

WETLANDS  
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RIZA



# The Socio-Economics of Wetlands



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## Wetlands International

Wetlands International is an independent global non-profit organisation dedicated solely to the work of wetland conservation and sustainable management. Networks of experts and close partnerships with key organisations provide Wetlands International with the essential tools for catalysing conservation activities worldwide. Our activities are based on sound science and have been carried out in over 120 countries.

Our vision is that all wetlands and their dependent biodiversity will be conserved, and that where wetlands are managed or used that this be done wisely.

Mission statement: "To sustain and restore wetlands, their resources, and biodiversity for future generations through research, information exchange, and conservation activities worldwide."

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RIZA (Institute for Inland Water Management and Waste Water Treatment) is the government research and advisory body for inland waters in the Netherlands and a leading international centre for integrated water management.

The Netherlands, situated in the complex delta formed by the rivers Rhine, Meuse and Scheldt, is rich in wetlands. Thus wetland development and restoration is a major part of our work.

In order to expand and share our experience, we maintain a programme for bilateral scientific exchange on wetlands, notably with counterparts in Central and Eastern Europe. Each year we organise international training courses on wetland management and on wetland restoration, for participants from most continents of the world. We have a formalized co-operation with the Ramsar Convention Bureau.

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# Foreword

Dear Reader,

The degradation and destruction of wetlands is a continuing concern in most parts of the world. Arguments for sustainable management of particular sites have generally centred on their importance for biodiversity, or historical/cultural significance.

These have achieved a measure of success, but many wetlands around the world are still being over-exploited and degraded.

Although the potential for wetlands to enrich human life and support (often spectacular) ecosystems is generally acknowledged, the protection of these values is often considered to be in conflict with what appear to be more profitable economic uses. In the face of hard economics and the need for governments to show tangible development achievements, it has often been difficult to present persuasive evidence to help combat unsustainable development options.

Decision-makers, who aim to design wise-use solutions for the future of wetlands, frequently lack access to convincing data that can challenge the arguments for single-minded exploitation or conversion. Increasingly however, economists, social scientists and wetland scientists have been

cooperating to better depict the socio-economic values of pristine wetlands in meaningful monetary and social terms.

Until it is widely accepted that wetland values can be significant and should be investigated prior to making development decisions, the world's wetland resources will continue to decrease despite many good intentions. The challenge now is to raise the awareness of these facts; a challenge that this booklet takes up. It explains the fundamentals of the socio-economic wetland values, their evaluation and role in decision making in a clear and accessible format. We commend this booklet to you and urge you to use it for your own enlightenment and as a tool to stimulate the integration of this information into your own decision-making processes.

Yours sincerely,



Delmar Blasco  
Secretary General  
Ramsar Convention  
Gland, Switzerland



Bart Fokkens  
Director Wetland Development and  
Restoration Department, RIZA  
Lelystad, the Netherlands

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# 1 Introduction

## 1.1 Purpose Of This Booklet

This booklet gives a brief introduction to the social and economic values of wetlands. It has been written predominantly for the benefit of managers, planners and decision-makers in government agencies in developing countries, who are responsible for charting the future of wetlands.

The booklet defines wetlands and wetland types, and gives an overview of the various values that wetlands may have and the reasons why these values are often disregarded. It provides guidelines on when wetland valuation is called for, and how this valuation can be performed. It concludes with an introduction to the economic instruments that can be used to address the gap between the perceived and actual value of a wetland.

Included are six case studies from developing countries that are based on sound economics. They address different wetland types and values and highlight the need for valuation as well as the issues of equity and financing.

After reading this booklet, we hope that wetland managers and decision-makers will be able to form an opinion about the value of their wetland(s) and confidently embark on a process of identifying and quantifying them.

## 1.2 What Is A Wetland?

The term wetland is not very precise. Wetlands are neither truly terrestrial nor aquatic; they can be both at the same time, or seasonally aquatic, or terrestrial. This 'in between' and dynamic character influences the plant and animal communities in such a way that wetlands are quite different to either aquatic or dry habitats.

### Definition of wetlands as used by the Ramsar Convention on Wetlands of International Importance:

*"Areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters."*

Wetlands cover approximately 6% of the earth's surface<sup>1</sup>. However, you will rarely find landscape features referred to as such. Wetlands will have a range of different names that can vary even within one country. The following is a useful way to categorise different wetland types:

- Coasts - areas between the land and open sea that are not influenced by rivers (e.g. shorelines, beaches, mangroves and coral reefs)
- Estuaries - where rivers meet the sea and water changes from fresh to salt as it meets the sea (e.g. deltas, mudflats, salt marshes, mangroves)

- Floodplains - land next to the permanent course of a river that extends to the edge of the valley (e.g. floodplains, including features such as ox-bow lakes, river islands)
- Marshes/swamps - land where water is more or less permanently at the surface and/or causing saturation of the soil (e.g. papyrus swamp, fen, peatlands)
- Lakes - areas of permanent or semi-permanent water with little flow (e.g. ponds, salt lakes, volcanic crater lakes)



### 1.3 Why Should We Care About Wetlands?

Ever since civilisation began, wetlands have played a key role in the support and development of society. The fertile Nile and Tigris/Euphrates river valleys supported the ancient Egyptians and Babylonians. Entire cultures have developed based on the seasonal flooding of wetlands in the Sahelian zone of Africa where grazing for cattle and fishing provide support to the diet of many African tribes. This relationship is still evident today although the link between communities dependent on wetlands and the availability of resources has become increasingly strained. Witness the Imraugen fishermen in the Banc D'Arguin, Mauritania whose traditional way of life is now threatened by competition from industrial-scale fishing vessels. Or consider how the population of people living in the Mekong Delta has increased to around 60 million, placing enormous pressure on the wetland's resources and sustainability.

In current times, wetlands are also capable of providing alternative sources of income for local people. Uses of wetlands have diversified into leisure pursuits such as recreational fishing, hunting, birdwatching and boating, which can generate money from visitors and provide sustainable development opportunities.



Small-scale fishing

L. Zwarts

In addition, many additional services and benefits are provided by wetlands that are often less tangible. Water quality improvement, flood protection and provision of navigable waterways can all be provided by wetlands depending on their type and location. For many people they also provide nature sanctuaries whether in terms of a landscape that may have historical or cultural significance or as reserve for biodiversity such as species-rich coral reefs.

**One can say that wetlands are important to people for a wide range of reasons from life-support to development to cultural inheritance.** However, continued provision depends on maintenance of the integrity and health of wetland resources; a major challenge in a world where pressure on resources is increasing due to a growing and developing population.

### 1.4 How Threatened Are Wetland Ecosystems?

The Ramsar Site Database<sup>1</sup> provides insight into the main threats to wetlands. In 1999, 84%<sup>1</sup> of Ramsar-listed wetlands had undergone or were threatened by ecological change. The most widespread threats are:

- Drainage for agriculture
- Settlements and urbanisation
- Pollution
- Hunting

These threats fall into two main categories; loss and degradation.

Worldwide, 50%<sup>1</sup> of wetlands are estimated to have been lost since 1900. During the first half of the previous century, this mostly occurred in the northern temperate zone. However, since the 1950s, tropical and sub-tropical wetlands, particularly swamp forests and mangroves have also been rapidly disappearing.

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<sup>1</sup> A database containing information on all designated wetland sites worldwide as appointed by Contracting Parties in accordance with the Ramsar Convention.

### Drainage for Agriculture

Agriculture is considered the principal cause for wetland loss worldwide. By 1985, it was estimated that 56%-65% of available wetlands in Europe and North America had been drained for agriculture; figures for other continents are: Asia 27%, South America 6% and Africa 2%.<sup>1</sup>

The extent of threats to wetlands due to degradation are less easily estimated but are no less dramatic. There are many mechanisms causing this. Embanking a river, or over-exploiting a groundwater resource, or building dams across contributing rivers alter hydrological characteristics. Pollution from agricultural and industrial sources can increase levels of nutrients or pesticides or heavy metals and seriously impair ecological processes. Excess harvest of animal or plant species or removal of the wetland itself through activities such as peat cutting can result in over-exploitation and long-term damage. Although a wetland may not be removed from the landscape through degradation, it can severely damage the way a wetland is able to work and provide benefit to people.

