5'772 fishing entrepreneurs and 7,136 fishing assistants. The total fish yield was 38'246 tonnes in 1996, and 28,753 tones in 1997, and the gross income from the lake fishery was estimated to be approximately Naira 846 million in 1997 (KLFPP, 1998).

Since 1993, the Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project (KLFPP) has been preparing, testing, and implementing a fisheries management plan for the sustainable exploitation of the lake's fisheries resources. The project hopes to contribute to an improvement of the socio-economic well being of the fishing communities around the lake.

The Traditional Fisheries Management Approach

The essence of management of renewable natural resources such as fisheries is to balance the rate of use (catch) with that of renewal (recruitment). Historically, in Nigeria as in the rest of Africa, the traditional institutions appointed water chiefs (in Hausa: *Sarkin Ruwas*), who had authority over the use of resources from lakes, rivers and seas. This social class, along with the supporting religions that evolved in intimate relationship with water use, was largely responsible for the rational utilisation of aquatic resources in pre-colonial Africa.

Many taboos existed as to the sizes of fish that could be caught, and when fishing could start or end in small rivers and water impoundments along seasonal rivers. Indeed fishing was never an open-access activity in much of Africa, rather it was traditionally restricted to certain tribes and families within the society. Shrines, coves, and "no go" areas offered

protection for fish breeding grounds and medicinal aquatic plants, and wetland biodiversity was conserved through the ages by culture and tradition through well understood "Do's" and "Don'ts".

The Approach since Independence

In Nigeria, with its ever-increasing population, the demand for fish far outstrips supply. In the aim to increase the output from fisheries, traditional management systems were discouraged, and trials were undertaken to replace them with "modern", government controlled fisheries management techniques. Some management measures proposed by fisheries scientists were adopted by the authorities of the States and the Federal Government in the hope of narrowing the gap between supply and demand. Such management measures include regulation through gear restrictions, gear selectivity, seasonal and area closures, control of fishing effort, mesh size regulations, economic control, and resource allocation through territorial rights (Panayotou, 1992). Previously, traditional authorities had successfully implemented some of these management measures.

In most cases the measures listed above had to be implemented (entirely or partly) through policing by uniformed staff of the Fisheries Departments applying state and federal laws and local government by-laws. After about four decades of independence, it is clear that this "police" enforcement approach has largely failed, as the gap between fish supply and demand grows. The failure of "modern" fisheries management can be attributed to the fact that, in fisheries, the emphasis of management programmes had been on managing the resource, rather than managing the people who make use of the resource. Clearly, such a biotechnical emphasis does not solve the social and anthropological problems confronting fisherfolk in rural areas. Reasons for the failure of government-based enforcement strategies in Nigeria, as in many other countries in Africa, include:

- inadequate area coverage of enforcement infrastructures
- lack of motivated and well trained human resources at technical and sub-technical levels for enforcement
- low budgetary allocations by government to the fisheries sector
- corruption of law enforcement agents, due in part to the lack of financial resources for enforcement
- lack of fisheries data upon which to base management decisions – too often, there is not even a database, or data are fabricated in the data recorder's office instead of through visits to the landing sites, and
- alienation of the resource owners, the fisheries communities (Ayeni, 1997).

Community-based Fisheries Management Approach

In the search for a solution to the problem of fisheries management it became obvious that some of the traditional systems were indeed useful. At the very least, they involved people very close to the resource users at all steps in the process. For fisheries management to have a chance of success in future, it must combine governmental control with traditional methods that were once in place. Community-based management has many facets, and each region and cultural setting has to develop its own approach.

An ideal community-based fisheries management approach requires that:

- the ownership or user rights of fisheries resources is vested in the community
- the views and the support of the community are enlisted from the beginning of the management planning process, and
- the community share in the revenue derived from the exploitation of the managed resources (Ajayi, 1996).

It should be noted that the situation differs from country to country and from region to region, and it may well be that none of the above requirements are available to the fisheries managers.

COMMUNITY-BASED FISHERIES MANAGEMENT IN KAINJI LAKE

The Kainji Lake fisheries management approach was developed by the Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project. When the project started, intensive research was carried out to better understand the fishery, and especially the main actors, i.e. the fishing communities. It soon became clear that:

- the traditional hierarchical structure in the villages is still very strong
- the village heads, and their group of elders, including the Chiefs of Water (*Sarkin Ruwas*) are still very powerful, and
- the traditional rulers (Emirs) in the area have a lot more authority than, for example, the local or state government authorities.

The traditional system is extremely stable, with appointed Chiefs staying in their positions almost for life, in comparison to government authorities, who change almost bi-annually. Also, the traditional authorities are "sons of the soil", and as such much more interested in the economic development of their respective areas.

However, in Kainji, the existence of a functioning traditional hierarchical system did not imply that the fishery was managed using traditional control mechanisms. The fact that the River Niger fishery was turned into the Kainji Lake fishery in 1968 when the reservoir was created, and the subsequent migration of many northern river fishers to the area, explains the lack of traditional fisheries management. In addition, in the years after the creation of the lake, management emphasis was shifted to "modern" government–based measures.

For the Kainji Lake Fisheries Promotion Project it became clear, that the existing structures in the villages could be used for fisheries management, especially when combined with

some governmental effort. The involvement of fishing communities in the planning and implementation of fisheries management was guaranteed through the membership of their representatives in the Kainji Lake Fisheries Management and Conservation Unit (KLFMCU), which was established by Government Decree in 1997. Other members of the Unit come from the Fisheries Divisions of Niger and Kebbi States, and the traditional institutions around the lake. The secretary of the Unit represents the Federal Ministry of Agriculture through the National Institute for Freshwater Fisheries Research.

As mentioned above, the Kainji Lake was primarily formed for electricity production to enhance industrial development of Nigeria. Today the Kainji Dam provides a substantial proportion of the electricity needed in the country and also exports energy to Nigeria's neighbours. The Kainji Lake is, and (because of its strategic importance) will remain, the property of the Federal Government of Nigeria. The Kebbi and Niger State Governments are mandated to manage the lake fisheries. Right-of-use of the water for fishing is vested in the fishing license holders.

The fact that the decisions concerning the management of the Kainji Lake are taken by representatives of the fishers and their traditional institutions within the framework of the Kainji KLFMCU has changed the fishers from antagonists to defenders of the management measures introduced. According to the Fisheries Edict of Niger and Kebbi States, the representatives of the local fishing communities are not only part of the decision-making process, but their leaders can also be authorised to implement management measures, using the traditional hierarchical system in the fishing villages. Fishers around the lake have far more confidence in traditional leaders than they do in the (often corrupt) system of government agents.

Introduction of a new License System

Kainji Lake had an open access fishery, although the previous Fisheries Edict made it compulsory for fishers to obtain a license. However, prior to the start of the project, only a few fishers had ever bought a license because: 1) nobody came to collect the license fees, 2) license fees when collected disappeared into the pockets of the fisheries agents, or 3) the State Fisheries Authorities, who are charged with license fee collection, were considered enemies. After one year of license fee collection by the KLFMCU, fishers believe that they now have improved status, and a better say in fisheries matters when they pay license fees.

When the approach was developed, several options were considered to license fishing operations, namely licensing the fishing craft, the fishing unit, the gear, or the fishers themselves (owners of the unit and/or crew). The option of licensing the fishing vessel did not appear practicable on Kainji Lake because the Local Government Councils already collect (transport) canoe fees. Since distinguishing between fishing and transport canoes would be difficult, licensing fishing canoes appeared as double taxation. Also, some fishing units require more than one fishing canoe for operation (driftnetting), while others (gillnetting) use only one canoe, or even none if fishing from the shoreline.

Ideally, licensing should be based on fishing gear, the key indicator to determine fishing effort on the lake. However, considering the fact that there had never been a functioning licensing system on Kainji Lake, and that the new method should be easy and easily acceptable by the fishers, licensing the various gear types appeared cumbersome. Licensing the fishing entrepreneur was finally adopted as the most practicable option. The entrepreneurs were thereafter held responsible for payment of fishing license fees of their assistants.

Given the number of fisherfolk mentioned above, the potential revenue from license fees collection for the two States was estimated at Naira 1.5 million. Previously not more than 5% of this revenue had ever been collected by Government. However after the introduction of a system of co-management, almost 80% of the fishers paid their license fees in 1998 (Table 1).

About 10% of the revenue derived from license fees was retained by the Kainji Lake Fisheries Management and Conservation Unit (KLFMCU) within the fishing communities for administration of license fees, and improvement of fishing infrastructure etc.

The registration and licensing of the fisherfolk suddenly gave status and voice to their leaders, as well as improving their access to alternative income opportunities, loans, inputs, and better infrastructure in the villages. Fishers also use the license proudly as an identity card whenever they travel to distant places.

Ban on Beach Seines

Beach seining is increasingly practised on Kainji Lake, and the number of nets has risen from 570 in 1993 to 820 in 1996 (KLFPP, 1998). Commercially it is the most profitable fishing technique currently practised on the lake (Olapade and Mdaihli, 1999). Beach seines are designed for fishing clupeids (small freshwater sardines). The average annual biomass of the clupeids in the lake was estimated at approximately

Table 1: Proportion of fishers with licenses in 1998

STATE	Fishing entrepreneurs (%)	Assistants (%)	Revenue (Naira)
Niger State	80	60	700'000
Kebbi State	74	91	600'000

36,800 tonnes, with a maximum sustainable yield (MSY) of 11,700 tonnes (Omorinkoba *et al.*, 1997) The smaller species, *Sierrathrissa leonensis*, made up about 97% of the total clupeid population in the lake, and occurred at a shallower depth than the larger species, *Pellonula afzeliusi* (Otobo, 1977).

The average mesh sizes of beach seines is 3.2 mm, and the average length of the gear is 130 metres (KLFPP, 1998). Since beach seines operate in shallow waters that are also breeding and nursery areas, the by-catch (up to 60%) especially between September-December, consists largely of undersized, immature fish, thus endangering the recruitment of commercially important fish species such as *Citharinus citharus*, *Synodontis membranaceous*, *Alestes baremose*, *Eutropius niloticus* and *Lates niloticus*. Clearly, the development of this fishery poses a serious danger to the continuity of stocks (Omorinkoba *et al.*, 1997).

From the clupeid production statistics in 1996, it is estimated that the MSY is already overshot by 34%; therefore, about 698 beach seines instead of the present 810 would be sufficient for sustainable exploitation of the clupeid stocks (Omorinkoba *et al.*, 1997). There was a dramatic decline in the landings of clupeids in 1997, and the reason for this could be attributed partly to the fluctuation in the abundance level of the stocks, since the decline in the number of beach seines was not as dramatic. Furthermore, as stated above, operating the clupeid fishery above the MSY in 1996 must have had a negative effect on the reproductive capacity of the stock, hence the decline in the 1997 landings.

Because of the substantial by-catches of the beach seines, this fishing method was banned from Kainji Lake in 1996. The losses arising from beach seine fishery ban was estimated as follows:

a) The total catch value of Kainji Lake fishery in 1995 was Naira 796 million for 35'000t of fish; of this 17'000t (valued at Naira 16/kg) was contributed by beach seines, and 18'000t (valued at Naira 29/kg, or a total of Naira 524 million) by other, less damaging fishing methods.
b) If beach seines were not operated on the lake anymore, the fishery would lose the economic benefits of 48% (by weight) or 34% (by value) of the annual fish catch, or a total of Naira 272 million.
c) On the other hand, if beach seines were banned, and the fish of the anticipated by-catch were allowed to grow for approximately one year, this would contribute an additional catch value of Naira 450 million (15'000t at Naira 30 per kg) .

The ban of beach seines is supported by the majority of fishers, who actually do not own beach seines, and consider their use on the lake as a serious threat to maintaining the fish stocks. The KLFMCU is presently mediating between the different lake users with conflicting interests. Recently, an agreement was reached between beach seine operators and non-beach seiners to eliminate beach seines from the Lake within the next five months. Apparently, the beach seine users have realised that their fishing behaviour is detrimental not only to the economic well-being of their non-beach seining colleagues, but also to the future livelihoods of their own children.

Over the long run, priority is being given by the KLFPP to the development of an open water seine, which is at the same level of exploitation as the beach seine and requires similar cost to acquire. In the absence of an alternative fishing method, the practical implication of the ban is that a substantial amount of clupeid will remain unexploited.

Water Hyacinth Control Efforts

Infestation of water bodies with water hyacinth (*Eichhornia crassipes*) is an aquatic problem worldwide, causing damages to cultivated crops estimated at $ 24 million annually in West Bengal, India, and $ 110 million each year to crops and range in the United States of America (Baruah and Singh, 1984). Several different control approaches have been employed in many countries, with varying degrees of success.

An important economic concern for controlling water hyacinth on Lake Kainji is the insidious loss of water through evapo-transpiration. According to Baruah and Singh (1984) and Kusemiju (1994), water loss by evapo-transpiration from a lake surface covered with water hyacinth is up to approximately 10 times higher than evaporation from open water. Water hyacinth also reduces the water storage capacity of reservoirs by displacing large volumes of water. On this basis, Gopal and Sharman (1981) estimated that 405 ha of water hyacinth displaced 1.2×10^6 m^3 of water in Lake Rio Lempa, in El Salvador. The water thus displaced represents a deficit of that needed for electricity generation and fish production.

Local fishers consider the water hyacinth on Lake Kainji to be harmful in many ways: e.g., preventing navigation, "sending away fish", dislodging gill nets, colonizing fishing grounds and fish breeding sites, and killing the livestock that eat it. The water hyacinth control programme for Kainji Lake relies on a combination of manual, biological and mechanical control efforts (Ayeni, Daddy, and Mdaihli, in press). Awareness about the nature of the problem and possible solutions was promoted through extension campaigns involving traditional institutions. Manual control is done through the efforts of the fishing communities who clear the weed from their beaches on a regular basis. To further enhance motivation, a competition was established, and prizes were given to the best performing communities. In addition, interest was sustained through weekly radio broadcasts by the project.

This approach was successful because the communities identified the problem, and therefore were motivated to act without relying on the government. Since 1995, over 1 million metric tonnes of water hyacinth were manually removed each year through community efforts, and without cash compensation.

In support of this community-based efforts, both the Federal Government and the German Technical Aid Programme (GTZ) were approached to support the communities'

endeavours. The Federal Government of Nigeria (FGN) made a contribution of Naira 5 million annually for five years to the National Institute for Freshwater Fisheries Research, one of the executing agencies of KLFPP, to pursue the physical removal of the hyacinth arriving in the lake with flood waters from neighbouring Niger and Mali. The German contribution to the KLFPP provided the funds to import weevils for biological control of the water hyacinth, and to meet the cost of constructing a water hyacinth barrier across the River Niger to prevent fresh plants from entering the lake. In addition, the FGN recently provided counterpart funds for back-up maintenance of the barrier, and to ensure removal and safe disposal of the water hyacinth retained by the barrier.

CONCLUSIONS

Although a community-based fisheries management approach worked successfully on Lake Kainji, it may have to be modified for application in other areas (especially urban) where respect for old values and traditional institutions may have diminished. Nevertheless, this approach should serve as a model in other rural areas in Nigeria, and possibly throughout most of rural Africa's fishing communities. The major lesson from the Kainji Lake project is that the key to sustainable resource management is to solicit and obtain the cooperation and participation of resource users from the very start.

REFERENCES

Ajayi, O. 1996. A review of fisheries law applicable to Kainji Lake and proposals for their amendment. GTZ. 23pp.

Olapade, K. and M. Mdaihli. 1999. Analysis of the profitability of different fishing methods on Kainji Lake. KLFPP Technical Report, New Bussa, Niger State, Nigeria.

Ayeni, J.S.O. 1997. Management and sustainable exploitation of lakes and reservoirs. First Public Lecture, FISON, Lagos, Nigeria.

Ayeni, J.S.O., F. Daddy and M. Mdaihli. (in press). Water Hyacinth on Kainji Lake, Nigeria – integrated control efforts. Entwicklung und laendlicher Raum, DES/ZLE,GTZ,DLG, Eschborn.

Barua, J.N. and H.D. Singh, 1984. An environmentally sound scheme for the management of water hyacinth through its utilisation. In: Proceedings of International Conference on Water Hyacinth, Hyderabad, India, February 7 -11, 1983.

Gopal, B. and K.P. Sharma, 1981. Water hyacinth, Hindasia, New Delhi.

KLFPP. 1998. Fisheries Statistical Bulletin, Kainji Lake, New Bussa, Niger State, Nigeria.

Kusemiju, K., 1994. Control of water hyacinth in the River Niger. Report submitted to National Institute for Freshwater Fisheries Research, New Bussa, 23p.

Omorinkoba, W.S., M.D.B. Seisay, T.A. Du Feu and M. Mdaihli, 1997. Preliminary Report on Resource Appraisal Survey of Clupeids in Kainji Lake, Nigeria. KLFPP Project Report. New Bussa, Niger State, Nigeria.

