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Wetland conservation and development in the Sahel of Cameroon

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Abstract — The common perception that most types of wetlands have little value and that they should be converted for more productive uses has led to some of these unique habitats becoming critically endangered and even extinct. Leading on from this, most biodiversity which depend on wetlands for all or part of their life cycle are endangered. The destruction of these wetlands do not only lead in a reduction in biodiversity and the endangerment of species which depend upon them, but also leads to a loss in social and economic benefits for the local people who depend on such wetlands and their biodiversity. In order to conserve successfully wetlands and their biodiversity; and develop them for the present and future generations, this writer has come up with certain choices, which must be made for appropriate responses in order to succeed. Wetland ecosystems are many and varied; ranging from mangroves, lakes, marshes, swamps, flood-plains, etc. This paper will only deal with floodplains and lakes, the only wetland types found in the study area.

Résumé — **Préservation des zones humides et développement dans le Sahel du Cameroun.** La perception fréquente que la plupart des zones humides ont peu de valeur et de ce fait devraient être convertis pour plus de productivité, a conduit à une menace sérieuse de certains de ces habitats uniques. En conséquence, la biodiversité qui dépend des zones humides est menacée. La destruction de ces zones humides conduit non seulement à la disparition des espèces qui en dépendent, mais aussi à la perte des bénéfices sociaux et économiques des populations locales dont la vie dépend de ces zones humides. Dans le souci de réussir la conservation de ces zones humides et de leur biodiversité, et les développer pour les générations actuelles et futures, cet communication propose certains choix qui doivent être faits afin de réussir à conserver et développer ces zones humides.

Introduction

Until of recent, the concept of wetlands as productive ecosystems which can play a central role in strategies for sustainable socio-economic development contrasts with the traditional image of inaccessible waterlogged marginal lands harbouring disease-carrying vectors, where the first available funds should be allocated to drainage and conversion. Today, institutional understanding of the value of wetlands and associated investment in them is bringing changes in peoples' perception and giving rise to a range of conservation initiatives. Wetland conservation today is increasingly accepted as an important issue. Nevertheless, much needs to be done to develop this awareness. Even greater is the need to build upon recent progress in wetland research, policy and management, and to develop management techniques and policies responsive to the growing awareness and to address urgent problems related to wetland ecosystems conservation and management.

A comprehensive programme of wetland conservation, one based upon a sound ecological, social and economical analysis, will entail a range of difficult choices (e.g. converting natural wetlands to intensive agricultural land, or reclaiming wetlands to provide space for industrial or urban expansion) because future development investment must be based upon more careful consideration of the long term costs of converting natural systems.

Rather than devise development strategies which focus on the productivity of the ecosystems, and respond to the needs of the rural producers who depend upon them, most development investment has centred on agricultural and industrial expansion to meet the needs of urban populations. Most of this investment has led to the destruction of natural ecosystems and deprived the rural poor of natural resources which could have served a broad-based development process, rather than one slanted for the growing urban centres. For example, dams to provide power for domestic needs and the development of industry have often disrupted floodplain agriculture, reduced the area of floodplain pasture, and devastated fisheries (Scudder, 1989). Such development policies are now widely criticized as having neglected the millions of small-farm and fishing families whose rising disposable income could drive development.

To rectify this neglect, certain choices which include: the involvement of the local peoples at all stages of wetland conservation and development endeavours, the development of tools for wetland conservation that contribute to sustainable development, encouragement of small-scale development approaches building on the productivity of the natural ecosystem, and equitable sharing of benefits accruing from wetlands conservation and development.

The importance of wetlands

The importances of wetlands in general are many and varied depending on where they are found. River valleys and their associated flood plains have served as centres of human population since the earliest times. Even today, the wetlands which nurtured the great civilizations of Egypt and Niger, to name only those two in Africa, continue to be essential in health welfare and safety of people who live in or near them.

Most of the fish eaten in the Sahel depended on wetlands at some stage in their life cycle, while millions of cattle and herbivores are supported by floodplain pastures. In addition, wetlands serve as wide variety of functions including flood control, water purification, etc. Consequently, if wetlands are altered without first of all taking into consideration their full value, the negative consequences can be felt immediately by local people. The economy of a region or even nation may be affected adversely if the alterations are many and large.

Groundwater recharge and discharge.

These functions occur when water moves from the wetland down into the underground aquifer, is stored underground and later moves upward into a wetland and becomes surface water. By the time it reaches the aquifer, the water is usually cleaner than when it began to filter down from the wetland. Once in the aquifer, it may be drawn out for human consumption (as is the practice in most parts of the Sahel), or may flow laterally underground until it rises to the surface in another wetland as groundwater discharge. Thus recharge in one wetland is linked to discharge in another.

Recharge is also beneficial for flood storage because runoff is temporarily stored underground, rather than moving shiftily down stream and overflowing. Meanwhile, wetlands fed by groundwater discharge have a direct influence on stream flow. A wetland can serve as site of groundwater recharge in one year and discharge in another year depending on the rise and fall of the local groundwater table.