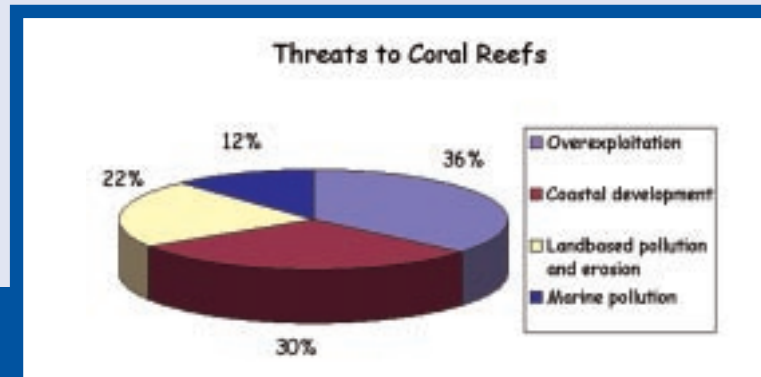
### Threats to Coral Reefs

All wetland types can be threatened. A recent study of coral reefs indicated that 58% of the world's reefs are at moderate to high risk of damage from human disturbance<sup>1</sup>.



M.J. Silvis

*Farmer at work on his "land"*





# Case 1

## Merja Zerga Lagoon, Morocco

### Site description

Merja Zerga is a wetland of 7,000 ha, located on the Atlantic coast of Morocco, adjacent to a small coastal town that serves as a centre of attraction for domestic and regional tourism. It consists of a large coastal lagoon with extensive intertidal mudflats, subtidal seagrass and fringing marshes, and can be considered as an coastal wetland.

### Threats

The main problem is the use of the wetland as a public good. All levels of society in the area unanimously agree that the wetland is important and that life without it would be very difficult; however, they use it without considering the durability of resources. Social regulations no longer exist to solve sectoral conflicts. There is significant urban sprawl and demographic growth in the region. Pastureland has declined due to overgrazing. Fish have decreased in size and number due to overfishing. The water table has dropped due to the illegal construction of wells depleting the freshwater influx into the lagoon.

### Main values

#### ● Direct-use values

- At least 2,500 households derive part of their income from the wetland. The main activities are:
- Agriculture (breeding of cattle).
  - Wetland products (fishing in the lagoon, gathering of clams and bait for recreational fishing, and harvesting of rush for mats, fuel and roofing).
  - Recreation (tourism advantages of the site are exploited informally through camp-sites and local hotels which lag far behind their real potential).

#### ● Indirect-use values

The site provides protection against coastal erosion and floods. The quality of the water improves as it moves via the lagoon to the sea.

#### ● Non-use values

The wetland is of international importance because it supports up to 200,000 wintering and staging waterbirds.

### Reason for the valuation study

The study in Merja Zerga was a pilot project to achieve a better understanding of social and economic aspects of wetland resources and how they are used and viewed by local inhabitants. The study took the form of a total valuation (See Section 3.3).

### Values quantified

The study quantified the direct use values and non-use values. The values for agriculture and wetland products were estimated via the market price method. Recreation and the non-use values were estimated with a contingent valuation study.

**Agriculture and wetland products:** Net annual income from the wetland was estimated by interviewing 170 households around the area. The average income from the wetland was 806 US\$ per household per year;

which represents 30% of the total income of these households. The distribution over various wetland products is shown in figure 1.

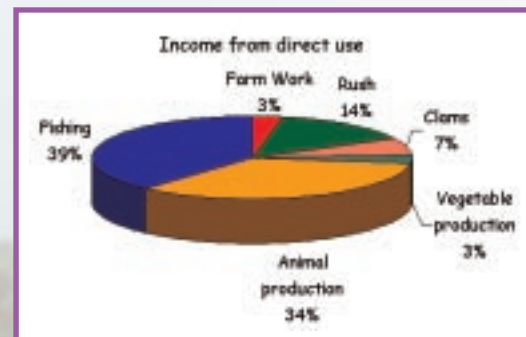


Figure 1.

**Recreation and non-use values:** These were estimated from a contingent valuation study. 250 visitors were interviewed. The people concerned were asked how much they were willing to contribute in a state project to avert the threats to the "attractiveness and value of the Merja Zerga site." A "rising or falling bid" method was adopted to determine this value, as bargaining is part of Moroccan everyday practice. The average was a one-time contribution of 19 US\$ per person. It was assumed that approximately 800,000 inhabitants of surrounding provinces would be willing to pay this contribution.

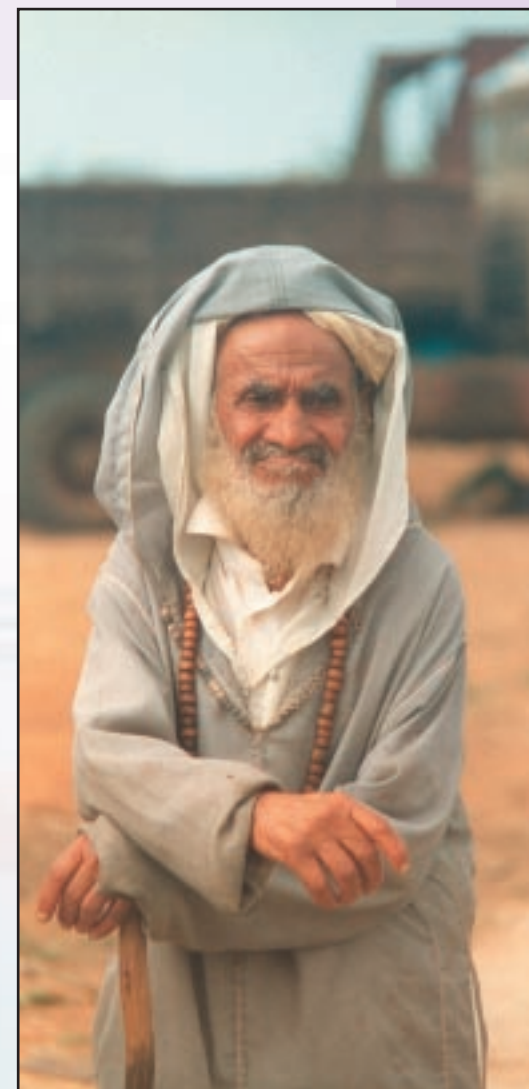
With these values an estimate can be made of the total value of Merja Zerga (table I). This should be considered as the minimum economic value of the Merja Zerga, as the value for the population living outside the area - national or international - was not taken into account.

Values have been expressed in various units, using a discount rate of 6% and a wetland area of 7,000 ha. For explanation of these units, see section 3.4 of this booklet.

Values		Households or persons involved	Net Present Value (million US\$)	NPV per ha (US\$/ ha)	Yearly flow (million US\$/ year)	Yearly flow per ha (US\$/ ha, year)
Direct Use						
Agriculture and Wetland products	803 US\$/ household/ year	2,500	33	4,780	2	287
Recreation	Included in non-use					
Indirect use	Not estimated					
Non-use	19 US\$/ person, one time	800,000	15	2,171	0.9	130

**Components of total value of Merja Zerga**  
(US\$ of 1998)

**Table I.**



N. Bennessalah

*Inhabitant Merja Zerga Region*

## 2 Wetland Values

### 2.1 What Is A Wetland 'Value'?

Wetlands are hugely diverse, but whether they are ponds, marshes, coral reefs, lakes or mangroves, their processes are based on the interaction of basic components - soil, water, plants and animals. It is these wetland *processes* that generate the products, services and attributes that are *valued* by humans.