Otobo, F.O., 1977. The biology of the Clupeid fishes in Kainji Lake, Nigeria. A thesis submitted for the degree of Doctor of Philosophy (Ph.D.) of the University of Ife, Ile-Ife. 272p.

Panayotu, T., 1992. Management concepts for small-scale fisheries: economic and social aspects. FAO Fisheries Technical Paper (228), 53pp.

SUSTAINABLE MANAGEMENT OF WETLANDS IN ETHIOPIA: LOCAL KNOWLEDGE VERSUS GOVERNMENT POLICY

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KEYWORDS: wetland, Ethiopia, local knowledge, community

ABSTRACT

This paper reports the initial findings of a research project exploring the sustainability of wetlands in the highlands of south-west Ethiopia. The main focus is the interaction between local knowledge of wetland management and government development policies. It reviews the range of experience of wetland use built up by communities over generations. In particular, the study shows how communities understand the hydrology and soil dynamics associated with wetland drainage and cultivation, and how they have developed management practices that appear to permit the long-term use of these areas without degradation.

A great variety of government development policies have impacted upon wetland use in this area, encouraging wetland use directly or indirectly. As a result, more intensive use of these areas has been developing, contrasting with the less intensive uses based on local knowledge, and raising questions about sustainability. The current interaction between local knowledge and government policies is explored, and suggestions are made about the need for more participatory policy development, given the considerable understanding of wetland dynamics that local communities have.

INTRODUCTION

There is increasing evidence from different parts of Africa that the sustainable use of wetlands is often endangered when government development and natural resource management policies are insensitive to the wetlands and to the communities who use them (Dugan, 1990; Dries, 1991; Gichuki, 1992; Olindo, 1992; Hollis *et al.*, 1993; Mafabi, 1993; Katerere, 1994). There are often conflicts between national policies, where goals are determined by the interests and priorities of the state or central government, and local policies and actions determined by the communities who use wetlands. Often this conflict is between short-term, single–use, production-maximising goals of governments, and long–term, sustainable and multiple-use objectives of local communities. Where the state imposes its priorities and policies upon rural communities, there may be negative impacts on local management practices that have ensured the sustainable use of wetlands over many decades, if not centuries through the build up of local knowledge. As a result, the sustainable use of wetlands may be undermined.

These problems are explored through a case study of wetland cultivation in south-west Ethiopia where, during this century, but especially since the mid 1970s, a number of government policies have affected the communities who use wetlands. The paper concludes that certain actions on the part of both the government and the local community can improve the chances of ensuring the sustainable use of wetlands in this area. The lessons from this case study would seem to have wider implications, and may offer guidance for the future, as wetlands appear to be the new agricultural frontier in many parts of the developing world.

CONTEXT

This paper draws on research undertaken by the Ethiopian Wetlands Research Programme (EWRP) which is working in the Illubabor Zone of the Oromiyaa Region in south-western Ethiopia (Wood, 1996a). Illubabor Zone, which forms part of the southwest highlands of Ethiopia, consists of a moderately dissected plateau at an altitude of 1600-2000 m above sea level. The area has the highest rainfall in Ethiopia: up to 2000 mm over the ten-month rainy season. The natural vegetation is tropical montane rainforest, with an understorey, which includes wild coffee (*Coffea arabica*), and some spices, notably cardamom.

The undulating plateau surface is underlain mainly by basalt rocks, and is drained by an extensive network of streams and rivers, which include wetlands at various points along their courses. These wetlands vary in size from less than 5 ha to over 400 ha, although small wetlands of less than 30 ha are by far the most common (Dixon, 1997). Spring-fed, valley-head swamps are the most common smaller wetlands, followed by mid-valley ones. The latter exhibit hydrological characteristics similar to the large floodplains, of which there are several examples in Illubabor. The sedge *Cyperus latifolius* dominates all of the wetlands, while the swamp palm *Phonex reclinata* fringes the larger wetlands. The larger wetlands remain inundated for most of the year, while the smaller

valley-head and mid-valley wetlands are inundated for varying lengths of time, usually for at least four months during the rainy season (Dixon, 1999).

Illubabor zone, some 450-700 km from Addis Ababa, is one of the more remote parts of Ethiopia. Until the 1960s there was no all-weather road to this area, and it was only in the 1970s and 1980s that two all-weather roads were built traversing the zone from east to west and north to south. The area is relatively sparsely settled by Ethiopian standards (ca 60 persons / km^2) (MoA, 1994), and approximately a third of the surface is still forested. However, this forest is being disturbed as a result of human use, notably for arable cultivation and coffee production under a thinned forest canopy. Illubabor can be seen as a resource frontier, which to varying degrees has been brought into the economic life of the country since the 1950s, particularly as a result of coffee production and spice collection, but also through spontaneous in-migration, resettlement, and market-oriented smallholder agricultural development. As the population has increased, forest clearance for agriculture has taken place on the interfluves. Where land has become scarce, or where food shortages have occurred, especially in the early rainy season, the margins of wetlands and then the whole of some valley-head and mid-valley wetlands, have been brought into cultivation for green maize. Despite the market orientation of coffee production and some sales of cereals and vegetables to the urban market, most people in Illubabor are still primarily subsistence farmers with limited involvement in market-oriented activities.

The Ethiopian Wetlands Research Programme is undertaking a pioneering study to identify the dynamics of wetland use in southwest Ethiopia. It follows a participatory approach, trying to understand these wetlands from the perspective of the rural communities who use them, complemented by a multi-disciplinary scientific approach to identify the changes in soils, biodiversity and hydrology that occur with wetland drainage for cultivation and grazing. The EWRP is also identifying the ways in which past and present government policies and socio-economic factors impact upon wetland use and the people who use wetlands. The aim of the project is to identify lessons that can help strengthen the sustainable management of wetlands by rural communities. This includes informing government policy makers so that they can become more sensitive to the direct and indirect impacts of policies upon wetlands, and the wider implications that can result from these changes.

USES AND BENEFICIAIRIES OF THE ILLUBABOR WETLANDS

Wetlands are a small but significant part of the resource base in Illubabor Zone. Although they only account for some 2% of the zone, virtually every household uses them in one way or another (Afework Hailu, 1998). This is shown by the estimates given in Table 1, which are based on data obtained through a year of participatory rural appraisal (PRA) and other research activities in the study area.

Use of wetlands for some of the benefits listed above probably goes back to the start of human settlement in this area. However, the health hazards of wetlands for humans and animals have meant that settlement has tended to be located away from wetlands, and the presence of people and cattle in these areas has been minimised. In particular, a recent survey found that wetland agriculture has been practised for over 250 years in some localities, while in other locations over 80 years of almost continual cultivation is recorded (Afework Hailu, 1998). A special word *bonee*, derived from *bona* meaning dry time, exists to describe wetland cultivation, and this tends to confirm that wetland farming is a dry season activity of long standing.

Wetlands are used for a variety of purposes with reed, medicinal plant and water collection the most common in terms of the number of wetlands having these uses, followed by dry season grazing and maize cultivation, which are practised at a smaller number of sites. Within a single wetland there may be a variety of on-going uses, and this may lead to rotational patterns, with parts of the wetland drained for cultivation in one year, and then returned to the normal flooding regime in another, allowing the sedges to recolonise the area completely.

Table 1: Wetland Uses and Beneficiaries in Illubabor

Wetland Uses Estimated	Proportion of Households Benefiting
Social /ceremonial use of reeds	100% (including urban dwellers)
Medicinal plants	100% (mostly indirectly by purchase from collectors / traditional doctors)
Domestic water from springs	50%-100% (depending on the locality)
Thatching reeds	85% (most rural households)
Temporary crop guarding huts of reeds	30%
Dry season grazing	most cattle owners, ca 30 % of population
Water for stock	most cattle owners, ca 30 % of population
Cultivation	25%
Craft materials (palm products & reeds)	5%

Source: Ethiopian Wetlands Research Programme, Field Records.

Wetland cultivation has varied in importance during this century in response to a variety of influences. In general drainage technology has developed, which has allowed cultivation to expand from the margins of wetlands to the whole of the smaller valley-head and mid-valley wetlands. Wetland cultivation was reported to be most extensive during the latter part of Haile Selassie's reign (1950s and 1960s).

During the subsequent Derg regime[1], there were developments associated with new crops such as potatoes and other vegetables, which were grown in response to the urban market. Since the overthrow of the Derg in 1991, there has been some reduction in the use of these wetlands for cultivation.

LOCAL KNOWLEDGE

Research based on PRA and other social science methods has indicated that through generations of wetland use a considerable body of knowledge has been built up (Dixon, 1997; Abbot & Afework Hailu, 1998, Tegegne Sishaw, 1998). This local knowledge concerns how to manage wetlands in order to meet local goals which include the long-term, sustainable use of these areas, in order to provide a variety of products and benefits in perpetuity (see Table 1).

With respect to reeds for thatching, farmers report that the quality of the reeds varies depending upon the maturity of the sedge plants. Where the wetlands have been disturbed for grazing or cultivation, the reeds for thatching are poor, and will only last for one or two years. In contrast, reeds taken from more mature sedges will last for several years (Afework Hailu, 1998). This experience, as well as local shortage of reeds as a result of the cultivation and drainage of wetlands, has led some communities to create local by-laws which protect areas of established sedges and limit the extent of cultivation and grazing in the wetlands (Tegegne Sishaw, 1998).

Farmers involved in wetland cultivation have developed considerable knowledge of the pedology and hydrology of these areas. From soil colour and texture, farmers can identify areas which will be suitable for drainage and cultivation in terms of fertility, moisture storage, and ease of drainage. There are also plant indicators, which farmers use to identify areas of wetland that appear to have adequate fertility to make drainage for cultivation worthwhile (Abbot and Afework Hailu, 1998). Maize yields are also used as an indicator of changing soil fertility; from this farmers can identify when an area of wetland should be abandoned and allowed to recover.

Hydrological knowledge amongst wetland cultivators is very detailed. As well as having a clear understanding of the seasonal rainfall and flooding regime, farmers know how to manage the water levels in wetlands in order to allow cultivation. This involves making decisions about the pattern and density of drains, their depth and width, and their management. Mapping of the drains and recording their management shows that these drainage practices are carefully adjusted to the type of soil and water conditions in different parts of the wetlands and the sources of water, such as springs, which locally affect the water table (Dixon, 1999). Farmers report that when wetland cultivation first began there was a process of experimentation, as the density and layout of channels had to be adjusted to ensure that crops could be grown (Tegegne Sishaw, 1998). In general, experimentation in this area seems to have been successful, and there appears to be a sound body of local knowledge concerning the layout and size of the channels that are required to drain wetlands of different types. Farmers also have extensive knowledge about the management of the drainage regime and the channels, with the lead-in times before cultivation well understood, as well as the need to block channels and raise the water table at certain times, especially just before sowing, when it helps ensure germination.

Local knowledge of water management is not always adequate, however, and in some cases there has been over-drainage, leading to wetland sites being abandoned from cultivation. This sort of problem may sometimes be the result of a lack of adaptation of local knowledge to specific sites or changes in environmental conditions to which this knowledge is applied. In other cases it may be the result of incomplete transfer of knowledge from community to community.

Farmers also recognise that flooding of the wetlands is important for the viability of agriculture, because of the way in which this helps maintain soil fertility and control soils processes, such as oxidation associated with drainage. Channels are blocked once the crop is harvested in order to assist flooding, and this in turn helps the decomposition of crop residues, the control of weeds, and the recovery of the sedge vegetation. The re-establishment of the natural swamp vegetation is seen as an indicator of the recovery of the wetland to a state where further cultivation can be practised. Blocking the drains is also seen to help ensure the retention of upland wash / erosion which, during the rains, brings nutrients from the surrounding catchments into the wetlands (Tegegne Sishaw, 1998; Dixon, 1999).

LOCAL INSTITUTIONS

The drainage of whole wetlands, rather than small-scale and local drainage of margin sites, has led farmers to coordinate their actions, especially in terms of constructing or repairing the central drain. Co-ordination is also needed in terms of crop guarding, as wetlands are often some way from the main areas of cultivation and settlement and are prone to attack by wild pigs, porcupines, baboons and vervet monkeys.

Groupings to coordinate such activities have been found in many areas. In general they are relatively recent, being

associated with the expansion of wetland cultivation since the 1950s. However, investigations show that there are traditional institutions for wetland management in some parts of Illubabor that have long histories. In the Tulla system of community administration developed by the Oromo after they invaded the area in the 17th century, one of the community elders was appointed as an Abba Laga, or father of the water. This person was traditionally responsible for coordinating the use of the wetlands for a variety of purposes including drainage agriculture. He had powers to organise drainage and guarding, but could also remove farmers from the wetlands if they were not farming appropriately (Afework Hailu, 1998).

Since the 1975 Land Reform Proclamation, natural resource management has been the responsibility of the community administration, initially the Peasant Associations established by the Derg, and since the mid 1990s the Kebeles and Sub-Kebeles (Shennies), which have replaced them under the present government. Sub-committees of these institutions have continued the work of the Abba Laga and have formulated local regulations on a number of aspects of wetland use. These include:

- restrictions on agricultural expansion in wetlands in order to protect areas for reed production and dry season grazing
- controls to prevent over-drainage which impacts upon crop cultivation directly through lack of water, and indirectly through soil changes
- limits on reed cutting and drainage in order to maintain the quality and supply of reeds
- coordination of drainage in order to make this work more efficient and effective
- coordination of guarding in order to protect the wetland crops, and
- resolving wetland management disputes when farmers fail to complete tasks allocated to them, such as drainage.

Thus wetland cultivation has stimulated considerable institutional development by local communities, in terms of both group formation and by-laws. The Abba Laga system was clearly more of a grassroots institutional form, while the more recent institutional developments connected with wetland management are at a higher level, and are more top-down in nature. Nonetheless, the latter have led to institutional arrangements being established that are based on farmers' perceived needs.

GOVERNMENT DEVELOPMENT POLICIES AND WETLANDS

The wetlands of Illubabor have been subject to a range of influences from outside the local community for many decades, and these influences have increased since the mid 1970s. The nature of these external influences and the pressures that they create upon the wetland users is probably one of the most important factors affecting the sustainable use of these areas. The earliest recorded government demands for wetland cultivation came from the first two decades of the 20th century when the Governor in Illubabor, Dejazmach[2] Ganeme, exhorted the landlords to encourage their tenant farmers to cultivate the wetlands in order to overcome famine. In some localities this was the start of almost annual wetland cultivation, and methods permitting the sustainable use of these areas for cultivation were developed through trial and error.

After the Italian occupation (1936-41) and associated road construction, which improved communications to the southwest, there was further encouragement of wetland cultivation by the then Governor, Dejazmach Tasaw. He is reported to have seen wetlands as a way of releasing land on the uplands or interfluves for coffee cultivation. However, farmers report that this use of wetland had to be enforced by landlords, as wetland cultivation is harder than upland cultivation, and will only be undertaken by farmers if it is necessary (Tegegne Sishaw, 1998).

Food security and coffee production have continued to be reasons for wetland cultivation up to the present. After the 1984 drought and famine in the north of the country, the Derg introduced a policy which required all regions to become self-sufficient in food, even if, as in Illubabor, cash crop surpluses (coffee) were used to "import" grain from surplus regions. In the north this policy was linked to micro-irrigation, but in the well watered southwest highlands this was inappropriate, and an alternative policy had to be developed (Kloos, 1991). With forest land officially subject to protection by the Peasant Associations and also by the Ministry of Tea and Coffee Development, the wetlands seemed to be one land resource that could be developed without attracting criticism. More important, however, was the fact that food can be produced from wetlands in the hungry season, which precedes the normal harvest, and during which grain prices are high. Hence drainage, rather than irrigation became the technology encouraged by the agricultural department in this area to meet their responsibilities towards the national policy (Wood, 1998). Indeed, wetland cultivation is still seen as a contributor to the search for food security after a poor harvest, and on such occasions the regional administration sets up a Wetland Task Force in each district to encourage cultivation in the following dry season (Afework Hailu, 1998).

Since coffee remains an important source of foreign exchange for Ethiopia, there have been continuing efforts to increase production through a variety of government measures and projects. One policy pursued in the southwest since the 1960s has been to encourage farmers to plant coffee in the forest near to their cleared farm land. This restricts the "normal" expansion of cultivation by forest clearance as the population grows and as soil fertility declines on established fields. In order to overcome this problem there have been further recommendations that wetlands should be drained to provide alternative land for food cultivation (Wood, 1996b).

A number of other Derg policies put particular pressure upon the wetlands. Following the 1984 famine in the north of

Ethiopia, the government decided to resettle half a million people from that part of the country to the better watered areas in the south (Alemneh Dejene, 1990). In Illubabor integrated resettlement was practised, whereby settlers were linked to established communities who were expected to allocate them land, and also provide some support to ensure their survival. Sometimes the established communities allocated wetlands to the settlers as these lands were less valuable than the alternative forest margins near to their existing fields. As a result wetland cultivation increased during the late 1980s, although much of this has been abandoned with the return north of many settlers following the change of government in 1991.