Biomass production

In the Sahel, wetlands support dense populations of vegetation on which feed fish, wildlife and various types of livestock which graze on the lush pasture. To the humans living in and around such wetlands, the direct harvest of forest resources of many wetlands yields a number of important services ranging

from fuelwood, timber, to non-wood forest products such as gum, resin and medicines. Wetlands provide nutrient-rich areas which serve as sheltered habitats used by fish for spawning, as nursery areas, or as habitats for adults. Two thirds of the fish eaten in the world depend on wetlands at some stage in their life cycle. Meanwhile the many wildlife species in some wetlands provide an important recreational resource (tourism, sport hunting, etc) and commercial products ranging from meat to trophies. Further, the natural production of wild grain such as *Oryza longistaminata*, *Echinochloa stagnina* and water lilies *Nymphaea* sp. is of paramount importance as food for the local people, especially during drought, and before millet and rice harvests in normal years (IUCN, 1987; Wanzie, 1990).

Agriculture

Many of the wetlands of the Sahel of Cameroon have been converted into intensive agriculture. A few and perhaps the less important continue to be cultivated in their natural form. Properly managed, natural wetland agriculture can yield substantial benefits to rural communities.

West African rice *Oryza glaberrima* was domesticated over 2.000 years ago. Throughout the region, rice cultivators have recognized the value of floodplains seasonally inundated by rivers (Adams, 1985). For instance, in the inner floodplains of the Logone (Waza-logone floodplain) where rice can still be grown traditionally, such rice cultivation is adapted to the annual flood. More importantly, varieties able to withstand the rising waters are planted at particular moments of the year following flood heights. In addition, in the inner delta of the river Niger in Mali, each village has rice varieties adapted to local soil condition (Gallais and Sidikou, 1978)

Biodiversity

The special attribute of a wetland, its biodiversity is not necessarily directly or indirectly used, but nevertheless is seen to have a value in itself, enhanced by maintaining the wetland intact or preserved. The lake Chad Basin for instance, supports thousands of mammals in addition to millions of waterfowls, many of them migratory, during the course of the year (Monval *et al.*, 1987; Wanzie, 1996). These can be exploited for recreation and income generation.

The above notwithstanding, the preservation of ecosystem diversity ensures the continuation of the processes that underpin the maintenance of all forms of life. These processes include: maintenance of water cycles, regulation of climates at both the macro-and micro-climatic levels, control of erosion, maintenance of essential nutrient cycles, and photosynthetic fixation of energy whereby energy from the sun is transferred through green plants to the ecosystem as a whole. In most cases, these uses occur without the products ever being formally marketed and therefore their value seldom appears in national income accounts.

Scientifically, our understanding of biodiversity is still insufficient to guarantee proper conservation, and only by further scientific research are we likely to learn improved methods for managing it. There are also certain to be new uses to which species, habitats and ecosystems can be put, and these are likely to be revealed by research. If diversity is reduced by destruction of habitats and ecosystems, an unknown potential for both a better understanding of the world and for learning how to use its resources wisely is irretrievably lost.

The causal factors for wetland loss

For centuries, the drainage of wetlands has been seen as a progressive, public-spirited endeavour (Baldock, 1984), which enhanced the health and welfare of human society.

One cannot deny the fact that the exploitation of these wetlands, even when leading to total conversion of the wetland, has often brought social benefits, in both the short and long term. Nevertheless, unacceptably high wetland loss has led to a net social cost. Many of these losses have been deliberate, but others are the result of decisions taken in ignorance of the full value of the wetlands in their natural state. Some are the result of inefficient management systems, and others are unintentional by-products of other actions.

Institutional weakness

Wetlands mean different things to different users. Agriculturalists see moist fertile soils with vast potential for growing grain, fishery managers find a support base for producing fish, hydrologists calculate capacities to provide water for industry, agriculture, and domestic use; public health specialists see them as regulators of water quality or carriers of disease; and so on. Well managed wetlands can yield a blend of these benefits in varying quantities. Yet, investment in wetland management is rarely integrated.

Instead, wetlands are invariably viewed by each user as single-product system, precluding other values, while single-purpose returns fall far short of expectations. There is thus the need to always reorganize the management of natural resources through effective integration and coordination. Only if this happens can development of the full potential of wetland ecosystems proceed in an orderly manner, bringing sustainable benefits to all.

Information gaps

Some of the products and services of wetlands are sold: commercial fisheries, meat and skins from grazing herds, crops, etc. But many wetland values do not have markets; for instance water purification, wind breaks, etc. Because these values are free goods, they tend to be ignored in the economic calculations that decide whether wetlands should be conserved or developed. The result is, in most cases, a systematic bias favouring development and hence the degradation of wetlands.

Yet this bias is economically inefficient. The non-market values of wetlands clearly have positive, and often very significant, economic values. For instance, if water is not purified by the wetland, it must be treated artificially and expensively. This "replacement cost" provides a benchmark indicator for the value of the wetland's purification function. It is essential to recognize that the absence of markets does not mean that wetlands have low economic value. What is needed is a systematic effort to measure the non-market values of wetlands, and to communicate this information, so that conservation/development decision makers are better informed.