Values have a worth to people, which can be measured in various ways. Most understandable is the concept that the values have an economic worth that can be expressed as an amount of money, for instance a market price. Values can also be given a worth in non-monetary ways such as by estimating importance to a way of life or community. For instance, certain nomadic groups in Sahelian Africa have a culture based on the seasonal inundation of wetlands. Their movements are timed to coincide with these events that provide them with fish, grazing for their cattle and trade opportunities.



L. Zwarts

Leading cattle to water

However the worth of a value is established, it is important to appreciate the link between the ecological processes taking place in a wetland ecosystem and the worth of the values that it provides to people. It means that:

**The values that a particular wetland type provides depends on its characteristic processes.** For instance, a coastal wetland's processes are often dominated by the daily tidal cycle, whilst a floodplain wetland is dominated by the freshwater hydrology of a river. Very different habitats arise in these areas and the associated suite of values that can be provided, are correspondingly different.

**The worth of values that a wetland can provide is dependent on the way it is managed.** If poor management results in damage to key processes, then the wetland is degraded and values may be lost or their importance decreased.

### 2.2 What Kinds Of Values Are There?

Values are realised when people decide that something is important to them. Human interaction with the environment is very diverse and so there are many specific values that can be appreciated by different individuals and stakeholder groups. These can be categorised according to the way that humans interact and benefit from them. The principal types are:

- **Use values** that are realised through human interaction and fall into three groups:
  - **Direct use values:** the most tangible and relate to the products and benefits that can be derived from use of a wetland, such as food, materials, recreational use.
  - **Indirect use values:** can also be thought of as services, and arise from the benefits provided to existing activities or resources through their occurrence. An example would be the protection of existing property by regulation of flooding.

- **Potential future use values:** arise when there is uncertainty over the future demand for a product or service and/or its availability in a wetland in the future. It reflects a need to estimate the benefit of conserving them for this purpose. An example would be the protection of future property by regulation of flooding.

● **Non-use values** are related to the essential nature of a wetland and the worth that is placed on it by a particular stakeholder/group(s) (farmers, nature conservationists, local population). This can be due to a variety of qualities such as its biodiversity or cultural/heritage or social significance.



M.J. Silvius

Tourism

Total Economic Value For Wetlands			
	Use Values		Non-Use Values
Direct Use Values	Indirect Use Values	(Potential) Future Values <sup>ii</sup>	Existence Value
Wetland products (fish, reeds)	Flood control	Potential future uses (as per direct and indirect uses)	Biodiversity
Recreation and Tourism	Groundwater recharge	Future value of information	Cultural and heritage value
Transport	Shoreline stabilisation and storm protection		Bequest values (Value for future generations)
Agriculture	Water quality improvement		
Peat/Energy	(micro) Climate change mitigation		

Summary of the main types of wetland value and the different categories they fall in. Table 1  
After: E. Barbier et al<sup>2</sup>.

<sup>ii</sup> The economic valuation literature describes option value, quasi-option value and bequest value as elements of this '(potential) future values' category. Besides, future direct and indirect uses could also be placed in this category, but could alternatively be put under the direct and indirect values. Note also that bequest value is sometimes considered to be both a use and non-use value rather than a strict use value. This remains a matter of taste.

# Case 2

## Total Economic Value of Lake Chilwa Wetland, Malawi

### Site Description

The Lake Chilwa wetland has an area of 2,400 km<sup>2</sup> and is situated in the south of Malawi, on the border with Mozambique. It is one of the most productive lakes in Africa, producing more than 20% of all fish caught in Malawi. It is also a very important area for waterbirds and for agricultural activities. The Lake Chilwa wetland has been designated as Malawi's first Ramsar Site (Wetland of International Importance) in 1996.

### Threats

The two major threats facing Lake Chilwa are a reduction in lake level due to water abstraction within the catchment, and degradation of the catchment by the local population. There is a shortage of wood for fuel, for construction of fishing crafts and for building material. Over-trapping and shooting of resident and migratory birds is also a major problem. Potential threats for the future include poverty, population increase, soil erosion and siltation, destruction of breeding grounds and sanctuaries for fish, increased use of agro-chemicals affecting the aquatic environment and invasion by exotic plant species.

### Reason for the valuation study

The goal of the project for which the valuation was carried out, was to sustain and enhance benefits of the wetland to local communities. The aim of the economic valuation study was to value net annual benefits of the wetland and to suggest implications of these values for management of the wetland.

### Values quantified

Five wetland resources were valued using the market price method:

- **Agriculture:** Including crop-growing and organised rice-schemes. The main crops grown in the wetland are maize and rice, depending on the location. Approximately 92% of the respondents in the wetland grow crops. The main costs of growing crops were fertiliser and employment costs, which were both subtracted from the benefits. Fertiliser is only used by a small



K.D. Schuit

group of people (28%), as it is often too expensive. Hired help is used by 14% of the people.

- **Fish:** Both values for fishermen and values for fishmongers were calculated. The average annual catch is 16,600 tons per year, making Lake Chilwa an extremely productive lake. The major costs for fishermen were employment costs, depreciation (devaluation) costs of boats, rental costs of boats, reparation costs of boats and depreciation of equipment. For fishmongers, main costs were purchasing and processing fish, transport, living expenses and market fees.
- **Vegetation:** Reeds in wetlands are used for mats, brooms and baskets; bamboo is used for fish traps; grass is used as a building material for roofs, walls and fences; wood is mainly used for firewood and clay is used for making bricks.
- **Open water:** Water is utilised by people for fishing, transport, irrigation and for domestic use. Transport is through small boats for trips to islands and other places within the wetland, and larger ferries that go to the north of Malawi and into Mozambique.
- **Grasslands:** Mostly used for grazing by cattle, goats, sheep and pigs.

	Yearly flow (million US\$/year)	Yearly flow per ha (US\$/ha/year)
<b>Direct use</b>		
Agricultural grounds	1.3	
Fish	18.7	
Vegetation	0.01	
Open water	0.4	
Grasslands	0.6	
<b>Indirect use</b>	Not estimated	
<b>Non-use</b>	Not estimated	
<b>TOTAL</b>	21.0	88

Economic values of the Lake Chilwa wetland (US\$ of 2002)

Table I.

K.D. Schuit

## 2.3 An Overview Of Wetland Values

There are many different values that have been attributed to wetlands. However, not all wetlands provide all values. Although five general wetland types have been outlined above, many factors such as climate, geology, environmental history and human impact mean that within each type, functioning can be quite different. As a result the values that arise can also be quite dissimilar, even between wetlands of the same type. Below, some of the most commonly noted values are described in a generic way. This should not mislead you though - the presence and importance of a value needs to be investigated in every case and cannot be assumed!

### Direct Use Values

#### ● Wetland products

In terms of biomass production, wetlands are among the most productive ecosystems on earth. This biomass can be harvested for a number of purposes such as consumption, construction and medicine. Wood for construction, reeds for thatch, peat for fuel, food such as fish, fruit and meat are all examples. Inorganic material may also be important - sediment may be collected for brick making, water for irrigation and drinking. Products can be both used for subsistence and/or sold locally or in areas away from the wetland. Examples of wetland products can be found in all the case studies in this booklet.