In the late 1980s, the process of "villagisation", through which the Derg regime tried to concentrate the dispersed rural population into villages, also had impacts upon wetlands. This policy created new concentrated settlements in areas where farmers had previously lived separately in dispersed settlements (Alemneh Dejene, 1990). The sudden need to replace most of the homesteads led to a major demand for building materials, including reeds. This created intense pressure upon the wetlands nearest to the sites of the new villages and many reed beds were seriously reduced in quality for a number of years. In other cases the relocation of people away from wetlands led to a decline in wetland cultivation as the distance to travel to these plots became excessive and their isolation made them difficult to guard.

Government agricultural development policies have also affected wetland use in a variety of ways. The introduction, during the late 1960s, of new short season maize varieties from Kenya made the cultivation of wetlands much easier, as the earlier maturation of the maize improved the chance of a harvest before the flood rose too high and killed the maize (McCann, 1995). In addition, as part of national efforts to increase output in (what were termed by the Derg) "surplus producing areas", government exhortations to increase crop production led to support for wetland cultivation through the provision of seeds and fertilisers. These areas of government attention continue today, and are used to encourage wetland cultivation.

IMPACTS OF INSTITUTIONAL AND SOCIAL POLICIES ON WETLAND MANAGEMENT

The interventionist nature of the Derg regime not only affected wetlands through its development policies, but also through the institutional changes that were imposed. The most important of these was the formation of Peasant Associations, which administered areas of 800 ha on average. The Peasant Associations were responsible for political, social and economic development – including the protection and management of the natural resources in their area. As a result, they replaced the traditional Tulla system with the Abba Lagas, and took over responsibility for the management of the wetlands. This meant that wetland management was now the responsibility of a government imposed institution, rather than an indigenous one, which in turn led to state, rather than community, interests dominating their use. It is questionable to what extent this top-down approach undermined indigenous support and capacity for wetland management, but the local sensitivity in wetland management may have declined as national pressures became more dominant, and as the Peasant Association system operated at a higher level than the Tulla system.

Under the Derg, with its emphasis upon a socialist mode of production, there was encouragement to communal and cooperative activities. In this situation, wetland cultivation, with its need for cooperation in drainage and guarding, was encouraged as an appropriate communal activity. This was in contrast to upland cultivation which, being undertaken individually for the most part, did not merit such encouragement, but rather was seen as in need of reforming into new communal forms – an action that was never introduced in Illubabor Zone (Dessalegn Rahmato, 1990).

The emphasis upon communal activities in the wetlands was facilitated by the redistribution of land, which took place through the Derg's land reform measures. In an attempt to ensure equal access to land, there was a redistribution of all land used for cultivation. In Illubabor this meant that wetlands, as well as cleared uplands, were redistributed among the farming households to ensure equal–sized holdings. In this way more households than in the past obtained access to wetlands.

However, it was not just a question of access to wetlands and the importance of communal activities that encouraged wetland cultivation during the Derg regime. Another part of the Derg's policy was that land had to be redistributed on a regular basis in order to ensure equality. At such times any land given to a household but left unused would be reallocated to another household. Hence it was essential for a household to use all the land allocated to it, however poorly this was done, just to ensure that they retained rights to that land. This meant that wetlands that were cultivated were used completely, if not so intensively, just to prevent their loss during the redistribution process.

The state intervention in crop pricing during the Derg regime also affected wetland cultivation. With coffee prices and grain prices held down, vegetables and cattle, items beyond the control of the state marketing system, became relatively more attractive. Hence, farmers increasingly used wetlands to expand these enterprises.

CONFLICTS AND CONFLICT RESOLUTION IN WETLAND MANAGEMENT

This experience in Illubabor Zone shows that government policies of a developmental, socio-economic and politico-institutional nature have affected wetland use and organisation

both directly and indirectly. For instance, increased coffee production led to the displacement of cultivation into wetlands, while wetland cultivation has been seen as a way of achieving national food security and supporting socialist style modes of production. In other cases, wetland cultivation has been encouraged in response to general government policies, such as land redistribution and the pricing of coffee, while local institutions involved in the management of wetlands have been replaced by state developed ones.

In general, wetland cultivation has been stimulated by central government policies which were developed to meet national goals. The implementation of these policies focused solely on the achievement of the national interests and, as is common with national policies, there has been little attention given to the varying impact of these policies in different parts of a diverse country, and to the need for flexibility. Certainly there has been no consideration of the impact of the policies upon wetland ecology or sustainability, nor on the ways these areas contribute towards the variety of local goals. Nor has there been any attention given to the way in which these policies have interacted with, and perhaps undermined, local knowledge by encouraging more intensive use of wetlands that may not be sustainable. In addition, these national goals are not necessarily the priorities of the local communities, and so increased wetland cultivation may have been undertaken by the rural communities not solely or primarily because it was in their interests, but rather because of circumstances and the pressures put upon them.

On the other hand, the traditional wetland management practices of the communities in Illubabor are designed to meet their own goals and objectives. The households that make up these communities pursue wetland use strategies that are relevant to their resource situations and to the micro-environments to which they have access. These local strategies of wetland use are not designed with a view to contributing to national goals but rather seek to meet the various goals of the individual households, which include long-term security. In some cases these may coincide with national priorities but in other cases they may not. For instance farmers' abandonment of wetlands in order to allow regeneration in a year of national, but not local, food shortage may be seen by the government as perverse, if not subversive.

Hence there is a potential for conflict between the state's interests in the achievement of national goals, such as increased production through wetland use, or social change through cooperative activities, and the interests of the local communities, who seek multiple benefits through the sustainable use of their wetlands, optimum returns on their labour, and advancement towards their socio-cultural goals. Some manifestation of this conflict may be seen in the wetland degradation that occurred in some parts of the study area since the early 1980s. While some expansion of wetland cultivation during this period has been achieved in an apparently sustainable manner, in other cases there has been degradation of the wetlands through over-drainage, cattle trampling, and soil fertility changes, leaving these areas as rough grazing rather than productive farmlands. The probable causes of this degradation include the excessive external pressures that have been placed upon communities to use wetlands. As a result, wetland cultivation has expanded too rapidly preceding the development, or dissemination, of appropriate management technology and the adaptation of existing local knowledge. It might also be suggested that this problem has occurred because of inappropriate external advice, or because of a lack of concern by farmers when wetland cultivation has been undertaken without any real interest, for instance when purely seeking to keep access to land.

To resolve the conflict between these two different perspectives and goals, and to maintain the sustainable use of wetlands whilst contributing to national goals, a series of proposals can be made for actions by both the government and the local communities.

With respect to the government it may be suggested that policies should be made more sensitive to the diversity of local conditions, including the specific wetland conditions and the needs of their communities. National policies need to be implemented more flexibly so that they can be adjusted to ensure that there is no degradation of the country's resource base, including wetlands. These objectives may be achieved through a number of actions including:

- respecting local communities' rights to wetlands
- recognising the range of contributions and benefits which wetlands produce, and making an economic assessment of the value of these, so that uncultivated wetlands are not seen just as wastelands
- developing sensitivity to local knowledge concerning sustainable wetland management, and incorporating this knowledge in policies and practices for wetland use which should be designed in a participatory manner
- undertaking strategic environmental impact assessments of policies in order to determine their environmental impacts on wetlands, and the possible need for adjustment of the policies, and
- recognising the long-term, sustainable, and multiple-use goals of local people and balancing these against the short-term goals of the state.

At the same time, wetland-using communities need to recognise their position in the state, and understand that as political and commercial pressures grow, they have to defend their interests and rights whilst making their contribution to national development. This will involve increased inputs by local communities into the planning and development process, which is one of the stated goals of the present government in Ethiopia. Actions by wetland-using communities to support this may include:

- recognising that they have rights to the wetlands they use and that they should be involved in any discussions and policies which concern these wetlands
- emphasising the value, both monetary and otherwise, of the various uses of wetlands in discussions with

government officials so that all parties recognise the values of the diverse benefits that come from wetlands
- ensuring that their local knowledge is recognised and valued appropriately, and perhaps formalised to some degree so that it can be more easily used in debates concerning the use of wetlands (but not formalised to the extent that the knowledge becomes alienated from the communities)
- identifying local management skills and capacity, and seeking their enhancement (rather than undermining them) through outside contacts with government extension services
- ensuring that the goals of the local communities, especially the long-term sustainable use goals, are recognised and considered in these discussions, and
- empowering local communities so they can take on new responsibilities and roles through participatory research, and
- developing simple monitoring systems with key indicators to enhance the communities' ability to ensure the sustainability of wetland use.

Overall it can be urged that for both parties, the sustainable use of wetlands should become a priority. This, however, needs to be seen within a wider, ecologically sensitive perspective that recognises the contribution of wetlands to the broader environmental responsibilities of the state and to the communities. In this way, it should be possible to ensure the continued functioning of the life support systems of which wetlands are a part – such as the hydrological cycle and biodiversity maintenance – and to enhance, in a sustainable manner, socio-economic welfare at the local and national levels.

TOWARDS THE FUTURE

It must be recognised that wetlands will not be retained or maintained by local communities or the state if they are not valued. This is especially true in poor countries where food security and poverty eradication are more urgent priorities than environmental sustainability. While some preservation of critical wetlands may be achieved in protected areas, the majority of wetlands will remain outside such areas, and will be used by rural communities. For the survival of wetlands in this situation, it is essential that they produce long-term benefits for both the local community and the state, so that they are valued, and their sustainable management becomes a common goal.

In some instances sustainable management may involve little alteration of wetlands from their natural state, but in other cases some drainage and rotation of land uses may be desirable. The latter should not be ruled out as long as it is undertaken in ways that ensure sustainable production and the continued contribution of the wetlands to ecological functioning through the hydrological cycle and biodiversity maintenance. In this way wetland utilisation may fulfil, in a complementary manner, the goals of the local communities and the state.

To achieve this, however, it is necessary to develop a better understanding between local communities and the state, based on the recognition of the ecological functions of wetlands and the range of benefits that they produce for both parties. Excessive pressures by the state to develop wetlands must be controlled, but at the same time sustainable use mechanisms need to be developed, building on local knowledge and institutions, to ensure the long term survival and contribution of wetlands to local and national development, and to ecological security.

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REFERENCES

Abbot, P.G.A. and Afework Hailu, 1998. Report of a PRA Training Course. EWRP, Mettu.

Afework Hailu. 1998. Woreda survey of wetland use in Illubabor, 1998. EWRP, Mettu.

Alemneh Dejene. 1990. *Environment, famine and politics in Ethiopia. A view from the village*. Lynne Reinner, Boulder, Colorado, USA.

Dessalegn Rahmato. 1990. Co-operatives, state farms and smallholder production. In: S. Pausewang, Fantu Cheru, S. Brune and Eshetu Chole (eds.) *Ethiopia: Rural development options*. Zed Press, London, pp. 100-110.

Dixon, A. 1997. Sustainable hydrological management of wetlands in Illubabor, Ethiopia. Transfer Report, Dept of Geographical and Environmental Sciences, University of Huddersfield, UK.

Dixon, A. 1999. Sustainable hydrological management of wetlands in Illubabor, Ethiopia: the role of local knowledge. Draft Thesis, Dept of Geographical and Environmental Sciences, University of Huddersfield, UK.

Dries, I. 1991. Development of wetlands in Sierra Leone: farmers' rationality opposed to government policy. *Landscape and Urban Planning* 20: 223-229.

Dugan, P.J. (ed.) 1990. *Wetland conservation. A review of current issues and required action*. IUCN, Gland,.

Gichuki, F.N. 1992. Utilisation and conservation of wetlands: an agricultural drainage perspective. In S.A. Crafter, S.G. Njuguna and G.W. Howard (eds.) *Wetlands of Kenya*. IUCN, Gland, Switzerland. pp. 173-174.

Hollis, G.E., W.M. Adams, and M. Aminu-Kano 1993. *The Hadejia-Nguru wetlands. Environment, economy and sustainable development of a Sahelian floodplain wetland*. IUCN, Gland, Switzerland.

Katerere, D. 1994. Policy, institutional framework and wetlands management in Zimbabwe. In: T. Matiza and S. Crafter (eds.) *Wetland ecology and priorities for conservation in Zimbabwe*. IUCN, Gland, Switzerland. pp. 129-136.

Kloos, H. 1991. Peasant irrigation development and food production in Ethiopia. *The Geographical Journal* 157: 295-306.

Mafabi, P. 1993. Policy development for wetland management. In: G.L. Kamukala and S.A. Crafter (eds.) *Wetlands of Tanzania*. IUCN, Gland, Switzerland. pp. 139-144.

McCann, J.C. 1995. *People of the plow: an agricultural history of Ethiopia, 1800 - 1990*. University of Wisconsin Press, Madison, WI, USA.

MoA (Ministry of Agriculture) 1994. *Profile of Illubabor zone.* MoA, Mettu, Ethiopia.

Olindo, P. 1992. Food policy and wetlands. In: S.A. Crafter, S.G. Njuguna and G.W. Howard (eds.) *Wetlands of Kenya*. IUCN, Gland, Switzerland. pp. 173-174.

Tegegne Sishaw 1998. Agriculture and land use in and around the wetlands of Wangegne and Beke Chora Peasant Associations in Illubabor Zone. M.Sc. Thesis, Dept. of Geography, Addis Ababa University.

Wood, A.P. 1996a. Sustainable wetland management in Illubabor zone, south-west Ethiopia. Research Proposal submitted to European Union, B7-6200 Environment Budget Line.

Wood, A.P. 1996b. Wetland drainage and management in south-west Ethiopia: some environmental experiences of an NGO. In: Reenberg, A., Marcussen, H.S. and Nielsen, I (eds.) *The Sahel, Proceedings of the 8th Danish Sahel Workshop*. Dept. of Geography, Copenhagen University, Denmark. pp. 119-136.

Wood, A.P. 1998. Policy impacts upon wetland utilisation. First year research report. EWRP, Huddersfield University, UK.

[1] The Derg regime is the committee-based military government established after the overthrow of Haile Selassie in 1974, followed by the government of Mengistu Haile Mariam from 1975 to 1991.

[2] "Dejazmach" is a politico-military title given under the Imperial regime to senior administrators and leaders of troops.

UTILISATION AND ECONOMIC VALUATION OF THE YALA SWAMP WETLAND, KENYA

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KEYWORDS: Yala, swamp, wetland, Kenya, economic valuation

ABSTRACT

The Yala swamp is an extensive wetland in western Kenya, covering an area of 17'500 ha. The wetland, together with its three lakes, is an important site for biodiversity conservation. The local community has been associated with the wetland for a long time, and they obtain key resources from it. To date, however, 2300 ha of the wetland have been reclaimed for agricultural production, and there are fresh proposals for further reclamations.

The aims of this paper are to describe the patterns of utilisation of the wetland, including a preliminary economic valuation of the resources, and compare these with the costs and benefits of conversion. Surveys, interviews, and participant observation were used to obtain information. Direct economic values were calculated for fisheries, water transportation, agriculture, building materials, fuelwood, grazing, hunting, mat making, salt licks, and tourism. Indirect values include medicinal plants, vegetables, flood control, and wildlife habitats. The wetland also has existence and option values, which will be lost if the swamp is converted.

Comparing these values with the short-term gains, and the cost of conversion, and considering soil degradation and disruption of the socio-cultural situation, it is suggested that the wetland provides valuable economic resources to support the population, and should not be converted. Instead, traditional sustainable uses of the wetland should be promoted for the benefit of the local people.

INTRODUCTION AND BACKGROUND INFORMATION

This paper is part of a wider research programme that has been initiated in the Yala swamp to study community utilisation, perception, and conservation of the wetland. The results will be used to initiate a community-based conservation programme. To achieve development, resource exploitation is necessary. The widespread lack of sustainable use of wetlands can be attributed to a lack of recognition of traditional values of these wetlands, and the desire for modernisation. Thus there is a compelling need to enhance traditional wetland uses through integrating them into modern management concepts. As rural African societies depend heavily on natural resources for their livelihood, conservation and rural development should be pursued jointly.

The Yala swamp is one of the few extensive wetlands found in western Kenya. The wetland covers an area of 17,500 ha and contains three freshwater lakes, Kanyaboli, Sare, and Namboyo. The swamp vegetation is mainly papyrus (*Cyperus papyrus*) and *Phragmites* reeds. This wetland is nationally important in that it is one of the few habitats where the threatened Sitatunga antelope (*Tragelaphus spekeii*) is found in Kenya. The associated lakes contain some critically endangered haplochromine fish species, some of which are no longer found in Lake Victoria (Kaufman and Ochumba, 1993).

Lake Kanyaboli has suffered as a consequence of land reclamation. In 1970, inflow into the lake from the Yala River, the lake's only major inlet, was stopped, by the construction of a diversion canal, 8 km long, to convey the river water directly into Lake Victoria. At present the only inlets into the lake are through River Rapudo, a small stream flowing from the east and through some broken dykes.