This limited appreciation of the importance of wetlands lies at the origin of many other problems which include those already considered above. If government has a better understanding of the importance of wetlands, and their role in sustaining a range of economically important activities, it is reasonable to assume that more concerted efforts would be made to improve planning and management of these resources.

The consequences of wetland loss

Wetlands have been destroyed because society has viewed eliminating them as either good in itself, or as a small price to pay for the benefits expected from wetland conversion. Today, such policies are increasingly condemned as short-sighted and socially and economically indefensible.

Dams and other river schemes have come under special criticism for having destroyed wetlands while falling far short of their predicted benefits (Goldsmith and Hildyard, 1984), and bringing hardships to those populations dependent upon the floodplain and other wetlands downstream. For instance in northern Cameroon, the construction of the Semry II irrigation project on the Logone River greatly reduced the extent and duration of flooding downstream. Fish yields collapsed from US \$2,000.00 to only US \$200.00 per season, and it is no longer possible to grow floating rice, once the principal cereal of the Kotoko community. Although small-scale irrigation and gardening is being tried, local people lack the skills and assistance required, while inputs and marketing of produce are difficult in the isolated floodplain environment (Drijver and Rodenburg, 1988).

The issue of floodplain development highlights the general principle that wetlands will be destroyed where people see other uses of the water as more productive. But how varied is this assumption? When efficiency is measured in terms of profit per unit of water, data from African floodplains suggest that there is little difference between traditional intensive methods of agriculture and intensive rice cultivation. And when the costs of the capital investment are taken into account, rice cultivation can lose money. Evidence suggests that natural processes in the inner delta of the Niger are worth around \$1.00 per

100m³ and that they produce a much wider range of foodstuff than a monoculture of rice (Drijver and Marchand, 1986). More detailed study of these issues is certainly required, but intensive irrigated agriculture is no longer viewed as the only option for floodplain use.

In the past, loss of these wetland benefits has generally gone unremarked because the relatively strong national and household economies of industrialized nations can afford to pay for the consequences. Flood control and water purification, once provided free by wetlands, are today replaced by dams, dykes and other projects financed by increased taxes. And higher prices are paid for fish and other wetland products now becoming scarce. In the developing world, wetland loss is leading to substantial impacts upon local communities which depend upon these resources. To solve this problem, the precise reasons for wetland loss need to be analysed and means to address them identified.

Discussion

While no single wetland fulfils all of the functions discussed above, yet all wetlands yield multiple benefits. Most development projects, on the one hand, concentrate intensively on one aspect, such as agriculture or fishery yields. The limitations of this approach are now becoming obvious. Firstly, full development of the single use approach often requires major investments of capital, manpower, technology, and inputs such as fertilizers, as well as substantial annual investment in maintenance. Secondly, where conversion is attempted, the ability of natural wetlands to sustain alternative development is generally found to be low (Burbridge *et al.*, 1988). And thirdly, such conversions usually involve hidden costs and, if development is to be substantial, require far more sophisticated management than is generally available to the average rural community.

In the light of these problems, while developing wetlands today, one must appreciate that the potential of wetland ecosystems can, in their natural condition, provide a very wide range of products and services.

Some tropical diseases such as malaria, yellow fever, filariasis, schistosomiasis, etc. are associated with wetlands, although not specific to them (Giglioli, 1980). For much of the recent past, the eradication of these diseases has been one of the principal arguments advanced in defence of the drainage of wetlands. What is clear is that many drainage efforts, while effectively destroying the wetland system, have done little to eradicate the diseases and their vectors. In contrast, some interventions in wetlands can actually increase the number of disease vectors.

The construction of dams and irrigation schemes are increasingly criticized as favouring malaria by providing mosquito breeding areas and schistosomiasis by harbouring large populations of snails. In Sri Lanka, the construction of reservoirs has increased the spread of malaria, and irrigation in Thailand has increased the problem of river fluke (Godsmith and Hildyard, 1984).

The message of these examples is that while wetlands certainly harbour diseases, neither drainage nor conventional form of intensive development, necessarily provide healthy alternatives. Improved health is closely linked to improved socio-economic standards. By contributing to the latter, environmentally sound management of natural wetlands may in many instances provide a more effective means of combating diseases than wetland destruction.

In many countries, including Cameroon, the rate of wetland loss has reached the proportion of a national crisis. In the Sahel of Cameroon, wetland loss has led to substantial impacts upon local communities which depended upon these resources. Consequently, efforts should be made, and very urgently too, to identify mechanisms whereby the productivity of the floodplains of the Sahelian zone can be rehabilitated; for instance diverting some of the water of the river Oubangui in Central African Republic into the Lake Chad Basin, as proposed by the authorities of the Lake Chad Basin Commission during their recent meeting held in Yaoundé early this year.

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