#### ● Recreation and tourism

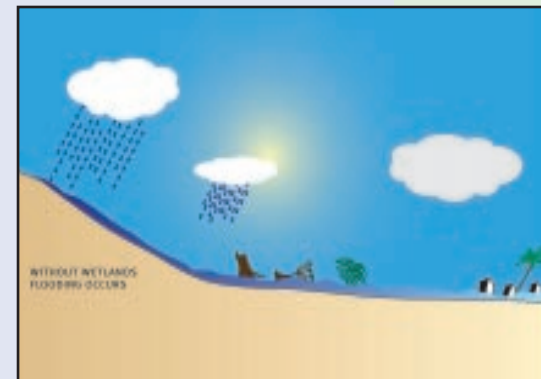
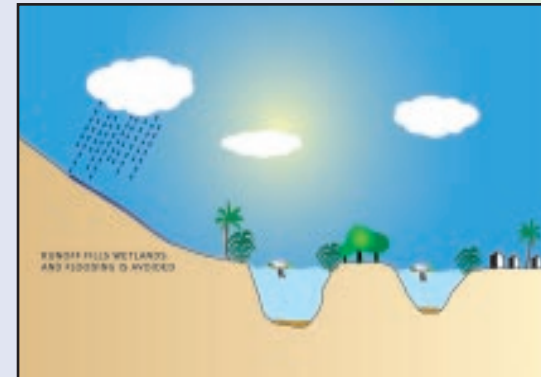


Wetlands can offer significant possibilities for recreation that can be harnessed to promote the development of tourism at a site. Features of beauty, rare or spectacular biodiversity or elements of a site that offer themselves to specific activities can be especially useful. Canoeing and sailing on lakes, diving in marine wetlands such as coral reefs, sport fishing, hunting and birdwatching are all good examples. Recreation and tourism can be an important component of the sustainable management of wetland areas (see Case 3, Olango Island). Roles as guides and food/refreshment vendors can provide local people with long-term employment and sustainable income streams. However, tourism and recreation must be managed with due care and consideration. Damage can result to the resource on which it is based and local communities that are not involved in the local tourism business may be disenfranchised.

### Indirect Use Values

#### ● Flood control

Wetlands of various types can contribute to the reduction of floods. Lakes, marshes and swamps can act as reservoirs that fill up with excess water. Floodplains are the natural extensions of rivers when high discharges occur, acting as temporary rivers that conduct the excess water. The effect is a lowering of the peak water levels, which is especially useful when surrounding areas are sensitive to flooding and are heavily utilised.



### The flood protection value of wetlands -high- if there is something to protect

If a wetland is drained, the risk of floods in unwanted places may increase, unless counter-measures, such as dikes, are taken. The economic worth of a wetland for flood control is then the cheaper of these two alternatives: dikes or flood damage.

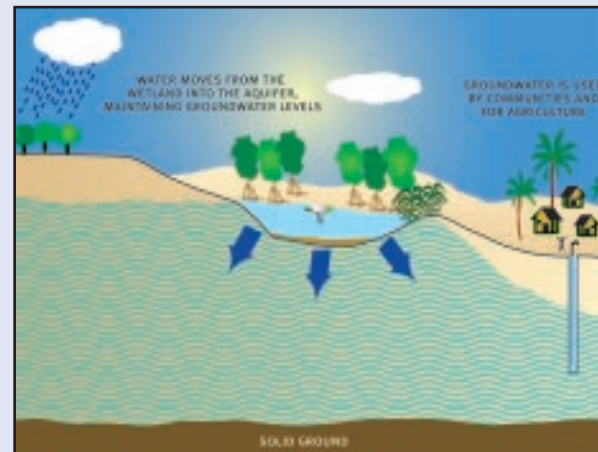
In the Netherlands, where there is a long tradition of draining wetlands, dikes have long been the preferred choice. With the protection offered by these dikes, large investments in infrastructure, agriculture, housing and industry are now concentrated in the former wetlands; the costs of a flood in this part of the country are now prohibitively high.

However, climate change is posing new future risks, through increases in sea-level and extreme river discharges. In the Dutch situation dikes are still the economically cheapest solution, but the prospect of indefinitely raising dikes is very unattractive. Thus the less heavily developed former wetlands may get a new lease of life. Restoration - broadening floodplains, (re)creating water retention areas in natural depressions, (re-) opening secondary channels of rivers - is now on the political agenda.

The costs of these measures depend heavily on what use is given to the areas when the floods are not around. If year-round wetlands, devoted to nature and flood control are the vision, then the costs are much higher than the costs of additional dikes; but their costs are still lower than the flood damage costs that are prevented.

### ● Groundwater recharge

Where the soil and geology of a wetland system is appropriate,



water may be able to filter down into the local or regional groundwater system. This may then be available for exploitation by local or regional populations for drinking water or irrigation.

This can be a very significant wetland value, particularly in semi-arid to arid areas where water resources are scarce. However, there are few case studies that have quantified it, due to the large research effort that is required. In addition, there are a number of



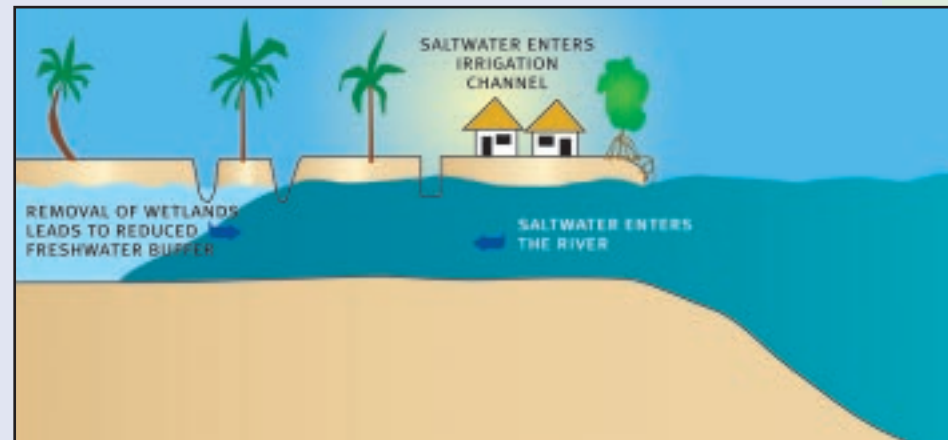
hydrological reasons why the relationship between wetlands and groundwater recharge may not always be as evident as it seems.



- **Prevention of saline water intrusion**  
Coastal freshwater wetlands can help to maintain supplies of drinking, washing and irrigation water to local communities and prevent salinization of the soil. In low-lying

coastal wetlands where the underlying substrate is permeable, a wedge of freshwater frequently overlies deeper saline water, preventing it from moving to the surface. Removal or reduction of this

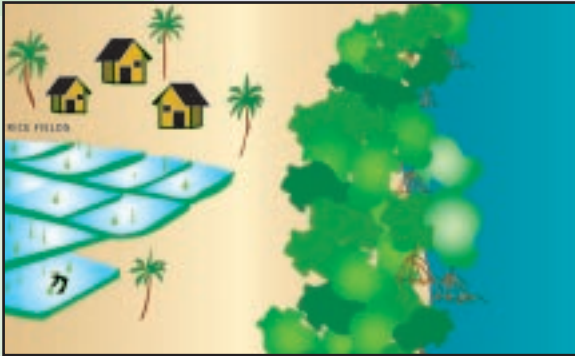
freshwater wedge through degradation (e.g. through groundwater abstraction) or removal of a wetland can allow the deeper saline water to penetrate the land surface, causing water quality problems.





- **Shoreline stabilisation and storm protection**

Coastal wetlands such as mangroves or coral reefs can help prevent or reduce erosion of coastlines, estuaries and riverbanks by acting as a physical barrier and as an agent of reinforcement. Vegetation such



*Removal of mangroves increases flooding and erosion of the coast.*



as mangroves and structures such as reefs reduce the strength of wave action and currents. In addition, vegetation can shield structures, crops or natural vegetation from damage by strong salt-laden wind. Plant roots can bind and stabilise soil/sediment and vegetative matter, reducing erosion. This can be a sustainable and highly cost-effective method of sea defence.