The wetland is important for biodiversity, but also has great socio-economic value to the local communities, for whom the wetland has long been a source of fish, vegetables, medicinal plants, building materials, and agricultural land. Since the wetland is not protected, it is vulnerable to over-exploitation. Currently there are fresh proposals supported by the local politicians to fully reclaim the wetland for agro-industrial sugar cane and rice plantations (Okondo, 1989). Its future cannot therefore be taken for granted.

The Yala swamp wetland is thus important to three different, and sometimes conflicting constituencies:

1) to the local people, who use it for agriculture, fishing, grazing, brick making, papyrus exploitation etc.
2) to development planners, for whom it represents a potential area where agro-industrial exploitation could lead to economic development
3) to conservationists and traditionalists, for whom it represents a unique area, important in its own right.

This situation raises some important issues:

- To which of the three broad uses – community-based resource management, agro-industrial development, or biodiversity conservation – should the wetland be put, in order to yield maximum benefits?

- What management practices could be adopted to ensure that the three conflicting uses of the wetland could be pursued to yield maximum economic gains to the local people?
- Is conversion of the wetland the most effective and economical use of the wetland?

While reclamation has received immense political support, evidence on the ground shows that past attempts were not well received. This was because the local people were displaced, and they were not even given access to the agricultural produce.

This study addressed these issues by pursuing the following research activities:

- elucidating the economic dependency of the local community on the swamp
- describing the patterns of utilisation of the wetland resources
- estimating the replacement value of economic activities that would no longer be possible if the wetland were converted.

Critical examination and analysis of the findings of this research will inform the basis of future activities in this wetland in collaboration with the local communities.

The study area was divided into three regions reflecting differences in socio-economic status and land uses:

- **Area 1. Usigu-Lake Sare area.** This area lies in the south-western part of the Yala swamp in the Yimbo administrative division, and includes two lakes, Namboyo (2 km^2) and Sare (5 km^2). This area borders Lake Victoria, and fishing forms a major economic activity. This area is occupied primarily by the Luo people; 200 interviews were conducted.
- **Area 2. Yala swamp complex / Lake Kanyaboli area.** This area houses the Yala Swamp reclamation field station, and several reclamation experimental farms are found here. This is the area where 2300 ha had been reclaimed. The main economic activities are subsistence farming, brick making, papyrus harvesting, and fishing in Lake Kanyaboli. This area is also occupied primarily by the Luo tribe; 150 people were interviewed.
- **Area 3. Sumba-Usonga area.** This area lies in the northern part of the swamp in the Uranga administrative division. A large expanse of the wetland is used for drought grazing. Subsistence agriculture as well as rice farming are predominant. Unlike the other two, this area is inhabited by the Luhya tribe; 150 people were interviewed.

In each of the three areas, wetland residents living within a radius of about 5 km responded to open-ended questionnaires. Information was obtained on: residents' activities in the wetland, role of these activities in wetland destruction, degree of dependence, socio-cultural values, role of economic activities and other factors in species decline, and conservation needs of the wetland. Surveys were done in the local markets to establish the prices of wetland products.

ECONOMIC DEPENDENCE ON AND VALUATION OF THE WETLAND

The research revealed that the local community is highly dependent on the wetland's resources. These resources are either consumed directly, used as materials in production, or sold. While almost all resources are exploited at subsistence levels, some of them are also exploited commercially. Fully 84% of the respondents indicated that if access to these resources is removed, then their lives will be affected, while only 11% indicated that their lives would not. Only 24% would have alternatives, whereas 69% said that they would not have alternative economic activities (the difference from 100% in each case represents those who did not respond).

To estimate the total economic value of the wetland, we calculated the use value of the various products. In the case of commercial goods such as harvested fish, we calculated the 'willingness to pay' value by computing the net benefit of the product to the consumer and to the producer. However, in attempting to produce an economic value of the wetland, we are aware of the intricacies of trying to assign a quantitative value to wetlands (Folke *et al.* 1993). Secondly, due to the difficulty of obtaining accurate quantitative information, a quantitative evaluation was not feasible, and we opted for descriptive, qualitative valuation.

The valuation of these commodities and services for purposes of wetland management is complicated by the difficulty of computing a common denominator for the various values of wetlands against human economic systems (Mitsch and Gossenlink, 1993). Table 1 provides a summary of the main economic activities found in the Yala swamp wetland, and the computed average monthly incomes from each.

PATTERNS OF WETLAND UTILISATION

Fisheries: In the satellite lakes, the main method of exploitation is by use of gill nets. As fish sizes decline, the mesh sizes used are correspondingly reduced. The consequence of this is that the sizes of the fish caught are getting smaller and smaller – a clear indication of over-exploitation. Imposition of regulations by the fisheries department and a local NGO have met with resistance. However, through the establishment of fisheries co-operatives, the fishers, through their officials, are beginning to understand the need and importance of closed seasons. Other methods of fishing include use of long lines, and, in areas bordering Lake Victoria, seine nets. Fish is the most important wetland product, and 98-100% of the respondents are dependent on the fish, either commercially or for subsistence. The average income per day per fisher is about Ksh 143 (1$=Ksh 60 at the time of research; 1$=Ksh 75 in September 1999). Other commercial activities, such as net repairing, are indirectly associated with fishing. The net repairers earn Ksh 100 per person per day.

Hunting: Traditional spears, trapping, and use of dogs are employed. No guns are used. Hunting is irregular, is carried out to augment food requirements, and is usually done by individuals, rather than groups. Animals hunted include sitatunga, impalas, squirrels, hedgehogs and wild pigs. Since hunting is illegal, most people were reluctant to divulge information. The actual number of people involved in hunting, and hence its economic contribution, is undoubtedly higher than the data presented here. Only 14% of the respondents around Lake Kanyaboli said they are dependent on hunting. None admitted to being involved in hunting as a commercial activity. Around Lake Sare 46% of the respondents admitted they are dependent on hunting. The average prices for some of the target animals are: sitatunga (Ksh 1000), duiker (Ksh 500), hare (Ksh 200), waterfowl (Ksh 120), Guinea fowl (Ksh 250) and harlequin quail (Ksh 20-50).

Grazing is carried out in the swamp, which is a free access property, and so grazing is not controlled. The wetland is particularly important for grazing during droughts. Of the people living around Lake Kanyaboli and Sare, 68% and 80% respectively depend on the wetland as a grazing ground. A special kind of clay containing minerals required by animals, and found only at particular spots, is used by cattle as a salt lick.

Agriculture: A number of crops are grown in the wetland, as shown in Table 2. Agriculture takes place on privately owned farms, based on traditional methods of land cultivation, with little use of fertiliser or biocides.

Fuel is provided by firewood or charcoal; no biogas production takes place. In the area around Lake Kanyaboli, 78% of the people are dependent on fuelwood, for either commercial or non-commercial purposes.

Building materials: Papyrus and grass are used as roofing materials. The papyrus is sold in bundles costing Ksh 70 each, and 30 bundles are required to build an average sized house (Ksh 2,100 for the roof of a 13x20-foot house). To build a similar house using iron sheets for roofing would cost Ksh 11,500. This then is the replacement value of papyrus as a building material. The wetland also provides clay and trees as building materials. Traditional houses in the wetland area are made of clays, sand, wood and papyrus, and 86% of the respondents are dependent on the wetland for building materials. Around Lake Kanyaboli, 12% earn direct income from selling building materials, while in the Lake Sare area this is 44%. Around Lake Kanyaboli 54% gather their own building materials, while 35% buy the building materials. Around Lake Sare, the figures are 14% and 42% respectively. The wetland further provides wood and clay that is used to construct and plaster the walls of houses. If these wetland products are no longer available, bricks would have to be used as a substitute and the cost of the bricks needed to make an average sized house would be Ksh 21,600. Bricks are made by baking the special clay from the wetland in earth furnaces. The Yala wetland is an important source of building materials.

Mats, seats and basket making: Papyrus reeds are cut and used to make a variety of products, either for sale or for personal use. Mats are used both as bedding materials or drying surfaces, and also have potential as roof ceiling materials. Mats of various sizes, ranging from 3x3 to 9x10 feet, are made from papyrus, and are sold for Ksh 100-350. Papyrus is also used for making chairs and roof cover.

Water from the wetland is used for domestic purposes such as washing, cooking, and building. The waters are also a medium of communication from one point to another. In addition, boat owners earn Ksh 3000-3300 per month for ferrying passengers.

CONCLUSIONS AND RECOMMENDATIONS

The above survey of direct use values suggest that the Yala swamp wetland provides the local population with a variety of economic benefits, and indicates that the wetland has enough economic potential to support its population.

Proponents of reclamation have argued that conversion of the wetland would improve incomes. We examined this argument by calculating the replacement value of each activity. Replacement value is defined as the cheapest way of replacing a value obtained from the wetland by some technology (Folke *et al.* 1993). For example, the cost of a water purification plant would be the replacement value of the wetland for maintaining drinking water quality. Some of the replacement values of the wetland to be calculated are as shown in Table 3. It is likely that the replacement values of substitution activities – when possible – will be much higher than the activities currently taking place. Conversion of the wetland would bring an end to, or greatly reduce, these economic activities, and thus it is unlikely that it would be economically justified to drain the area.

We also noted that, in addition, conversion would lead to the loss of important ecological and socio-cultural values, listed in Figure 1.

Conversion of the wetland, while it may give short-term gains, will lead to long-term economic, social, and environmental problems such as inflated costs, and reduction or loss of yields after irreversible soil fertility exhaustion. Examples of this pattern are known from elsewhere, e.g., in Uganda's Kibimba Rice Scheme, yields fell from 4.9 T/ha in 1986 to 1.7 T/ha in 1988 (Denny and Turyatunga, 1992). Other problems resulting from conversion include resettlement, compensation, siltation, eutrophication, and loss of habitat for animals. Since reclamation of the wetland will likely result in numerous and severe problems, we recommend that it should not be undertaken. Instead, present economic activities should be enhanced and their wise use promoted.

Possible sustainable development programmes that should be pursued would include:

a) Papyrus industry. This could involve formation of groups to make mats, baskets, seats etc. NGOs could be consulted in order to improve the technology and the quality of the products, to help develop other innovative papyrus products, and to explore better marketing strategies.
b) Brick making. Again groups could be formed to be develop brick-making activities.
c) Aquaculture. At present, this is not practised in the wetland at all. Aquaculture could be developed by cutting wide channels into the swamp at right angles to the shore, as proposed by Denny and Turyatunga (1992) for Ugandan Lake Victoria wetlands. The soil removed from the channels would be heaped between the channels to form raised beds. These channels could be used to raise *Clarias* and *Tilapia*, while the fringe of the ponds could be used to cultivate papyrus. Furthermore, aquaculture development would reduce pressure on the satellite lakes.
d) Tourism. This is the least developed activity at present, and it holds the greatest promise. Potential tourist attractions include birdwatching, sportfishing, boating, and viewing animals. Further income could be obtained by charging scientists visiting the wetland. The wetland could be aggressively promoted as a locally controlled, people-centred tourist destination, and included in Kenya's "western circuit".
e) Energy. To reduce pressure on trees, the use of papyrus as a source of renewable energy through harvesting and briquetting, or through biogas plants, should be encouraged.

Although it is not possible to give a single robust figure that states the total economic value of the wetland, this study strongly indicates that the wetland has enough economic values to sustain the population, if resources are used sustainably. In addition, inclusion of value-added data on commercial use value would further increase the wetland's value. The total value of the wetland is even higher if we take into account the non-use values illustrated in Figure 1. To get a complete picture of the total value of an economic benefit, such as fishing or agriculture, one must look at the whole chain from harvest to end-market. Taking these and the entire range of values of the Yala wetland into account, it is recommended that conservation and wise use, rather than conversion of the wetland should be pursued.

REFERENCES

Mitsch, W. and J. Gossenlink. 1993. *Wetlands*. Von Nostrand Reinhold. 539 pp.

Okondo, P. 1989. The Yala swamp is useless. *Resources* 1: 11-14.

Folke, C., C. Perromgs, J.A. McNeely, and N. Myers. 1993. *Biodiversity conservation with a human face: Ecology, economics and policy. Ambio 22(23): 62-63.*

Denny, P. and F. Turyatunga. 1992. Ugandan wetlands and their management. In: E. Maltby, P.J. Dugan and J.C. Lefeuvre (eds.). *Conservation and Development: The Sustainable Use of Wetland Resources*, IUCN. Gland, Switzerland. pp 77-84.

Kaufman, L. and P.B.O. Ochumba. 1993. Evolutionary and conservation biology of cichlid fishes as revealed by faunal remnants in Northern Lake Victoria. *Conservation Biology*, Vol. 7 (3): 719-730.

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Table 1. **Patterns of exploitation of the Yala Swamp Wetland**

Activity	% people involved	Mean monthly income (Ksh) (Commercial)	Subsistence
Grazing[1]	49.3	300	✔
Hunting	11.2	150	✔
Fishing	80.6	5015	✔
Tourism	-	-	-
Fuel wood collection	66.15	984	✔
Papyrus	21.0	1000	✔
Exploitation[2]			
Agriculture[3]	89.53	1263	✔
Salt lick	35.0	-	✔
Water for domestic use	97.0	-	✔
Transport	70.0	3000	✔
Brick making	5.58	2000	✔
Building materials (papyrus)	28.00	2100	✔

1- Sale of milk only (meat not included)
2- Chair, mat making
3- Mean for all crops

Table 2. **Income from agricultural crops grown in the Yala Swamp Wetland**.

Crop	% people involved		Income (Ksh/month)
	Commercial	Subsistence	(commercial)
Sorghum	1.6	36.0	210
Cassava	1.3	47.0	290
Maize	5.8	52.0	552
Peas	-	5.5	-
Yams	2.3	9.1	55
Beans	1.3	21.7	148
Tomatoes	14.0	10.0	1466
Onions	1.9	1.6	196
Cotton	12.0	-	5000
Kales	15.8	42.4	2197
Sweet potatoes	2.6	28.8	300
Rice (only in area 3)	10.6	2.7	7000
Fruits (oranges, pawpaws, bananas, mangoes)	1.6	10.4	1500
Others (sugarcane, sesame, groundnuts)	-	5.0	-

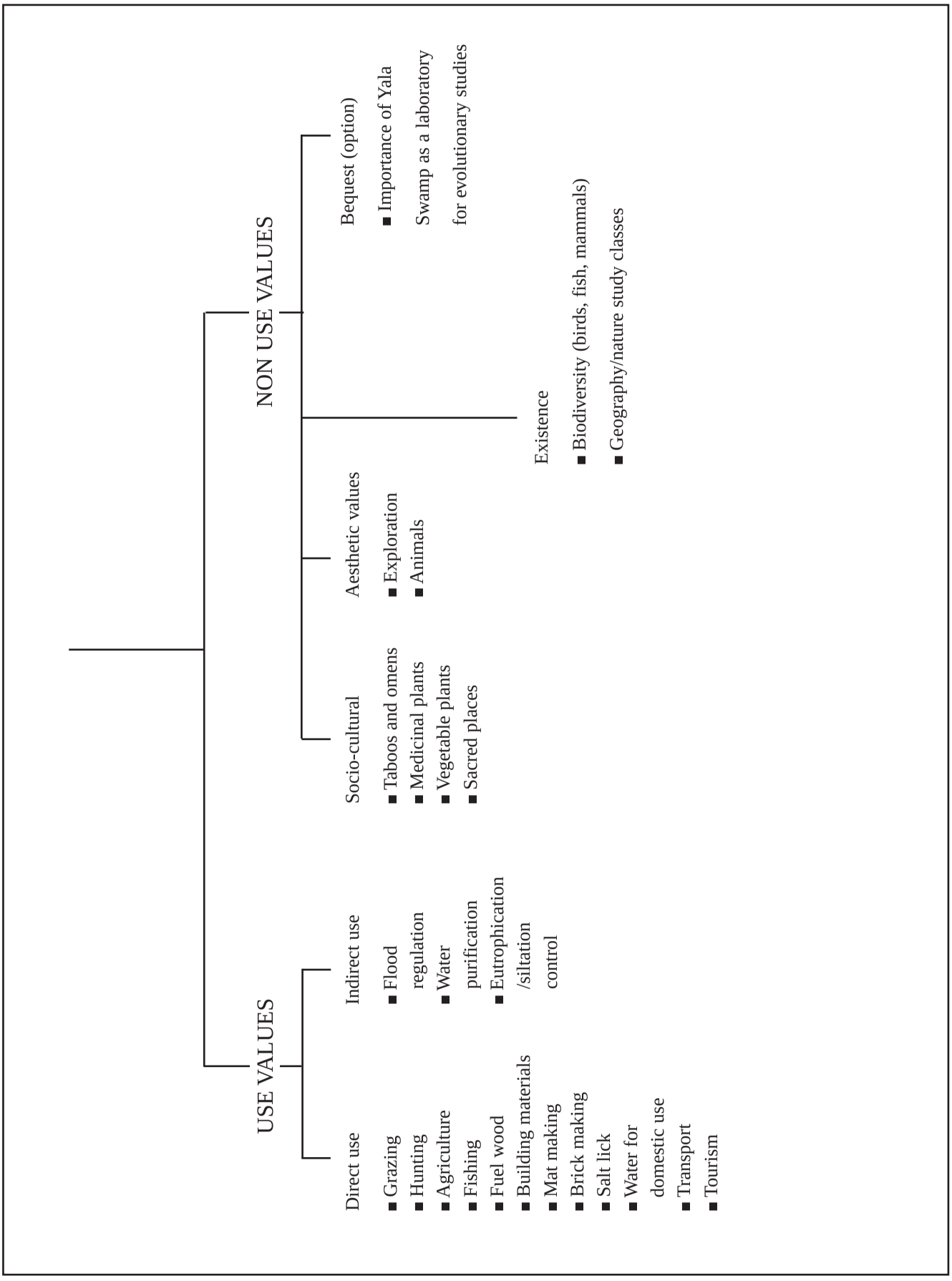
Table 3. Replacement values of some Yala Swamp Wetland Resources.