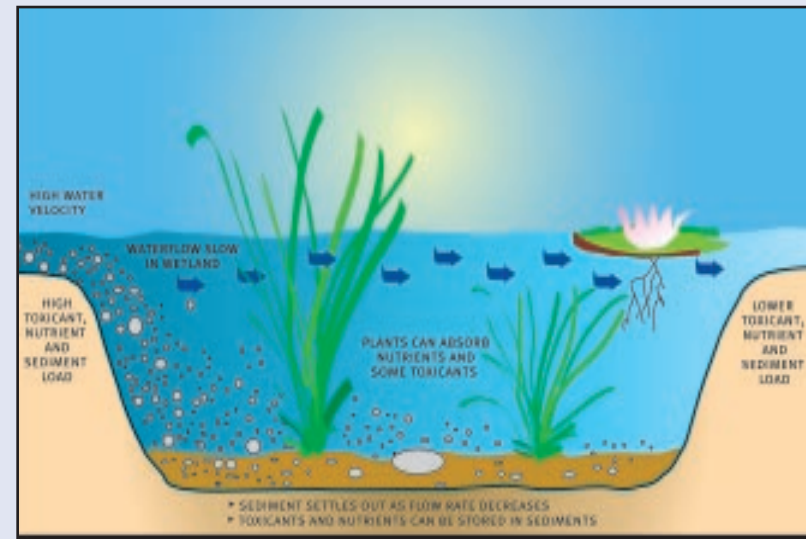
- **Water quality improvement**

Wetlands can improve water quality by reducing the amount of sediment / organic material and chemical compounds carried in water travelling through it. This can improve systems receiving water from wetlands by reducing the occurrence of pollution-associated events such as eutrophication and improving navigation by reducing the deposition of sediment in waterways.

Pollutants carried in solution such as nitrates, can be permanently removed from a system or chemically altered to a more benevolent form or stored within plants or chemically attached to sediment. Pollutants carried in association with sediments and organic material can be similarly dealt with and in addition they can be buried more or less permanently.

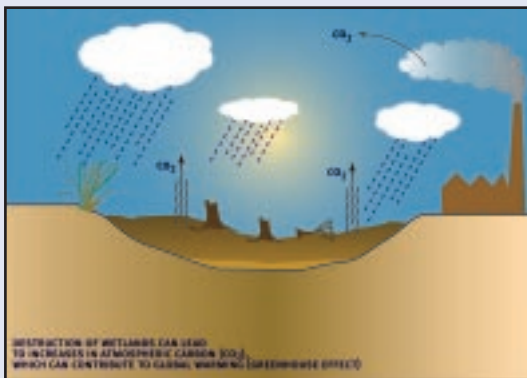
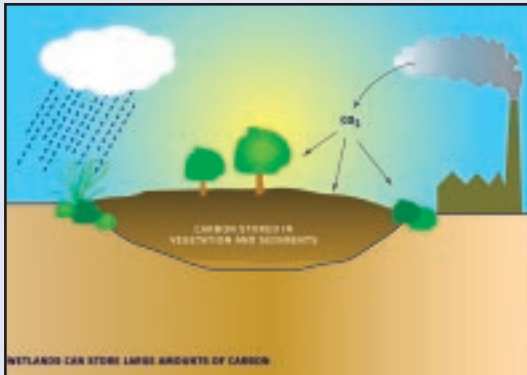
However, the processes responsible for water quality improvement can also degrade the wetland. For instance if a wetland receives too many nutrients the vegetation type and fish species will change and along with it the wetland's character. Some pollutants can be chemically stored for long periods of time only when specific soil, chemical and hydrological circumstances are met.

In such cases, using a wetland for water purification comes with a price; it is essential that the consequences are carefully evaluated. The water purification issue is central in the Nakivubo case.



- **Carbon sequestration**

Certain wetland types accumulate large amounts of carbon in the form of un-decomposed organic material. Peatlands are particularly significant in this respect storing over 16-24% of all carbon in soils whilst covering only 3%<sup>4</sup> of all global land area. There is great concern over increases in carbon dioxide in the atmosphere since this contributes to global warming. Destruction of wetlands, especially peatlands, will contribute to this effect.



- **(Micro) Climate change mitigation**

Wetlands may affect the microclimate in the area of the wetland itself and its immediate surroundings. Evaporation from wetlands can maintain local humidity and rainfall levels. As yet, little research has been performed on these processes.

### **Non Use Values**

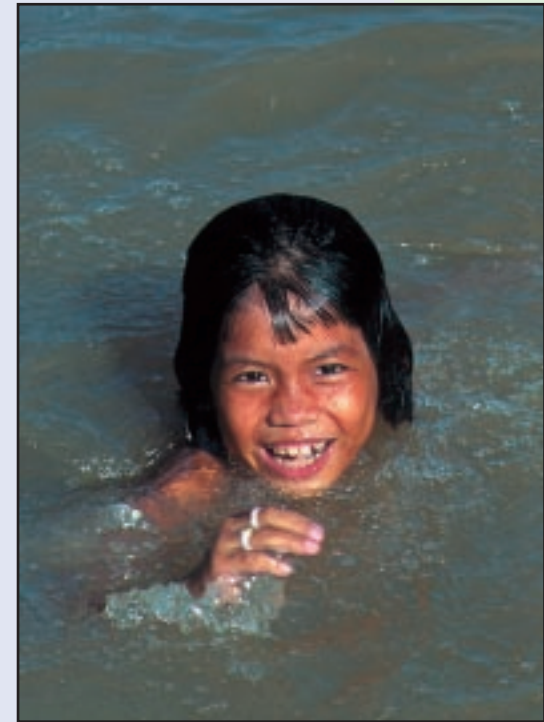
- **Culture and heritage**

People who do not directly utilise a wetland can also place a value on it because of its essential character or meaning to them. For instance they may wish to see it preserved, for its cultural and heritage value. Wetlands are frequently of religious, historical, archaeological or other cultural significance on a local or national level.

### **Lake Titicaca, Peru**

The floating Islands of the Uros people of Lake Titicaca are formed from compacted beds of reeds. The reeds are also used to construct huts and boats. It is believed that the Uros people originally took to the reed islands of Lake Titicaca in an effort to isolate themselves from other groups such as the Incas. The Titicaca area is steeped in tradition and folklore and is the centre of Inca creation legends. Inca myth tells how a god emerged from the lake to create the sun and moon and fashion humans from stone.

- **Bequest**



M.J. Silvius

Bequest value results from individuals placing a high worth on the conservation of wetlands for future generations to use. These values for future generations may be particularly high among the local populations currently using a wetland, in that they would like to see the wetland and their way of life that has evolved in conjunction with it passed on to their heirs and future generations in general<sup>3</sup>.

- **Biodiversity**

Many species of animals and plants and their habitats depend on wetlands for their continued existence. Some species live permanently in wetlands and others depend on them for key aspects of their life cycles (such as resting points on routes for migratory birds, spawning grounds for fish). Many rare or threatened species depend on wetlands and people value their continued presence in their own right and not as a source of food or other direct use.



## 2.4 'Total' Value

- **Total economic value**

All of these wetland values have been explained individually to give an idea of how they occur and what type of benefit can be realised. However, in decision-making it will normally be the overall worth of a wetland that will be important rather than consideration of only one value. Often this will be expressed economically and when doing this, the following must be taken into account:

**The total economic value of a wetland is the sum of all mutually compatible values.** The value of a wetland is not the sum of all possible values - not everything can be realised at the same time. For instance the use of a wetland for water quality improvement may not be compatible with a role in provision of recreation; discharging urban run-off into a wetland being used for swimming will rarely be popular!

**The total economic value of wetland is a function of perspective.**

The use and value of a wetland varies with perspective and there is no right or wrong, just different perspectives. For a local village, only some goods and services that wetlands provide might be important. A fish nursery value for open ocean fish may not be important for this local community. For a region or a country as a whole, this could be very important, On the other hand, its biodiversity value may be very important for the international community, for instance if the site lies on a bird migration route.

- **Values: Equity and social significance**

Wetland values can also be considered in terms of their social significance; stakeholder perspective should be taken into account in these circumstances. Social values cannot be seen as separate from the stakeholders. Development of a wetland resource by one stakeholder group may deprive another of an essential resource for cultural or physical survival. To one stakeholder a wetland resource is a development opportunity, while to other stakeholders it represents an essential lifeline providing food and environmental security. Costs of mitigating the negative social impacts of resource use by one stakeholder on the resource use of another may be more costly but sometime less obvious than the economic benefits gained.

**It is often the poorest people (with the smallest economies) that depend the most on natural wetland resources and functions.** Even though subsistence communities constitute a significant proportion of the population in low-income countries, they are easily marginalised and overlooked by planners and decision-makers. These people are often directly affected by negative impacts of well-intended development and are unable to pay for escape strategies to bail themselves out. Hence the importance of increasing recognition to ensure involvement from the outset, of all stakeholders and particularly the people that depend on these areas for their livelihood in wetland development and management planning.

# Case 3

## Benefits of Coral Reefs, Olango Island, Philippines

### Site description

Olango Island has a total land area of 10 km<sup>2</sup>. It is surrounded by a coastal wetland comprising 40 km<sup>2</sup> of wide fringing coral reefs and seagrass beds. In addition, it has smaller areas of mangroves and mudflats, which have an estuarine character. The following focuses on the coastal part of the island.

### Threats

There are over 20,000 inhabitants, half of whom are under 18 years of age. The majority of households are engaged in fishing or related activities, such as shell-craft. The catch per fisher has dramatically decreased from about 20 kg per fisher per day in 1960 to less than 2 kg per fisher per day in 1998. The main problem for the inhabitants is poverty, which leads to over-exploitation of the reef resources. Although the coral reefs of Olango are visited by many foreign tourists, the residents realise little direct benefit from the influx of foreign exchange, as the tourist accommodation is located on a nearby island.

### Reason for the valuation study

Valuation of the net benefits of the coastal resources in the present situation, and estimating the benefits and costs of improved management. This shows the relatively high returns from small investments in management

### Values quantified

The study estimated the direct use values of the coastal resources. The major benefit is the amount spent by foreign tourists for accommodation on the resorts of a nearby island, while making day trips to Olango. Other significant benefits are the expenditure of tourists during their stay on the island.

Values	Yearly flow (US\$/ ha/year)
<b>Direct use</b>	
Fishery - local market	45 - 70
Fishery - live fish export	15 - 30
Seaweed farming	40 - 80
Tourism - on site expenditure	40 - 65
Tourism - off site expenditure	240 - 380
<b>Indirect use</b>	
Coastal protection	Not determined
<b>Non-use</b>	
Aesthetic/ biodiversity	Not determined
<b>TOTAL</b>	<b>380 - 625</b>

**Economic value of the coral reefs and seaweed beds of Olango Island.** (US\$ of 1997)

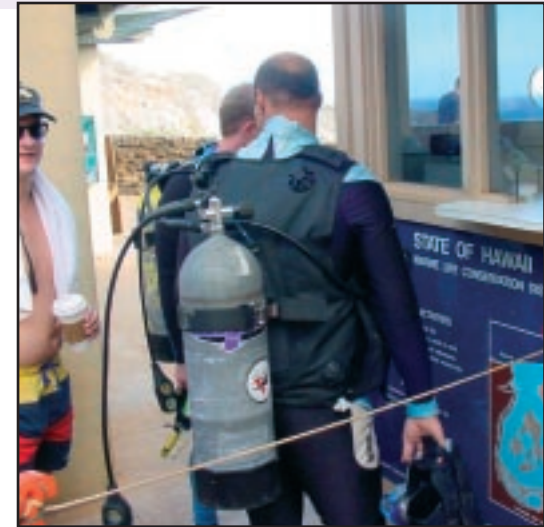
Table I.

### Benefits and Costs of Improved Management

With more active management, the quality of the coral reef on Olango could improve, which would lead to an increase in benefits from both tourism and fisheries, as well as an increase in revenues from fees and taxes. This increase in benefits could amount to 60% (or 1.1 million US\$ per year for the entire coral reef) in 5 years.

Based on experience in other parts of the Philippines, the costs required for improved management are estimated at only 70,000

US\$ per year (this includes the management of the estuarine parts of Olango).



H.S.J. Cesar

Visitors paying to see coral reefs

It is apparent from the analysis that the coastal resources of Olango Island are very valuable. However, the major part of these benefits is reaped by the owners of the resorts. The inhabitants of Olango see little of the tourist money and therefore have little incentive to preserve the reefs. Improved management can significantly increase the benefits of the coral reefs for society as a whole. Thus, it is economically justified that local and national government allocates a larger budget for the management of the coastal resources. These funds should be "harvested" from the owners of the resorts, who currently benefit most.

# 3. Taking Account of Wetlands Values in Decision-making

## 3.1 Wetland Values in Decision Making: Why they are Overlooked

The values of wetlands are frequently not given sufficient consideration in decision-making, resulting in threats that can lead to the degradation and destruction of wetlands. Some of the principal reasons why this happens are presented below.

- **Lack of market**

Often there is no market for the values a particular wetland provides and consequently they can easily be ignored and seem insignificant next to the more easily appreciated worth of conversion and alteration of land-use. For instance agriculture, aquaculture and property development are generally considered important for economic development and regional growth. These activities can create spin-off to other sectors, especially food processing and construction, and provide jobs in regions which may have few other alternatives. Furthermore, these money flows can be taxed, thus increasing government revenues.

Contrasting this, direct use and many of the indirect-use values are often not marketed and therefore disregarded by policymakers. Many of the poor in developing countries depend on the productivity and services of natural systems. Communities near wetlands that live on a subsistence level tend to have livelihood strategies that combine subsistence agriculture with the utilisation of wetland resources. As these communities often are less organised than market-oriented parts of society, the economic values wetlands provide them with are poorly represented in national political or development decisions. Furthermore, development projects that aim to alleviate poverty may unintentionally marginalise these poorer populations, if this dependence on wetland resources is not recognised and incorporated in the planning and implementation of the project from the very beginning<sup>5</sup>.

- **Public good**

Some of the ecological services, biological resources and amenity values provided by wetlands have the qualities of what can be called a *public good*; belonging to all. This means that they may be enjoyed by any number of people without affecting other people's enjoyment. However, although people value them, no individual has an incentive to pay to maintain the public good. For example, if a wetland supports valuable biodiversity, all individuals potentially benefit from this service, and no one individual can be excluded from it. Such situations make it extremely difficult to collect payment for the service, since whether you pay or not, you may still benefit. In such circumstances, wetland values may be easily overlooked or ignored.

- **No clear ownership of wetlands and their resources**

Ownership of wetlands can be difficult to establish. Wetland ecosystems often do not have clear natural boundaries, e.g. they may vary seasonally due to extent of flooding. Even where natural boundaries can be drawn up, they may not correspond with an administrative or political boundary and so responsibility of a government organisation cannot be easily allocated. In fact,



*Mangrove immediately after clearance*

M.J. Silvius

frequently wetlands are regarded as having no clear public or private owner. With no clear ownership, the user values are not immediately apparent to a decision-maker. For example an unregulated fishery is an open-access resource used by the 'public' with no available figures for harvest and resulting income; as a result this value can easily be overlooked.

- **Perverse incentives**

Many policies and government decisions provide incentives for economic activity that often unintentionally work against wise-use of wetlands, leading to resource degradation and destruction rather than sustainable management. These are called "perverse incentives." They create a situation where the values in a wetland are overlooked in favour of short-term economic gain through exploitation of the resource. For example in the Selangor Peat Swamp Forests (Case 6), the Forest Department is encouraged to issue short logging tenures to as many different agencies or individuals as possible, in order to achieve a fairer distribution of logging concessions. New concessionaires use a logging method that has a negative impact on the soil and the vegetation in the logging area. Companies that have been logging in the region for much longer, use a sustainable logging method which requires more technical knowledge and equipment. Over time, this sustainable method becomes more profitable for the long-term logger, as the same equipment can be used repeatedly.