Economic activity	Replacement Technology	Replacement value
Grazing	Replacement not possible	None
Hunting	Cost of meat bought	None
Fishing	Replacement not possible	Cost of buying fish from the wetland
Tourism	Replacement not possible	None
Fuel wood collection	Installation of energy sources	Cost of installation, cost of fossil fuel
Agriculture	Reclamation	Cost of reclamation, cost of compensation
Brick making	Block making factory and other building materials	Cost of blocks purchased from far
Papyrus exploitation	Replacement not possible	Value of other building materials e.g. iron sheets
Salt lick	Replacement not possible	Coast of commercially produced salt licks
Water for domestic use	Water treatment plant Water quality inspection	Coast of installing the plants, purchase of chemicals, water transport, maintenance coasts
Transports	Building bridges and roads round the wetland	Coast of bridges and roads; maintenance costs

Some calculated replacement values:

1. Hunting: Ksh 50 per family per day
2. Fuelwood collection: Ksh 300 per month per family on charcoal. Ksh. 1000 per month per family on gas.
3. Brick making: Ksh 30 per block. Ksh 30,000 for a whole house
4. Papyrus exploitation: Ksh 11,550 to build a whole house.

Figure 1.
Total Economic Value of Yala Swamp Wetland.



MITIGATING THE EFFECTS OF INTENSIVE AGRICULTURE ON WETLANDS: THE CASE OF SAIWA WETLANDS, KENYA

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KEYWORDS: Saiwa, wetlands, intensive agriculture, soil conservation, land use, sitatunga (*Tragephalus spekei*)

ABSTRACT

The Saiwa wetlands are located in the Trans-Nzoia District in the Western part of Kenya. Part of these wetlands form Saiwa National Park (SNP), which is the smallest park in Kenya, with an area of 3.1 km^2. The wetlands host important biodiversity, but are threatened by intensive agriculture carried out in the catchment area. Threats include inputs of agricultural chemicals transported by runoff from the adjoining farms, and encroachment by farmers neighbouring the wetlands. The major impacts of these changes include the erosion of the banks of the two rivers (Sinyerere and Kapenguria) that feed into the wetlands, and the succession of the native *Typha* vegetation by elephant grass.

WWF - WorldWide Fund for Nature initiated the Community Based Wetlands Conservation Project to work on mitigating these problems in the Saiwa wetlands. The project used a combination of Participatory Rural Appraisal (PRA), ecological management principles, and economic tools to help promote a sustainable land use system for the Saiwa wetlands. A soil conservation scheme was implemented in Kipsoen. With technical support and training, the community elected a Catchment Committee, responsible for advising and ensuring progress on the soil conservation schemes. The aim of the scheme is to benefit both the people – through alternative land use practises – and biodiversity, by reducing chemical loading of the wetlands, thus improving habitat. This paper examines the main issues in the resolution of resource use conflicts, and the management of the wetlands. The case of the Saiwa wetlands points to a win-win co-management scenario, where both people and nature benefit.

INTRODUCTION

Since the beginning of the 20th century more than half of the wetlands in the world may have disappeared (Barbier, 1991 and 1993; Micheli, 1992). While most of this loss has occurred in developed countries, wetland loss is on the rise in the developing world, especially in the tropics. Most of these wetland conversions are for agricultural lands, fishponds, and urban settlements (Farber and Constanza, 1987).

The Saiwa wetlands, located in the Trans-Nzoia District about 400 km west of Nairobi, are threatened by intensive agricultural practices that, if not checked, may have severe ecological impacts. These are productive wetlands, suitable for various land uses, including agriculture, forestry, livestock production, and to some extent ecotourism. They are also host to important plant and animal species. The suitability of these wetlands for various types of use has led to conflicts between competing interests: particularly the local communities who are concerned with maximizing productivity, and conservation groups who are concerned with conserving the wetlands.

Two rivers, the Sinyerere and the Kapenguria feed the Saiwa wetlands. River Sinyerere originates from Mt Elgon, and has a catchment area of 2500 km^2. River Kapenguria originates from Cherangani hills, and has a catchment area of 1125 km^2. In 1974, part of the wetlands was gazetted as Saiwa National Park. The park is the smallest in Kenya, covering an area of 3.1 km^2. The wetlands host a diversity of species, including 26 species of mammals, 370 bird species, and about 480 plant species. Noteworthy are the sitatunga (*Tragephalus spekei*), which is endemic to the wetlands, and crowned cranes, a well-known flagship species in the area. The vegetation in the park consists of three communities: gallery forest (39%), open grassland (24%) and wetland vegetation (37%). The principal wetland vegetation consists of large stands of bulrush (*Typha domingensis*), reeds and sedges such as *Cyperus latifolius*, and tall swamp grasses such as *Echinochloa pyramidalis* and *Pycreus lankecus*, interspersed with extensive patches of low vegetation, mainly *Hugrophila spiciformis*, *Ranunculus multifidus* and *Polygonum setulosum*. The wetland vegetation is bordered by remnants of tropical gallery forest composed of a variety of trees and shrubs including *Ficus* sp., *Phyllanthus* sp., *Acacia* sp., *Albizia* sp., *Termanalia* sp., *Syzigium* and *Hibiscus* sp. The gallery forest gives way to grassland community in the lesser water zone, with species such as *Chloris gayana*, *Sporobolus africanus* and *Setaria* sp.

Various ethnic groups have emigrated from other parts of Kenya to benefit from the settlement schemes in Trans-Nzoia District, and now inhabit the area surrounding the wetlands.

As a result of this migration, the population of Sinyerere (the area encompassing Saiwa wetlands) has grown from 600 settlers at the time of independence, to an estimated 30'780 people in 1996. The government settlement programme marked a turning point in 1969, when former white farms were transferred to local people. The population of the Sinyerere area, and population density trends are shown in Table 1 below.

The growth in human populations has resulted in substantial impacts on the Saiwa wetlands, particularly in the increased demand for wetland resources. Common practices that affect the wetlands include sub-dividing family farms, draining wetlands, and renting out wetlands (Kamugisha *et al.*, 1997). People have settled in or near wetlands, and cultivate areas close to the riverbanks. Wetland encroachment has resulted in riverbank erosion of the Sinyerere and Kipsaina Rivers.

Intensive agricultural activities are a major threat to the Saiwa wetlands and their biodiversity. Most farmers in the area, in order to increase their yields, use agro-chemicals, which then are carried by runoff to the wetlands, thus changing the water chemistry, and triggering vegetation succession (elephant grass has displaced the native *Typha* vegetation), and other ecological changes. The decline in the population of sitatunga in Saiwa National Park is attributed to the elephant grass, which impedes the sitatungas' movements. Furthermore, the population of breeding crowned cranes has decreased from 24 pairs recorded in 1992, to 14 pairs recorded in 1998. It is thought that the decline in the crane population is due to deterioration of the wetland habitat because of unwise agricultural practices in the catchment area (Gichuki, 1998).

METHODS

Most of the Saiwa wetlands lie outside Saiwa National Park, and are not protected by Kenya Wildlife Service, and the Community Based Wetlands Conservation Project adopted a catchment approach as the most appropriate mechanism for conserving the wetlands and mitigating the adverse impacts of agricultural development. The major strategic concern for the project is to maintain the ecological integrity of the Saiwa wetlands without precluding the economic development of the resident communities. Several methodological frameworks were combined to meet this challenge. The first steps were an examination of the existing situation through participatory rural appraisals, review of the existing literature, and examination of pertinent policies and legislation. The next step was the ecological characterisation of the different wetland zones along a land use suitability gradient. Thirdly, economic valuation tools were used to determine the comparative advantages of various land use types, through gross margin analysis for various enterprises.

Three broad land use types for the sustainable management of the Saiwa wetlands were subsequently identified and promoted. The first zone consists of the body of water and its associated vegetation, which would be left intact as habitat for wildlife, particularly sitatunga and water birds. The outer zone is the agricultural zone, where farmers grow crops based on appropriate and sustainable farming principles. In between these two zones is the interface zone, the limits of which zone were determined based on the agricultural act that restricts farming on areas adjacent to watercourses up to a width equal to the width of the stream. In this zone, the project promotes wise use livelihood support initiatives, such as fish farming, beekeeping, poultry production, and fruit trees.

RESULTS

The WWF Community Wetlands Conservation Project targeted four major result areas:

- soil conservation in the catchment
- alternative sustainable land use practices on the edges of the wetlands
- community conservation education
- institution building.

Table 1.

Year	Population	Population Density (Persons / km2)	%Change in population
1960	600	2	
1969	6'487	18	order of magnitude
1979	13'493	38	108
1984	18'486	53	37
1989	24'541	70	33
1994	28'848	83	18
1996	30'780	89	7
1999	31'703	96	3
2001	32'654	102	3

Source: Trans-Nzoia District Development Plan 1997-2001. (The figures for 1999 and 2001 are projections based on a growth rate of 3% per annum.)

During the first step of project implementation – community consultation through PRA – the communities identified the various threats and possible interventions, and wetland conservation issues were raised. The local people identified soil erosion as a major problem, and the project intervention, a catchment-based soil conservation programme, was a direct response to that. One of the four settlement schemes, Kipsoen, has been covered with soil conservation structures, including terraces on 102 farms, and cut-off drains at the end of these terraces. Three group nurseries, each producing about 50'000 seedlings annually, have been set up in this scheme, and 60 home nurseries established in individual farms. The seedlings raised in these nurseries will be transplanted in the catchment. Two severely degraded sites have been rehabilitated by the local people, and are showing remarkable improvement, through the regeneration of indigenous vegetation. Local communities have been trained in basic soil conservation techniques so that they can participate fully in the scheme. In addition, the project team recently assisted other members of the local community in rehabilitating two degraded sites near Saiwa wetlands on Rivers Kapenguria and Kipsaina.

As human populations grow in the small areas around the wetlands, pressures on the wetlands increase. People encroach on the wetlands because they have few or no livelihood alternatives. Most of the encroaching farmers are either second-generation owners with small farms (usually less than two acres), or land leasers who wish to maximise their returns by growing vegetables during the off-crop seasons, when supply is low and prices are high. Wetlands provide good sites for growing vegetables when other places are dry, and thus attract encroachment. In order to reduce pressures on the wetlands, while meeting the livelihood needs of the resident people, the project, jointly with a few model farmers, initiated some alternative land uses. The project supports nine community groups around Saiwa with alternative micro-enterprises, including fish farming, beekeeping, and sheep and poultry production. Based on comparative gross margin analysis, it has been found that these alternative enterprises provide a higher gross margin than does maize. For instance, in 1997 the Afya Youth Group earned KSH 90'000 from a quarter acre agro-forestry nursery near the wetlands. In comparison, the gross margin for maize would have been only KSH 30'000. The Afya Youth Group has since expanded its activities to include fish farming and beekeeping, which will further increase the gross margins from these mixed enterprises.

A major focus has been conservation education, targeted at all categories of the resident communities to explore whether the proposed conservation activities are in their long-term interest. Educational methods include cultural activities, lectures, video shows, and information about wetland management. The project supported construction of a resource centre at Saiwa National Park, where local communities are given opportunities to share conservation ideas with the project staff and wildlife personnel.

The project also initiated institution-building initiatives, which will be critical to ensure the long-term sustainable management and conservation of the Saiwa wetlands. The Catchment Committee, formed and trained by the project during the implementation of the Kipsoen soil conservation programme, has transformed itself into the Saiwa Wetlands Conservation Committee.

DISCUSSION

The project aims to benefit both biodiversity and people. The catchment conservation measures undertaken in Kipsoen are designed to reduce chemicals runoff from farms and deposited in the wetlands. Since the sitatunga have suffered from vegetation changes due to nutrient enrichment from runoff, and since the decline of the crowned cranes is thought to be related to pesticide runoff, it is hoped that these soil conservation measures, in addition to benefiting the farmers, will also help to reverse the trends of declining numbers of sitatunga and cranes. The local people have directly benefited from the soil conservation work and related activities. Through the alternative land use systems, the community in Kipsoen increased their incomes and diversified their economic activities, thus reducing agricultural risks.

In participatory management, it is important that all elements of the communities are involved, and the project staff worked to ensure gender equity in all project supported activities. It was important to deal sensitively with the issue of gender in the context of the local culture. One effective way of promoting gender equity was to support income-generating projects that benefited women. The project vision is that, through economic empowerment, all community groups will have a role to play in the management of the wetlands.

The Saiwa experience provides a useful test case for WWF's freshwater strategies. All three of WWF's strategic approaches – intervening at the catchment level, using a holistic approach to freshwater management, and involving local communities – have been applied in this project.

CONCLUSIONS

This project attempts to combine science, policy and livelihood realities in order to mitigate the adverse impacts of intensive agriculture on the Saiwa wetlands. The project started the process with community consultation, and together with the local people, developed a land use system that benefits the resident community and at the same time protects the wetlands. Encouraging results have been achieved in terms of soil conservation, and a new local institutional base has been developed. These results have all been achieved through a joint management strategy.

The test of success will be whether the local people continue with the land use system after the close of the project. We believe there are two reasons for optimism: (1) the people

derive real benefits from this initiative, and (2) the foundation has been laid for local institutional capacity. Now local farmers lay out terraces, and leave uncultivated strips between their farms and the wetlands, and are maintaining or increasing their real income. The project interventions hope to provide a win-win scenario for both people and biodiversity.

REFERENCES

Barbier, E.B. 1991. Environmental degradation in the Third World. In: Pearce, D. (ed.) *Blueprint 2: Greening the World Economy*. Earthscan, London.

Barbier, E.B. 1993. Sustainable Use of Wetlands Valuing Tropical Wetlands Benefits: Economic Methodologies and Applications. *The Geographical Journal* 159 (1): 22-32.

Farber, S. and Constanza, R. 1987. The Economic Value of Wetland Systems. *Journal of Environmental Management* 24: 41-51.

Gichuki, N. 1998. *Status of Birds in Saiwa Swamp National Park, Kenya*. National Museums of Kenya, Nairobi.

Kamugisha, J.R. *et al.* 1997. *Parks and People – Conservation & Livelihoods at the Crossroads: Four Case Histories.* RSCU, Nairobi.

Micheli, E.R. *et al.* 1992. Is Wetter Better: Roundtable. *Bioscience* 42 (1): 58-61.

WWF. 1998. WWF Wetlands Conservation Project FY'98 Annual Report. WWF East Africa Regional Programme Office, Nairobi.

WHO IS WATCHING OUR WATER? PARTICIPATORY MONITORING BY WATERWATCH AUSTRALIA

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KEYWORDS: Waterwatch, community, water monitoring, water quality, catchment

ABSTRACT

Waterwatch Australia is a national community waterway monitoring programme, operating in every state and territory throughout Australia. Waterwatch was initiated by the Federal Government in recognition of a growing concern for water quality, triggered by major issues such as salinisation, clearing of riparian vegetation, and blooms of blue-green algae. It was recognised that these issues reflect a much broader problem: the declining health of catchments throughout the country. In the wake of these problems, Australian communities have developed a strong impetus to explore and address catchment degradation. Through monitoring local waterways, communities are motivated to take action to address water quality issues, and to work together to protect and rehabilitate waterways.

The vision for Waterwatch Australia is "Healthy Waterways", and its goal is for community groups and individuals to be active in the protection and management of waterways. Those involved in Waterwatch build pictures of the health of their waterways and catchments through biological surveys and chemical tests. The programme seeks to create links among communities, local and state governments, school children, parents, the business sector, and other community organisations.