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However, for short-term loggers the initial investment in material and knowledge makes the sustainable method uneconomic. <sup>6</sup>

- **Lack of compensation for side effects of human activity**

When a wetland is affected by human activity, such as the pollution of the upper-catchment by runoff from agricultural land, the people living downstream next to the wetland could suffer from this. This is called a negative externality; an unwanted external effect due to human activity. The resulting

loss of value is not accounted for and the wetland stakeholders are generally not compensated for the damages they suffer.

**Ramsar definition of wise use of wetlands:**  
*"The wise use of wetlands is their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".*

# Case 4

## The Importance of Integrating Wetland Values Into Land and Development Decisions, Nakivubo Urban Wetland, Uganda

### Site description

Nakivubo wetland is located on the outskirts of the city of Kampala in the southeast of Uganda, adjacent to Lake Victoria. It is a swamp with an area of 5.3 km<sup>2</sup> and is fed by the Nakivubo River, which doubles as the main drainage canal for Kampala. The wetland extends from the central industrial district of Kampala to Lake Victoria at Murchison Bay and is bordered by dense residential settlements and commercial areas.

### Threats

The Nakivubo wetland is threatened by urban and industrial encroachment. Ultimately this may result in the total loss of wetland resources and services and their associated economic benefits. Urban planners, decision-makers and developers are aware of the immediate gains in income and employment arising from wetland conversion, but do not take account of possible economic costs associated with the loss of wetland resources and services.

### Reason for the valuation study

This valuation study was done to determine the economic value of the wetland resources in its present state.

### Values quantified

- **Direct use - wetland products:** Nakivubo supports subsistence and income generating activities for residents bordering the wetland. The most significant are small-scale cultivation, papyrus harvesting, brick making and fish farming. These values have been quantified using the market price method.
- **Indirect use - water purification:** Nakivubo is a recipient of much of Kampala's domestic and industrial wastewater. Via the Nakivubo River the wetland receives raw sewage from approximately 100,000 households, as well as from industries that are not connected to the

main sewage system. In addition it receives the effluent of the main wastewater treatment plant of Kampala. The wetland protects Murchison Bay and Lake Victoria from the effects that would arise if the wastewater would be discharged directly into this bay. This protection is critical for the city's water supply, as the main intake for the piped water supply of Kampala is located 3 km from the outflow of the wetland to Murchison Bay.

### Estimating the water purification value

The economic value of Nakivubo's capacity for water purification has been quantified using the replacement cost method, by estimating the necessary investments in the event that the wetland is "removed". Two estimates were made:

- The construction of sewerage and sanitation facilities in the settlements around the wetland, the connection of Nakivubo River to a wastewater treatment plant and the expansion of this plant in order to cope with the additional wastewater load.
- The transfer of the intake of Kampala's water supply to an alternative location.

In order to take benefit of the full capacity of the wetland for water purification, there is a need to reconstruct the inlet of Nakivubo River into the wetland in order that the inflow spreads over a large area of the wetland. This investment has been taken as a cost in the present value of the wetland.

### Discussion

The Nakivubo case is of special interest because its main value is one of indirect-use: the purification of a considerable amount of urban wastewater. The case is open to a number of interesting discussion points:

- At present, a large part of the water purification value of Nakivubo is received free of charge by the beneficiaries; part of these beneficiaries - industries and wealthier households - are in a situation where they can well afford to contribute. The management

	Yearly flow (thousand US\$/year)	Yearly flow/ha (US\$/ha/year)
<b>Direct use</b>		
Crop cultivation	156	
Papyrus harvesting	14	
Brick making	25	
Fish farming	5	
<b>Indirect use</b>		
Water purification	980 - 1810	
<b>Non-use</b>	Not estimated	
<b>TOTAL</b>	1,180 - 2,010	2,225 - 3,800

**Present economic value of Nakivubo Wetland** (US\$ of 1998)

of the Nakivubo wetland requires a financing strategy that attempts to capture some of this value.

- The value of the case study is that it highlights the need for alternative wastewater treatment facilities if Nakivubo wetland is converted. If the alternative were taken as the focus of a separate study, the costs involved may well turn out to be lower than the conversion costs presented here; but it is unlikely that these costs are low.
- The unit value of Nakivubo (2,220 - 3,800 US\$/ha/year) is much higher than results of other African case studies, which typically range from 45 to 90 US\$/ha/year. This in itself does not discredit the case, as it is an urban wetland, and it is plausible that the value of a wetland can increase with proximity to a city. Nakivubo presents an example of an extreme case - a relatively

small wetland that is intensively used, including its function as a buffer for almost all of the wastes of a large city.

- The food crops cultivated in the wetland may be - or become - a health hazard. Thus, the value of crop cultivation may be incompatible with wastewater treatment, and could be lost in some near future.
- The non-use values for Nakivubo are not described in the case study, but are likely to suffer by the input of urban wastewater. This cost may be considerable if the wetland in its natural form plays an important role in the ecology of Lake Victoria.

Wetland ecosystems such as Nakivubo often help to fill the gap between the level of basic goods and services that a government is able to provide, and that which rapidly increasing urban populations require. Omitting environmental concerns from urban planning and development can give rise to untenable economic losses for some of the poorest sectors of the population, decrease social and economic welfare throughout cities' residents, and impose high economic costs on the public sector agencies who have the responsibility for providing basic services and assuring an acceptable standard of urban living. These groups are rarely in a position to bear such costs or expenditures.

**Table I.**



*Life on the waterfront*



### 3.2 Quantifying Wetland Values: The Cost Benefit Analysis Approach.

Quantification of values is an important step in supporting a rational discussion about the wise-use of a wetland. Although there are many ways to express the worth of a value, the most easily understood in many situations is one expressed in terms of money, or economic value.

The most frequently used and most intuitive approach to doing this is Cost-Benefit Analysis (CBA). CBA measures the net gain or benefit from policy or action. It entails listing and evaluating all of the measurable benefits and costs in a particular scenario and comparing them. In this manner, policies or actions can be evaluated to determine whether it provides net economic benefits.

Because it focuses only on economic costs and benefits, CBA determines the *economically efficient* option. This may or may not be the same as the most socially acceptable option, or the most environmentally beneficial option; for instance a CBA could provide a strong argument for wetland conversion, rather than wetland conservation. This is illustrated in the case study of Pagbilao (Case 5).

#### ● Societal and financial CBA

CBA can be performed from the standpoint of society as a whole, or from that of one of the stakeholders involved. A societal cost-benefit analysis determines whether society, will be better off if a policy or action is implemented; it finds the economically efficient solution. A financial CBA looks at the costs and benefits for an individual stakeholder such as the local government, a private landowner or a local community. Thus the conclusions from a financial CBA will differ from stakeholder to stakeholder. This can be important in revealing the motives behind different parties in a particular situation although societal CBA is the better basis to make decisions.

Most case studies attempt societal CBAs. The case study of the Selangor Peat Swamp Forests presents a societal CBA and a financial CBA for the major stakeholder, which are in contradiction.

### 3.3 When Is Economic Wetland Valuation Used?

Economic valuation should be seen as only one of the key elements in decision-making, together with political, social, cultural and environmental considerations. It facilitates wetland planning and management decisions, which have economic components. Generally three scenarios can be identified in which the use of economic valuation will be important. These are summarised in figure 1.