INTRODUCTION

Australia is the flattest and driest continent on the earth, and the health of its river systems, creeks, billabongs, flood plains and wetlands is vital to the well being of all Australians. The impact of European settlement on Australia's river systems has been severe: many are suffering from unsustainable levels of water extraction, destruction of aquatic and riverbank habitats, weed growth from nutrient enrichment, and rising levels of salinity, silt and pollutants. The message of Waterwatch is that: "The way we treat our natural assets must change and, as community members, we must learn to tread lightly and take responsibility for what ends up in our waterways."

Water quality is a fundamental gauge of environmental health, and can help to direct the energies and actions of concerned communities. Species of frogs, fish, invertebrates, and waterbirds can indicate declining water quality, and monitoring them can help communities to pin-point problem areas within a catchment.

Programmes such as Waterwatch have been very successful at reaching the broader community and informing them about the need to protect water quality, by promoting awareness that everything that feeds into the community's drains, sinks, gardens, streets, and paddocks ends up in the area's streams and lakes. In parallel to the growing awareness about waterway health, there has been an increase in community participation in environmental conservation and management. The general public is becoming more active in the nomination of significant wetlands as protected areas, and community members are encouraged to have greater input into local planning reviews. As a result, there is increased community involvement in the protection, monitoring and management of Australia's waterways and wetlands.

Waterwatch is about communities caring for catchments. It is an environmental education and awareness programme that promotes water quality monitoring, in order to create an ownership ethic for catchment-wide land and water management by the Australian people. Those involved in Waterwatch have built pictures of the health of their waterways and catchments through the biological and chemical tests they perform. Over the years, Waterwatch has grown to involve more than monitoring, and is now entering a new era of action to find solutions to waterway problems.

THE HISTORY OF WATERWATCH

The Waterwatch Australia Program was conceived in 1992 following a workshop organised by the Federal Government and involving government agencies, community groups and individuals. The development of the programme was the consequence of a growing concern of the Australian people to improve water quality, triggered by major issues such as salinisation, blooms of blue-green algae, and the destruction of aquatic and riverbank habitat. Since 1993 Waterwatch Australia has grown from 200 groups monitoring in 16 catchments, to nearly 1800 groups monitoring in more than

150 catchments. It is estimated that there are now over 4000 Waterwatch sites being monitored by over 50'000 people from across Australia. Waterwatch Australia is established in all states and territories, and is now operating in a coordinated and strategic manner. Catchment by catchment expansion is being planned by state/territory-based steering committees that have strong community representation.

At present more than 120 regionally-based coordinators are supported to varying degrees by Waterwatch Australia. These community employees are training others to get involved in Waterwatch and to "read" the results of their monitoring so they can design projects to tackle the problems they detect. The programme has evolved to include a State Facilitator in each state and territory, and a National Facilitator in the national office, based in Environment Australia in Canberra. A Waterwatch Australia Steering Committee has also been established to provide overall direction and support for the programme, and to make policy decisions on behalf of the network. Over the past five years, the Federal Government has invested AU$8.2 million in Waterwatch Program in support of over 80 projects across Australia, the vast majority of which continue to be community–based.

The Natural Heritage Trust commits AU$1.25 billion to environmental action, funding projects that directly address pressing environmental issues. The Waterwatch Australia Program is funded under one such initiative funded by the Trust (Edgar, 1998). The Commonwealth's Natural Heritage Trust aims to increase the level of community understanding and involvement in waterway management and rehabilitation. As Waterwatch Australia has been successful in encouraging communities throughout the country to be actively involved in monitoring and managing their local waterways, the Federal Government now views the Waterwatch Program as the cornerstone of this activity of the Natural Heritage Trust. The Natural Heritage Trust represents a new era in environmental responsibility, enabling every Australian to be involved, and bringing together the efforts of individuals, communities and governments to target environmental problems at the source. Through programmes such as Waterwatch, local communities now have a greater opportunity to participate in conservation by identifying sites for environmental action, and applying for funding to conserve, protect, monitor, rehabilitate, and better manage local areas.

Further information about Waterwatch can be obtained from its website at: http://www.waterwatch.org.au.

OBJECTIVES

Waterwatch Australia coordinates and supports community monitoring of waterways, focusing on water quality and aquatic biodiversity. Being a community–based programme, Waterwatch can deliver outcomes that governments alone cannot achieve. The goals of the programme include:

- raising community awareness of the consequences of people's actions on water quality
- improving community understanding of the importance of planning and managing for catchments
- instilling the ethic of wise use of water resources
- providing communities with information and resources to implement concrete actions to improve water quality
- strongly encouraging governments to respond to water quality issues, and
- maintaining a large monitoring network.

Waterwatch seeks to create links among communities, community organisations, school children, parents, local government, and the business sector. The principal mechanism of support is to partially fund state and catchment-level facilitators, who orchestrate expansion of the programme on the ground, provide training, infrastructure support, and feedback, and create links among participating groups within each catchment. Community groups are encouraged to raise their own funds where possible, or to gain sponsorship from local government or the private sector. This strengthens community links and ownership of the projects at the local level.

TECHNICAL STANDARDS

With over 50'000 people in the field collecting waterway monitoring data, it has been important to develop efficient systems and standards, in order to correctly record and interpret the information gathered. Community participation in data collection for educational and management purposes will continue only if the data are accurate and of high quality. The aim of the programme is to collect robust data that can be used by both the community and government to guide management decisions. Waterwatch encourages correct procedures and techniques for data collection. Whilst it is not always necessary to collect data to a fine degree of precision, it is important that the methods used result in accurate, reliable, good quality data. Data must also be collected at the level of precision for the purpose for which they are to be used. Not everyone, however, will want to collect information to the same standard. Waterwatch recognises that, with groups of different ages, different technical abilities and different objectives, there will be different technical levels in the collection and analysis of data.

Waterwatch has a strong environmental education focus and has targeted the involvement of the general community and school students. The main purpose of primary school involvement in Waterwatch is to explain concepts such as protecting and measuring water quality, and to develop the children's general awareness of catchment issues. In this case, it is the educational aspects of collecting the data, rather than the data itself that are important. For university and senior secondary classes, where monitoring is incorporated into the curriculum, it is important to collect more scientific data. In some cases, students conduct regular physical and chemical testing in conjunction with local governments, water authorities or catchment management boards, whilst others

are involved in macro-invertebrate surveys or biological research projects.

Some Waterwatch groups collect data that feed into state and national scientific monitoring programmes. Here, it is important that Waterwatch provide training and build capacity to collect credible data. Unfortunately there are some scientists who continue to question the value of information collected by communities, even though the scientific community comprises only a small percentage of environmental monitoring in Australia. One great advantage of community-collected data is that geographical coverage can be greatly extended, and the process involves many more people, who can then translate monitoring into action.

The Waterwatch Australia Steering Committee is currently finalising a National Technical Manual to provide standards, techniques and equipment for collecting data on a number of water quality and biodiversity parameters, such as aquatic macro-invertebrates and riparian vegetation. Developing access to a Waterwatch database is a growing component of the programme. The most important level of data sharing and data ownership is among local groups. The data storage system has been developed on the basis that it is the community who own the data, and it is the community who need to be able to analyse and interpret the data.

SELECTING WATERWAY MONITORING SITES

Waterwatch monitoring sites are selected by the community groups involved, often in conjunction with their Regional Coordinator. In some circumstances, sites are chosen as a result of a local issue or water quality concern. Some are selected as a result of advice from a Catchment Coordinating Committee, local government organisation, or a state agency.

The Waterwatch network develops monitoring regimes to measure two types of impacts: point source, and nonpoint source pollution. To measure point source pollution, monitoring sites are located upstream and downstream of a known source of pollution into a waterway, such as a stormwater drain or a wastewater outlet. To measure nonpoint source pollution, monitoring sites are located strategically throughout the catchment, or upstream and downstream of a waterway, to enable data from the chosen parameters to be collected throughout the catchment. A nonpoint source monitoring programme shows patterns and trends in the context of the known issues within the catchment.

WATER QUALITY INDICATORS

The current key set of water quality indicators recommended by Waterwatch Australia (Table 1) is internationally accepted as reflecting changes in water quality resulting from land use practices and disturbances within the catchment. Waterwatch's underlying rationale is to use water quality as the main indicator of catchment health, based on the premise that nearly everything that happens in the catchment is reflected in the water.

HOW WATERWATCH DATA ARE USED

In most cases volunteer monitoring is driven by a particular need for information. Requests for information may come

Table 1. Waterway Monitoring Parameters used by Waterwatch Groups

Physical and chemical water quality parameters	Biological habitat assessment
Turbidity	Macroinvertebrate abundance and diversity
Stream conductivity	Bank vegetation
pH	Verge vegetation
Dissolved oxygen	Bank erosion and stability
Temperature	Stream cover
Total Dissolved Solids	
Total Phosphorus	
Reactive Phosphate	
Nitrate (Nitrogen)	
Flow	
Faecal coliforms	
Chlorophyll *a*	
Groundwater conductivity	
Groundwater level	

from local government authorities, catchment committees, water authorities, or state governments, and people react to local environmental concerns in the waterways or wetlands in their area. Information is collected, and feeds into the system through the regional infrastructure. As a result, the Waterwatch network feels empowered to take action, and the local authorities have waterway monitoring evidence to work with. Stakeholders get together to address the issues raised by the data collection. In some cases, a direct relationship between the indicator and the landuse or disturbance becomes clear. In other cases, it is harder to trace the cause, but the motivation has been generated to discover the reasons for the water quality problem. Sometimes, waterway monitoring results are printed in the newspaper, which allows the wider community to keep an eye on the changing results, and paints an objective and accessible picture of what is happening in the local waterways.

Other ways in which Waterwatch data are currently used includes:

- state of the environment reports at local, state and Federal Government levels
- environmental impact statements
- catchment management reports and strategies
- identification of priorities where community action is required
- as a component of school curricula
- in Ramsar wetland reports
- in local planning studies.

A Case Study: Use of Maroochy Waterwatch Data

In Maroochy Shire, with Australia's fastest growing population, extensive pressures have been put on the remnant native vegetation, agricultural land, and local waterways, making this a critical area in which to monitor water quality, undertake biological surveys, and test other waterway parameters. Maroochy Waterwatch involves the community in monitoring and identifying potential water quality problems, and in seeking solutions and managing water resources co-operatively with other water users and regulatory authorities. When it was proposed that water quality tests undertaken by the group be used by the Department of Transport for an environmental impact statement, sections of the Queensland Department of Environment were sceptical about using data collected by the community.

After several years of monitoring, the Maroochy Waterwatch group was faced with the challenge of government acceptance of its data. The group boasts 55 volunteers, including agricultural scientists, teachers, farmers, social workers, surveyors, a fish breeder, and environmental scientists. When the Queensland Department of Environment scientifically replicated the Waterwatch samples and data, the results of the Department of the Environment were consistently within one per cent of the Waterwatch findings. As a result, the Department of Environment decided to use Waterwatch data in the environmental impact statement (EIS). This was the first time that community-collected data had been used as part of an official government EIS in Queensland. Official state government recognition of the veracity of the data was an important achievement for Maroochy Waterwatch.

WHAT MAKES THE WATERWATCH PROGRAM SUCCESSFUL?

The success of Waterwatch can be measured in different ways. The fact that the programme is becoming more widely known, and that community interest in water quality, waterway use and catchment management is becoming more widespread, can be partly attributed to Waterwatch. The programme now operates in every major metropolitan centre across Australia, as well as in the bush, and this is another indicator that waterway environmental education is moving beyond the school setting, and into the broader community. The spread of Waterwatch promotes links and mutual understanding between urban and rural dwellers resulting in greater cooperation and action on the ground. One of the best indicators of the success of the programme is the extent to which Waterwatch data are used by government agencies and the private sector.

Strategies that have contributed to achieving the objectives of the Waterwatch Australia Program include:

- the development of state and National Technical Manuals to guide and teach Waterwatch volunteers about waterway testing techniques
- National Waterwatch guidelines, policies and procedures that direct the programme and ensure consistency and a high standard of delivery across the country
- the State Facilitators and Regional Coordinators, who provide technical support, training, advice, and maintain enthusiasm and motivation
- the standardisation of sampling, calibration procedures, units, and data entry across Australia, which in turn ensures the data collected are of a high standard
- national unity within the programme, and
- strengthening community capacity to engage in decision making processes.

INTERNATIONAL LINKAGES

Community–based waterway monitoring originated in the United States with the Global Rivers Environmental Education Network (GREEN), which now operates in 120 countries around the world. In 1995 an international GREEN conference was held in Sydney, with a number of the GREEN coordinators coming from countries in Africa, Asia and central Europe. In many of these countries, support for monitoring is strong, but government support, unfortunately, is limited. Another similar international programme is the River Watch Network, which operates in

countries such as the United States, Canada, Mexico and Hungary. This network is a national and international nonprofit organisation that works with community groups to create and sustain citizen-based river monitoring and protection programmes.

Other countries in the Asia-Pacific region have shown an interest in how Waterwatch operates, and how it was established. There is also a strong demand for technical manuals and technical equipment. Many of the practical tools used by Waterwatch, such as the turbidity tube, could be applied to advantage in places where community–based action may be the only feasible option for monitoring water quality. Waterwatch Australia has the potential to provide a model for community-based water quality monitoring around the world. The guiding principles of community awareness and ownership, regional facilitators helping community groups, and strong technical support have relevance and applicability elsewhere in the world where declining water quality is a serious concern.

CONCLUSIONS

To ensure its long-term future, and to remain relevant to government and community expectations, Waterwatch needs to remain vigilant with regard to challenges and opportunities such as:

- meeting community demands
- maintaining and increasing resources to the programme
- continuing to provide strong support to the Waterwatch Network
- maintaining a strategic direction for the programme
- establishing effective communication
- further developing technical standards, equipment and manuals
- promoting Waterwatch internationally.

Australia is a big country, with catchments that encompass deserts, mountains, tropical and temperate rainforests, wetlands, prime agricultural land, and large cities. The condition of these catchments varies from wild and pristine, to highly modified and polluted. In a country as vast and diverse as Australia, it is an enormous task to preserve the pristine, to manage the impacts, and to reclaim the polluted. The exciting aspect of Waterwatch Australia is the true community nature of the programme, resulting in a rich diversity of activities. Inherent in this network is strong community representation at all levels, and across the nation (Gowland and Foster, 1997).

Ultimately, everything that happens in a catchment can have downstream effects. To correct problems, communities – be they rural or urban – must work together throughout the catchment. Australia's natural environment will be protected only if the whole community is involved in land and water management. In line with this vision, Waterwatch Australia provides a premier environmental education and awareness programme to help all Australian communities achieve a harmonious relationship with, and respect for, the country's unique natural environment.

REFERENCES

Edgar, B. 1998. *The Natural Heritage Trust*. Proceedings from the "Getting Better at Getting Wet" National Waterwatch Conference, Roseworthy 1998.

Gowland, K. and Foster, D. 1997. Waterwatch Australia - Environmental Education for the Whole Community. In: *Earthlinks '97*. Proceedings of the 9th Biennial National Conference of the Australian Association for Environmental Education and the Marine Education Society of Australasia. AAEE, Tasmania 1997.

COMMUNITY PARTICIPATION IN COASTAL RESOURCES MANAGEMENT IN GHANA

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KEYWORDS: coastal, wetlands, Ghana, Ramsar, community, participation

ABSTRACT

The Coastal Wetlands Management Project (CWMP) was formulated as a component of the Ghana Environmental Resource Management Project, which was developed for the effective implementation of the country's National Environmental Action Plan. The CWMP aims to protect the ecological integrity of five lagoons designated as Ramsar Sites to enhance the benefits derived by local communities. Based on the growing awareness of the positive role of local communities in the conservation of natural resources, the CWMP advocated the active participation of the local people, who depend on the wetlands, in the management of these sites. The local communities contributed to the management of the wetlands in different ways:

- the active involvement in decision making and financial contribution of the District Assemblies
- participation in Site Management Committees, which play a major role in identifying local environmental problems and solutions, and a forum for the exchange of ideas and knowledge
- direct participation, including the contribution of labour and land for the construction of sanitation facilities, stream channel clearing, marine turtle conservation, and community tree planting

This paper highlights the direct and indirect participation of local communities in the implementation of the CWMP, and the possibilities for win-win situations, where both people and nature benefit from community participation in wetland management. The paper offers lessons for the design and implementation of integrated community development and conservation projects, especially in the developing world.

INTRODUCTION

Ghana, like many countries, is faced with numerous environmental problems that pose a threat to sustainable development, including land and forest degradation, pollution of water, soil, and air, degradation of wetlands and coastal resources, and the development of unplanned settlements, with concomitant sanitation problems, especially in urban areas. In an effort to balance national economic development with rational exploitation of the natural resource base, the government of Ghana initiated a National Environmental Action Plan (NEAP) in 1990. The objective was to define a set of policy actions, related investments, and institutional strengthening to make the country's development strategy more environmentally sustainable. For effective implementation of the NEAP, the Ghana Environmental Resource Management Project was developed in 1993. One of the main components of this is the Coastal Wetlands Management Project (CWMP).

The CWMP was formulated to conserve five major lagoon sites designated as wetlands of international importance under the Ramsar Convention because of their global importance as habitats for migratory birds. The five Ramsar Sites covered under the CWMP are Keta, Songor, Sakumo, Densu and Muni. These coastal wetlands are ecologically important because they provide feeding and roosting grounds to over 250'000 water birds, and because of their mangrove forests. The Ramsar Sites in Ghana are of immense socio-economic value to the local people living in and around them. The local people depend on the wetlands for fishing, salt, farming, livestock grazing, fuelwood harvesting, and reed collection for mat weaving.

The CWMP seeks to protect the ecological integrity of the wetlands so as to enhance the benefits derived by local communities. The specific objectives of the project are to:

- ensure biodiversity conservation within the coastal ecosystem
- create awareness about environmental conservation in the coastal zone
- improve community infrastructure within the coastal wetlands areas
- ensure the wise use of the wetlands resources
- offer financial assistance to support poverty alleviation ventures, and
- identify development options that are compatible with the conservation of wetland resources.

The CWMP is funded by the Global Environment Facility through the World Bank, and is implemented by the Wildlife Department. The Ghana Wildlife Society (GWS), an environmental NGO, is assisting the Department by carrying out the education and public awareness component of the project.

There is growing awareness worldwide of the positive role and contribution of local communities in the conservation of natural resources, based on the recognition of the rights of local communities to the natural resources on which their livelihoods depend, and on the value of traditional local knowledge in resource management. Policies are being formulated in Ghana to institutionalise this concept of local community participation in the country's conservation efforts. The 1994 Forest and Wildlife Policy emphasises that "the government will increase public awareness and involvement of local communities in conservation of forest and wildlife resources, particularly where they directly affect the livelihood of communities and the stability of the environment".

These policy initiatives represent a significant departure from the past, when conservation approaches often excluded and alienated local communities. In some instances, communities were negatively affected by the management of national parks and reserves. The current emphasis on community participation is compatible with the concept of "wise use" of the Ramsar Convention on Wetlands, which allows for options of sustainable use and development. In defining the institutional arrangements of CWMP, the crucial role of local communities has been highlighted.

The management of each of the Ramsar sites under the CWMP is facilitated by field staff of the Wildlife Department and the Ghana Wildlife Society (GWS). The Wildlife Department is responsible for carrying out habitat improvement activities, boundary maintenance, and monitoring ecological changes in the wetlands areas. The GWS, on the other hand, is responsible for publicizing the aims and objectives of the CWMP, mobilizing local communities for conservation activities to solve identified environmental problems, and liaising with the District Assemblies (the local political authority) for their support. At the site level, local communities have participated directly and indirectly in decision–making, and in the implementation of the options chosen to solve local environmental problems.

INDIRECT PARTICIPATION OF LOCAL COMMUNITIES IN CWMP

Involvement of District Assemblies

Local communities have participated indirectly in the CWMP through the involvement of District Assemblies. The active involvement of the District Assemblies in decision–making, and their contribution to the implementation of most project activities, such as provision of sanitation facilities, is one form of local participation. The District Assembly is essentially made up of representatives who have been democratically elected by the local people to take decisions on their behalf. The District Assemblies are contributing both financially and materially towards the construction of toilet units and refuse management in all the Ramsar Sites.

Establishment of Site Management Committees

The local people are also participating indirectly in the project through the establishment of the Site Management Committees (SMC) at the Ramsar Sites. The SMC is made up of representatives from the local communities, identifiable local groups or associations, the traditional authority, relevant government departments, and the District Assembly. The SMC is a conduit for transferring information from the project to the local people and vice versa. It has also played a major role in the identification of local environmental problems, and the local needs and concerns that should be addressed by the CWMP.

DIRECT COMMUNITY PARTICIPATION APPROACHES IN CWMP

Construction of Sanitation Facilities

When studies were being carried out prior to the preparation of the CWMP, the local people in the wetland areas were consulted, and they provided information on a number of issues. One of the key problems identified in the Ramsar sites was the lack of sanitation facilities, such as toilets. People were using the beaches, the banks of the lagoons and steams, and the bushes for their intimate needs. The communities, who provided land free of charge for the purpose, took the decisions on the location of the toilets. The communities also contributed labour for the construction of the toilets, and upon completion, the communities accepted responsibility for maintaining them as their own.

An evaluation survey carried out recently in the communities where the toilets had been built showed that they are helping, to a very large extent, to improve sanitation in the wetland areas. People are no longer using the beaches and bushes, as they formerly did when they had no alternatives. The local people expressed appreciation that they were invited to participate in the effort to solve the sanitation problems, and they talk about their involvement with pride. The involvement, commitment, and ownership of the communities have been the key to success in improving sanitation in the wetlands.

Clearing of Stream Channels

Another major problem at almost all the Ramsar sites in Ghana is the blockage of freshwater corridors leading to the lagoons. Freshwater discharge into the lagoons is thus very limited, resulting in high salinity, which has affected the growth of vegetation (especially mangroves) in most areas, such as Totope, in the Songor Ramsar site. Also, due to the high salinity, most of the lagoons can no longer support a wide variety of fish, and *Tilapia* is now the most abundant species in the coastal lagoons.

In addition to the ecological impacts of the blockage of freshwater channels, the socio-economic activities of com-

munities living along these streams have been seriously affected. Commercial fishing, one of the major economic activities of the local people, has become virtually impossible because the growth of aquatic weeds that prevent the use of fishing nets. In addition, water from the stream can no longer be used for domestic purposes, since these streams, which used to be free flowing, have now become stagnant and unwholesome. In addition, local people can no longer use the streams to transport their produce to marketing centres, and commuting between villages has become difficult. Farming activities have also been affected because of the difficulty accessing water.

The project held consultative meetings with the communities to involve them in identifying problems and solutions. At Songor, the communities along the Luwe stream pointed out the blockage of freshwater channels as a major environmental problem that affected their livelihoods. The communities were unanimous on the need for clearing weeds from the channel and desilting it. They offered to provide the labour, while the CWMP assisted by providing the materials required: boats, tools, cutlasses, shovels, ropes, chain saws, boots, and protective clothing. Approximately 10 km of the stream has been effectively cleared through communal labour, and the communities are already benefiting in the following ways:

- The volume of water flowing through the stream has increased, and the occasional flooding of the banks has been restored, thus favouring mangrove restoration and farming of crops such as rice and sugar cane.
- Fishing in the stream, which was virtually impossible until now, has restarted.
- Domestic water supply has improved because a lot more fresh water now flows from upstream. Before, the impeded flow of fresh water resulted in high salinity and the decomposition of organic matter, giving the water a bad odour, taste and colour.
- The open water channel can now be used to transport people and goods, and the stream provides a convenient alternative to walking for the communities, which are not connected by roads suitable for motor vehicles.
- The project has also helped to foster unity within and among the communities. Opinion leaders from the participating communities now meet regularly to discuss development and other issues affecting them.

Marine Turtle Conservation

All species of marine turtles are threatened or endangered and have been listed in the IUCN Red Data List. The Ghana coast is noted as a favourable nesting ground for three species of marine turtles: olive ridley (*Lepidochelys olivacea*), leatherback (*Dermochelys coriacea*), and green (*Chelonia mydas*) turtles. On the Ghana coast these turtles are threatened by a number of factors. A major threat is the predation of eggs and juveniles by domestic animals, especially pigs and dogs. Human exploitation is also a significant factor in the decline of turtle populations in Ghana. Female turtles that come to the beaches to lay eggs are often ambushed and killed as soon as they start laying. When a turtle succeeds in laying the eggs, local people follow the tracks and dig out the eggs. Special fishing nets are also used for trapping turtles by local fishers. Turtle meat and eggs are eaten, or traded for cash income. Other threats include coastal erosion, beach development, and dumping of rubbish, particularly plastics, which can injure or kill turtles that mistake them for edible jelly fish.

In Ghana the NEAP and the Biodiversity Strategy legally guarantee the protection of marine turtles. They are also protected by the Wildlife conservation regulation L.I. 680 of 1971, under which the hunting, capture or destruction of marine turtles is absolutely prohibited. However, national policies and regulations have had little impact on reducing the threats to marine turtles along the Ghanaian coast. In view of this, a marine turtle conservation programme was initiated under the CWMP in partnership with the local coastal communities. In this partnership, the coastal communities are recognised as the key stakeholders, who play a central role in the turtle conservation efforts.

A national workshop was organised by the GWS in 1995 to develop strategies for the participation of local communities in the project. As recommended by the workshop, a community turtle task force was formed, made up of community volunteers, who were selected with the assistance of community leaders. The role of the turtle task force is to:

- educate the communities about the status of marine turtles in the country and the need to stop the killings and eggs collection
- identify important nesting sites, and protect nests from predators and natural hazards, such as erosion
- liaise with fishers to release any turtles caught accidentally in fishing nets
- assist in the collection of scientific data needed for the management of marine turtles
- take the lead in mobilizing people in the community projects to enhance marine resource conservation.

The involvement of local communities in the project has proved to be very successful, as the communities are being empowered to take responsibility for protecting the turtles. The level of awareness has increased appreciably, and the task force has reported that fishers often invite them to come and witness the release back into the sea of turtles caught accidentally. Before the project the turtles would have been killed instantly for food or for sale.

Community Tree Planting

At all of the five Ramsar sites in Ghana, wetland vegetation is under heavy pressure from the local communities, who exploit different tree species for domestic and commercial purposes. These include ecologically important species such as the mangrove, which is used for fuelwood,

building, fishing etc., especially at the Keta Ramsar site. The increasing demand for fuelwood has led to an alarming rate of degradation in most areas. The problem is exacerbated by the lack of alternative energy sources, and the lack of awareness of the need for replanting depleted areas.

Under the habitat improvement component of the CWMP, attempts are being made to assist communities to establish woodlots, and to undertake mangrove restoration projects at the Ramsar sites. The communities are contributing to this programme by making land available, by providing labour for planting the seedlings, and by maintaining and weeding the areas planted. The Forestry Department supplies the seedlings, while the CWMP provides financial assistance for preparing the land. The community tree planting programme is thus a collaborative effort involving the communities, the CWMP, and the Forestry Department. In recognition of the success of this community tree planting programme, the Matsekope communities at Songor were selected for a national award in 1997.

CONCLUSION

The success of the Coastal Wetlands Management Project with regard to community participation has not come about by coincidence. Having realised the need for the support and cooperation of the people, the project made a conscious effort to encourage the involvement of local communities. This was done through an intensive programme of public education and awareness building, which involved a series of seminars, workshops, community meetings, and consultations. Local communities are unlikely to join forces with any project if they are not sure of the benefits they could derive.

A key lesson from this project is that resource conservation must be relevant to local needs. It is well known that poverty is a major root cause of excessive exploitation of natural resources. In developing countries, poverty alleviation is obviously the first priority of local communities, and conservation must be seen to be addressing this problem to win local support and cooperation. To this end, a particularly valuable tool has been a community investment support fund operated under the CWMP, which is aimed at improving the socio-economic conditions of coastal communities in the Ramsar sites.

WETLAND CONSERVATION AND DEVELOPMENT: THE LAKE NAKURU CASE STUDY

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KEYWORDS : Lake Nakuru, land use, environmental impact, sustainable development, ecosystem health

ABSTRACT

Lake Nakuru, designated as Kenya's first Ramsar site in 1991, is a shallow hyper-eutrophic saline-alkaline lake on the floor of the Rift Valley, and is well known for its spectacular concentrations of Lesser Flamingos. The lake lies at the bottom of a catchment basin that has witnessed a relentless intensification of land use over the last three decades. The major threats to the lake originate from human activity in the catchment, resulting in alterations in the water balance and water quality. There is growing evidence that these changes in land use are linked to the frequent and prolonged dry outs of the lake, resulting in alterations in the primary producers and the morbidity and mortality of endemic bird and fish populations. The key to the conservation of Lake Nakuru hinges on the management of human activity within the watershed. A balance must be struck between conservation and meeting the needs and aspirations of the resident human populations.

This paper focuses on four areas:

- Lake Nakuru National Park, a unique and richly endowed wetland ecosystem under stress
- the recent history of human activity in the catchment basin, which has resulted in the park's present predicament
- the nature and scope of past and present conservation measures in the catchment area, and
- ecosystem health, a unifying paradigm to bring about improved understanding of, and countermeasures for, a wide range of negative impacts of human societies on ecosystems.

LAKE NAKURU

Lake Nakuru is one of a chain of endorheic, hypereutrophic, alkaline-saline lakes in the eastern arm of the Rift Valley in Kenya. It is a shallow lake and an extreme ecosystem in which intervals of complete dryness alternate with periods of flooding and high water. The biota of the lake is depauperate, although persistent populations of the cyanobacteria, *Spirulina platensis* occur, forming the base of the food chain and supporting large concentrations of lesser flamingos (*Phoeniconaias minor*). The only fish species in Lake Nakuru is the filter feeding cichlid, *Sarotherodon alcalicum grahami*, introduced from Lake Magadi in 1953 to combat mosquito breeding. The introduction of fish substantially increased the diversity of the lake ecosystem by extending the food chain to over 30 species of fish-eating birds. Other organisms, found in varying abundance, include a copepod (*Lovenula africana*), a chironomid (*Leptochironimus deribae*), three species of rotifers (Brachionus *dimidiatus, B. plicatilis*, and *Hexartha jenkinae*), and three species of water bug (*Micronecta jenkinae, M. scutellaris* and *Sigara hieroglyphica kilimanjaronis).*

Lake Nakuru occupies an area of 44 km^2, and is surrounded by a buffer zone, which together with the lake constitutes Lake Nakuru National Park. The park is a popular destination for local and international tourists, and receives approximately 200'000 visitors annually. Although the park provides habitat for over 50 species of mammals and 500 floral species, it is best known for its bird life, and for the spectacular assemblages of lesser flamingos that congregate on the shores of the lake. Lesser flamingos account for approximately 78% of the world's total flamingo population, and the alkaline lakes of southern Kenya regularly hold between one quarter and one half of this population.

Until recently, the high primary productivity of Lake Nakuru made it a key feeding ground for this species. Since 1993, however, frequent dry-outs, accompanied by decreased primary production, have rendered the lake unsuitable for feeding, resulting in the migration of lesser flamingos to healthier systems such as Lake Bogoria, located 70 km to the north. The consequences of this increased utilisation, and competition for resources at Lake Bogoria have yet to be determined. Apart from the flamingos, over 51 species of waterfowl and water-associated birds inhabit the lake and its littoral fringe, and a further 350 terrestrial bird species inhabit the buffer zone. The lake is also a staging site and wintering ground for several species of Palearctic ducks and geese.

Lake Nakuru occupies the lowest point in a catchment basin of 1,800 km^2. Apart from direct precipitation and subsequent runoff, it receives surface flow from five seasonal streams and several springs along its northeastern shoreline. The origin of these streams in the escarpments north, south and west of the lake delineate the boundaries of its drainage basin, and define the area in which its fate will be decided. Ground

water recharge is a major source of water to Lake Nakuru, which has been described as a "window on the water table", as its levels rise and fall in response to changes in the feeder aquifers.

In 1990 Lake Nakuru was designated the first Ramsar site in Kenya.

HISTORY OF HUMAN OCCUPATION AND LAND USE

Little is known of the settlement patterns in the catchment basin prior to 1889, although the area has been a periodically important centre for human populations for tens of thousands of years, and many prehistoric sites are located in the vicinity (Horrobin, 1971 cited in Mwangi, 1994). Written records by European travellers visiting the area at the turn of the century provide descriptions of uninhabited landscapes teeming with wildlife (Elliot, 1905; Chapman, 1908; Percival, 1928). Local oral traditions record occupation of the area by shifting cultivators and pastoral groups, who used the valley floors, grasslands and forest glades for cultivation and wet season grazing – practices that continue to this day in some parts of the catchment basin.

The arrival of the Kenya-Uganda Railway in Nakuru in 1889 set the stage for permanent settlement in the catchment. During the colonial era, land ownership in the area fell mainly to the farming and ranching European settlers, who engaged in widespread fencing of their properties and shooting of "vermin" to protect their crops and livestock. Timber merchants secured generous concessions in the hardwood forests in the upper reaches of the catchment, and pursued their lucrative trade with such vigour that, in 1949, the colonial government felt compelled to restore forest cover by establishing plantations on the vast tracts of land laid bare by clear felling.

The town of Nakuru was founded close to the shores of the lake in 1904, to service the agricultural hinterland straddling the railway line. The town quickly grew in size and stature to become a district headquarters and the agricultural capital of the "White Highlands". By 1948, it supported a population of 14'000 people. Landscape modification during this period led to loss of habitat and interference with the migratory routes of endemic wildlife. This, together with uncontrolled hunting, precipitated their decimation and dispersal.

In 1963 independence ushered in a second settlement thrust by indigenous, small-scale farmers, which led to further modifications in land use. Settlement initially took place on existing mixed farms bought from European owners. These were fragmented into many smaller individually owned holdings, ranging in size from 1 to 5 hectares. As the number of settlements increased over the next decade, encroachment into the forest reserves occurred. Between 1967 and 1986 more than 400 km^2 of forest and areas under natural vegetation were converted to subsistence agriculture. Most of this clearance occurred between 1970 and 1980, when the influx of new settlers was finally stemmed. During this period, the area of the catchment under forest and natural vegetative cover declined from 47% to 26%. Declines also occurred in the area of land under large-scale farming and ranching, as small-scale subsistence farming burgeoned from insignificant levels in 1970 to over 35% of the catchment area in 1986. The type of farming practised by the new settlers depleted resources available for restoring or improving soil fertility or curtailing erosion. The allocation of land for farming on steep slopes, often exceeding the 55% gradient stipulated by the Agricultural Act, further exacerbated the erosion problem. This in combination with other factors led to a progressive decline in environmental quality and crop yields over the ensuing years.

The aggravating factors include: insecure land tenure, inaccessibility of extension services and technological options, low farm prices and disposable income, recurrent droughts, crop pests and in some cases, wildlife depredation (LNCDP, 1990). Large-scale farms (>100 acres), with trained managers and greater access to capital, were able to modernise their operations in the post-independence era, and emerged as the most productive farms in the country. However, these gains were achieved and maintained through heavy investments in agricultural machinery and agro-chemicals.

In 1987, the remaining natural forests in the catchment were accorded protection, and brought under the management of the Forest Department. For the next seven years, extraction of timber was regulated in both natural and plantation forests. By 1990, however, fuel wood scarcities began to emerge, affecting large sections of the catchment's rural population. In 1994, the government in a highly controversial move degazetted over 20'000 ha of plantation forest in the Western Mau Escarpment, a major national watershed, and the source of feeder streams to Lake Nakuru. The decision ostensibly taken in the interests of "landless" people was swiftly implemented, and resulted in rampant deforestation, and an influx of an estimated 30'000 people into the catchment. This incident drew attention to the wilful blindness of politicians to the environmental consequences of their decisions, and also to the apathetic response of stakeholders, including the resident communities, who stood to lose the most. Despite a ban on felling imposed by the government in 1998, illegal forest clearance continues in Lake Nakuru's watershed.

From its small beginnings in 1904, the township of Nakuru has grown into the fourth largest city in Kenya, occupying an area of 102 km^2, and supporting a population of 360,000 people, with an annual growth rate of 5% (Mbwagwa *et al.*, 1998). Between 1923 and 1992, the town extended its boundaries four times. In terms of wetland management, the most significant developments during this period was the urban sprawl, with encroachment into farmlands, forest and wildlife habitats at the town's periphery, and the growing burden of waste generated. A further expansion is now proposed, which, if carried out, will encircle the northern

boundary of Lake Nakuru National Park and extend down its western and eastern flanks.

Land use in the developed area of Nakuru town is dominated by housing, which accounts for 70% of the area, followed by industry and commerce (18%), and transport (2.5%) (Mbwagwa *et al.*, 1998). There are 178 registered industries in Nakuru, generally small- to medium-scale enterprises, manufacturing and processing a variety of products, such as batteries, textiles, tanned leather, animal and human foodstuffs, and agro-chemicals. In addition, there are machining works, electroplating facilities, and a multiplicity of automobile and open-air workshops.

Like most cities, Nakuru is a huge consumer of resources, and a prodigious producer of waste. Although only 19 % of the town is sewered, a total of 9,000 m^3 of sewage is generated each day, and processed in two treatment plants before being discharged into the lake. The sewage treatment plants were rehabilitated and expanded in 1996, and currently have a design capacity to handle 16,200 m^3 of sewage per day. However, given the growth projections for the town and the plans to expand the sewage reticulation system, this capacity could be easily outstripped in just a few years.

Solid waste management is constrained by inadequate resources resulting in the diffuse build up of waste in the environment. Pre-treatment of industrial waste is the exception rather than the rule, and storm water is discharged into the lake without prior treatment.

ENVIRONMENTAL IMPACTS OF PAST AND PRESENT LAND USE

The land use and land treatments described thus far have serious implications for the environment of the catchment, the national park and for the lake in particular. Over the years, Lake Nakuru National Park has become an island of nature surrounded by a sea of humanity. The potential effects of this insularisation are particularly worrying. Nairobi National Park, which shares a similar predicament, is forecasted to eventually lose over 80% of its species, and similarly, the Serengeti is expected to eventually lose about 70% of its species (Soule *et al.*, 1979 cited in Mwangi, 1994).

Some of the environmental impacts arising from development and massive landscape modifications in the catchment basin of Lake Nakuru include:

- alterations in the hydrological regime of the catchment resulting in increased seasonality of stream flow, declining yields from wells and bore holes, and frequent, prolonged dry-outs of the lake as have occurred in 1993, 1994, 1995 and 1996
- loss of biological diversity and the capacity for disturbance regulation, as a result of deforestation in the catchment basin
- accelerated soil erosion, resulting in loss of farm productivity and income, which in turn leads to over exploitation of the natural resource base – soil loss from farms in the catchment is estimated to range from 18 to 50 t/ha/annum
- deterioration in the water quality of streams, and exposure of human and livestock populations to pesticide residues and other potentially dangerous leachates
- contamination of the lake with pesticide residues, heavy metals and possibly PCBs, dioxins and furans
- contamination of the bottom sediments of Lake Nakuru with lead, copper, mercury, zinc, cadmium, chromium, nickel, DDT, dieldrin, and gamma BHC, which unfortunately is expected to increase (other contaminants remain to be assayed)
- nutrient enrichment of the lake, resulting in reduced productivity of the lake's natural primary producer (*S. platensis*), and the frequent occurrence of blooms of toxic blue-green algae (*Microcystis* and *Anabaena* sp.), which has led to the desertion of the lake by flagship species such as the lesser flamingo
- die-offs involving fish and waterfowl: analysis of fish tissue following a die-off in 1992, revealed the presence of malathion and elevated levels of lead; the lesser flamingo die-offs of 1993 and 1995 are being investigated, and a possible toxicosis is suspected
- disappearance of aquatic species such as the clawless otter (*Aonyx capensis*), last reported in Lake Nakuru National Park in the 1970s.

ENVIRONMENTAL CONSERVATION IN THE CATCHMENT BASIN

The first recorded conservation efforts in the catchment basin date back to the 1930s, when the colonial government employed compulsive measures for reforestation and soil conservation in the area. It is notable that many of the soil conservation structures built on settler farms during this period were subsequently destroyed by indignant Kenyan farmers following their occupation of the land after independence. This example illustrates the futility of using compulsive methods to achieve conservation.

In the late 1950s, a game warden stationed in Nakuru made repeated appeals to the settler community to protect the endangered Nakuru hartebeest (*Alcelaphus buselaphus cokii x jacksoni)*, but it was a case of too little too late, and in 1958, the last of member of this species died.

The protectionist strategy of establishing national parks "for cultural, scientific and recreational purposes" was extended to Lake Nakuru in 1961, when a part of the lake was gazetted as a bird sanctuary. In 1968, the national government, continuing essentially the same policy, increased the area under protection to include the entire lake. This effort was further augmented in 1974, when a buffer zone of 144 km^2 was added to the park, bringing it to its present dimensions of 188 km^2. It is probable that the creation of a buffer zone, and the subsequent ring fencing of the park in 1987 lulled planners into believing that the park was safe from

environmental degradation. Little was done thereafter to protect the lake or the park from the threats that were building up within and outside its boundaries.

Between 1960 and 1988, rural development programmes were carried out in the catchment by extension staff of the Ministry of Agriculture, the Catholic Diocese of Nakuru and other church organisations. Although these initiatives included some elements of soil and water conservation, they bore no direct relation to the conservation of the environment or the lake. Instead emphasis was placed on maximising farm yields and income through greater reliance on agro-chemical inputs. Interactions between farmers and extension workers were limited, with only a few farmers receiving more than one visit in a year.

In 1988, the WorldWide Fund for Nature (WWF) initiated the Lake Nakuru Conservation and Development Project (LNCDP). LNCDP is an integrated conservation and development project, which seeks to maintain ecosystem health in the catchment basin of Lake Nakuru. Agriculture, forestry and tourism are the main economic activities in the catchment, and all three are dependent on the maintenance of a healthy environment.

Ecosystem health is defined as the ability of an ecosystem to maintain system organisation (structure) and potential for growth (function) despite stress. These concepts embody resilience, which tends to confer sustainability (Constanza, 1992 cited in Beasley, 1993). The target states for healthy ecosystems in the catchment include:

- highly liveable cities and rural areas
- productive farms and forests
- clean streams, and
- a lake in which its inherent potential is realised, its capacity for self-repair when perturbed is preserved, and minimal external support for management is needed.

For an ecosystem to work, it is necessary to ensure normal inputs, and to avoid interference with the critical mechanisms of self-regulation (Beasley, 1993).

The goals of the project are therefore, to influence human activity and decisions in ways that will ensure a suitable environment for human beings as well as maintain biological diversity. The key features of the project are: its catchment approach to conservation, the establishment of strategic partnerships with local organisations and communities, building on existing resources and skills, and demonstrating how conservation can generate economic benefits for local people. The project incorporates a suite of conservation activities, including:

- the promotion of soil, water and energy conservation
- the provision of broad-based environmental education for school children and members of the general public
- support for waste recycling
- alternative income generation, and
- watershed rehabilitation.

It has also initiated programmes for pollution monitoring and prevention, supported research in ecology and toxicology, and lobbied rural committees and urban planners to adopt the ecosystem health paradigm, and integrate environmental considerations in to the rural and urban development process.

Key results achieved by the project and its partners over the last ten years include:

- the development of environmental education packages for use in 140 primary schools and adult literacy classes
- the establishment of an outreach programme, which has involved over 16,000 school children, and facilitated visits to the national park by over 8,000 children
- training of over 30,000 farmers in sustainable agriculture, and subsequently involving farmers in diffusing conservation skills to fellow farmers
- the formation of over 90 village environmental committees, trained by the project and now involved in village mapping, the establishment of natural resource inventories, identification of degraded areas, and the development of action plans for environmental conservation
- the formation of urban environmental health committees involved in solid waste collection, recycling and compost making – recently one of these committees raised KShs 39,000 (US$ 650) to purchase implements for street cleaning; another active committee was rewarded with four plots of land by the Municipal Council in recognition of their contribution to urban waste management
- the construction of over 500 km of terracing in farms within ten target areas
- annual soil and water conservation campaigns planned by the village committees, and carried out by members of the community in collaboration with the project and government extension services
- the excavation by villagers of 1’800 earthen dams, which retain runoff from agricultural fields and rural access roads; the water collected is used to irrigate kitchen gardens and tree nurseries
- the establishment of over 200 group and individually owned tree nurseries, which have an annual turn over of over 200,000 seedlings – most of these nurseries are now self reliant and do not receive any material support from the project
- the rehabilitation of over 40 km of river frontage
- the initiation of a process to develop a strategic structural plan for Nakuru township, aimed at developing the town as an eco-city: an updated map of the town was produced to replace the previous map, which was very outdated
- the establishment of a Pollution Release and Transfer Register for industry in Nakuru, which monitors waste emissions from 11 industries: the initiative is expected to expand to include all the industries in Nakuru within the next five years, and two industries have reported significant reductions in waste emissions and economic gains as a result of this effort
- the initiation of an environmental monitoring programme, and the ongoing development of an extensive data base for the lake, which provides information on the current status of the lake, and forms the basis for tracking future

trends
- the initiation of studies to determine the background causes of morbidity and mortality among lesser flamingos, and to establish the causes of the die-offs that occurred in 1993 and 1995.

Although the project has made major strides in integrating conservation and development, it is important – in the interest of sharing lessons learned – to acknowledge shortcomings as well, e.g.:
- the failure to address policy issues during the design and implementation phases –inappropriate national policies often lie at the heart of the most severe threats to biodiversity, as demonstrated in the case of Nakuru by the degazettement of forests in the lake's watershed
- the failure to secure the full commitment of all potential partners – in the case of the LNCDP it was wrongly assumed that the Kenya Wildlife Service, as the official custodian of wildlife in Kenya, would support any initiative that worked in favour of its own mandate
- the failure to invest sufficient staff time and resources in collecting and documenting comprehensive baseline data on peoples attitudes and the state of the environment prior to the onset of project activities, which has made it difficult in some cases to demonstrate the impact of the project and to establish clear cause-effect relationships, and
- perhaps most importantly, the failure to assume the role of facilitator, rather than the implementer, of certain critical project activities, which threatens the long-term sustainability of activities such as environmental monitoring.

CONCLUSIONS

The main issues confronting Lake Nakuru are the threats to its water balance and water quality arising from human activity in the catchment basin. Over the last ten years, many manifestations of environmental stress have become evident. These include the occurrence of frequent and prolonged dry-outs, toxic contamination of the lake's water and bottom sediments, and unexplained die-offs among resident wildlife. The processes that endanger the lake also pose serious threats to the health and well being of the human populations living in the catchment basin. In this sense, Lake Nakuru can be considered as the "canary in the cage". The degradation of the lake should serve as a warning that people's own life support systems are under threat.

Many technical prescriptions have been advanced to counter the threats confronting the lake and its watershed. Some of these, such as improvements in soil management practices, reductions in the use of agro-chemicals, improvements in handling and disposing urban and industrial waste, and the restoration of ground cover have been successfully initiated. However, much more needs to be done at the local and national levels, and with greater urgency and commitment. Decision-makers need to know with more scientific certainty how, for example, migration, urbanisation, rapid population growth, tourism, and high rates of resource consumption affect the natural environment and the ecosystems on which life depends.

To achieve enduring success in maintaining the health of ecosystems, astute environmental policies that provide incentives are needed. Apart from tourism, Lake Nakuru National Park is not amenable to any form of direct consumptive utilisation by the catchment residents. However, significant resources are generated by the park from tourism (estimated at over US$ 2.5 million/year), which can be used to provide essential services to catchment residents in a manner that safeguards ecological interests at the same time. The provision of potable water and the regulation of water abstraction and use are other possibilities worthy of consideration.

As suggested by Odom (1992), the choice in the management of natural resources is one of becoming a "smart parasite" that does no harm (or that even confers some advantage) to the overall life sustaining base, or a "stupid parasite" that threatens ecosystem health and survival.

The Nakuru experience corroborates the assertion of Beasley (1993) that realistic environmental policies targeting the achievement and maintenance of ecosystem health must also be compatible with human nature, and must include an allowance for a reasonable degree of self-interest. At the same time, practices that unjustly provide short-term gains for the few at the expense of long-term gains for the many must be discouraged.

Finally, it must be recognised that environmental issues cannot be tackled in isolation of prevailing economic and social problems. Poverty, for example, is known to cause and compound environmental problems. The outstanding issues of inequity, insecurity, and political instability must also be addressed. Until this is done, sustainable development and ecosystem health will remain elusive for many more years to come.

REFERENCES

Beasley, V., 1993. Ecotoxicology and ecosystem health: Roles for veterinarians; goals of the Envirovet program. *J. American Vet. Med. Assoc*. 203 (N°5): 617-628.

Chapman, A., 1908. *On Safari*. Edward Arnold, London.

Elliot, C. 1905. *The East African Protectorate.* Edward Arnold, London.

LNCDP, 1990. Lake Nakuru Conservation and Development Project Annual Report. WWF East Africa Regional Programme Office, Nairobi.

Mbwagwa, R.K., H. Musoga, J. Michoma, L. Esho, Mwau,

J. Muthomi, N. Githire, M. Lateste, M. Ng'ayu, R. Musyoka, P. Mutai, F. Swallah, 1998. Strategic Structure Plan: Action Plan For Sustainable Urban Development. Vol. 1. Municipal Council of Nakuru, Nakuru, Kenya.

Mwangi, E.M., 1994. The Structure and dynamics of an insularized herbivore community in Lake Nakuru National Park. PhD Thesis, University of Nairobi. pp 1-31.
Odom E., 1992. Great ideas in ecology for the 1990s. *Bioscience* 42: 542-545.

Percival, A.B., 1928. *A Game Ranger on Safari*. Nisbett and Co. Ltd., London.

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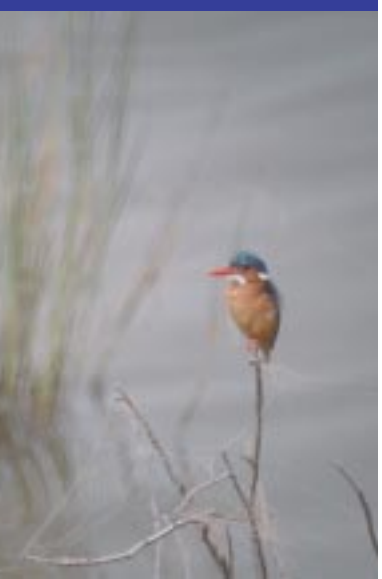

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