#### 1. Impact analysis

**Relevant question:** "How high is the damage to this wetland?"

**Method:** Impact Assessment

**Example:** an oil spill on a coastal wetland.

**Non-economists:** establish cause-effect relationships between oil and wetland values

**Economists:** cost the values that are affected by the oil

#### 2. Evaluation of alternative development options

**Relevant question:** "What is the best future for this wetland?"

**Method:** Partial Valuation

**Examples:** Conversion or development of parts of a wetland for agriculture, aquaculture etc.

**Non-economists:** design relevant alternatives and establish effects of these alternatives on relevant values

**Economists:** cost the values that change under one of the alternatives

#### 3. Calculation of total economic value

**Relevant question:** "What is the total value of this wetland?"

**Method:** Total Valuation

**Examples:** Develop arguments to give wetland a protected status; or the wetland faces total conversion

**Non-economists:** determine sustainable levels of use

**Economists:** cost all values that are compatible

After: E. Barbier *et al.*<sup>2</sup>.

Figure 1

It is worth noting a few practical points under these scenarios:

- When conducting impact analysis or evaluating alternative development options it is essential that cause-effect relationships are understood before economic valuation can take place.
- The difference between an impact assessment and a partial valuation is not fundamental - the impact assessment of an oil spill can be considered as a \ comparison of 2 alternatives: the one with and the other without the oil spill.
- Most of the cases in this booklet are examples of total valuation - Merja Zerga; Lake Chilwa; Olango Island and Nakivubo wetland (Cases 1 to 4). Examples of partial analysis are Pagbilao and the Selangor Peat Swamp Forests (Cases 5 and 6).

### 3.4 Wetland Values: How to Quantify Them

In order to estimate the economic worth of wetland values, either collectively or individually, it is necessary to be able to assign a monetary value to each of them. This applies in any situation, whether the issue is the evaluation of an impact, an alternative development option or more simply a total valuation. This is not always an easy task, for many technical and economic reasons. The simplest way to approach this



*Bricks and fuelwood; marketable wetland products*

L. Zwartz

would be to apply market prices. However, for many wetland products and services there is no market, and some values are intrinsically non-marketable. However, various techniques have been devised to quantify these. Table 2 summarises the most common techniques, giving details of their application and the types of constraints that can be expected. Going down the table, the precision of the techniques decreases, and the values to which the techniques can be applied move from direct use values, via indirect use values to non-use values. All methods suffer from some limitations, but their use is widespread.

The financial value(s) that will be calculated using these techniques can then be used according to the objectives of work being

carried out. One such purpose may be to establish the price of a wetland for somebody intending to buy it, using a loan. This requires the net present value to be calculated. To do this, factors other than the net economic cost of the wetland must be taken into account. The aim is to establish a net present value for the site; this requires a discount to be

applied to the estimated yearly flow of benefits that the owner will receive.

#### ● Discounting

Discounting is applied when adding cost and benefit flows that occur at different points in the future. The underlying reason is the people's time preference: people generally prefer to receive money sooner rather than later, and to pay costs later rather than sooner. Discounting takes this time preference into account by calculating the value in today's dollars, of a given amount received or paid in the future. For example, if a person were promised US\$1.10 in a year from now and the discount rate is set at 10%, he would be equally happy with US\$1.00 today.

For decisions related to natural resources, the appropriate discount rate is the rate that reflects society's preferences for allocating natural resource use over time. However, determining this social discount rate is controversial, and the choice of discount rate can have a large effect on the results of a CBA. A larger discount rate gives more weight to the present in relation to the future, and thus costs and benefits for the current generation are given more weight than costs and benefits for future generations. Many have argued that a social discount rate for environmental projects should be lower than the market rate, in order to leave more opportunities for future generations. Rates of 2% to 4% are often used as social discount rate<sup>5</sup>.

- **Net present value and yearly flow**

The value that is obtained after discounting is the Net Present Value (NPV); the NPV of a wetland is the economic value of this wetland -



C.J. Baker

*Produce being transported to a floating market*

if somebody bought the wetland for this amount, with borrowed money, he would be able to service the loan from the proceeds of the wetland.

Wetland benefits are often expressed as a yearly flow of money. If this yearly flow is expected to continue indefinitely, there is an easy formula for the relationship between NPV and yearly flow:

$$\text{NPV} = \text{yearly flow} / \text{discount rate}$$

In the case of Merja Zerga (Case 1), the yearly flow of agriculture is 2 million US\$ per year; this corresponds - at a discount rate of 6%, to a NPV of 33 million US\$.

### **Benefit Transfer**

It is often quite costly to carry out research to determine all the values of a wetland in a specific location. It is sometimes possible however, to use a study in a comparable site or a meta-analysis of several comparable studies carried out in other areas. The values obtained from those studies might, if carefully done, be applied to another area. If an extensive study has been carried out for the sustainable fisheries and forestry potential in one wetland area, then it is not unlikely that these values can form the basis of a proxy for another, similar, wetland area elsewhere in the same country. Put differently, because of human or financial resource constraints, values can sometimes be taken out of previous studies focusing on a different region or time period. This practice of transferring monetary values is called 'benefit transfer'. An example is the case study of Olango Island (Case 3), where the values for fishery - both for the local market and for live fish export have been obtained from coral reef studies elsewhere in the Philippines. These data were combined with local data on seaweed farming and tourism.

Method	Applicable To <sup>iii</sup>	Description & Importance	Constraints
Market Price Method	Direct Use Values, especially wetland products See: all cases	The value of wetland products and services is estimated from the prices in commercial markets.	Market imperfections and policy failures distort market prices.
Damage Cost, Avoided, Replacement Cost & Substitute Cost Method	Indirect use values See: Nakivubo	The value of flood control can be estimated from the damage if flooding would occur (damage cost avoided); the value of groundwater recharge can be estimated from the costs of obtaining water from another source (substitute costs)	It is assumed that the costs of avoided damage or substitutes match the original benefit. However, this match may not be accurate, which can lead to underestimates or overestimates.
Travel Cost Method	Recreation	The recreational value of a site is estimated from the amount of time and money that people spend on reaching the site.	Over-estimates are easily made, as the site may not be the only reason for travelling to that area. The technique is data intensive.
Hedonic Pricing Method	Aspects of Indirect Use Future Use and Non-Use Values	This method can be used when wetland values influence the price of marketed goods. For example: clean air, presence of water and aesthetic views will increase the price of surrounding real estate.	The method only captures people's willingness to pay for perceived benefits. If people aren't aware of the links between the environmental attribute and benefits to themselves, the value will not be reflected in the price. Very data intensive.
Contingent Valuation Method	Recreation, Non-Use Values See: Merja Zerga	This method asks people directly how much they would be willing to pay for specific environmental services. It is often the only way to estimate non-use values.	There are various sources of bias in the interview techniques. In addition, there is controversy over whether people would actually pay the amounts that they state in the interviews

After: E. Barbier et al.<sup>2</sup> and D. King & M. Mazzotta<sup>5</sup>

<sup>iii</sup> See table 1

Table 2

# Case 5

## Preservation or Conversion? Pagbilao mangrove, Philippines

### Site description

The Pagbilao mangrove covers a small area of 110 ha. on the island of Luzon, the Philippines. The area has decreased sharply in recent decades due the conversion into fishponds; what remains has been declared a protected area and has been extensively studied due to its proximity to the capital Manila.

### Main values

The main direct-use values of the mangroves are forest products and shellfish. Important indirect-use values are the provision of nursery grounds for shellfish that migrate to open sea, shoreline protection and soil accretion (trapping of sediment).

### Threats

The main threat to Pagbilao mangrove is its conversion to fishponds for the production of milkfish or prawns.

### Reason for the valuation study

The study compares alternatives for the future of Pagbilao mangrove. Eight alternatives were distinguished, which range from complete preservation to intensive aquaculture. Here 4 of these alternatives are presented, which illustrate the spectrum of alternatives.

The alternatives were scored on three objectives: economic value, social equity and sustainability. Here, only attention is given to the objectives of economic value and social equity.

### Values quantified

The direct use values were quantified with market prices and expert judgements of production under the various alternatives. It should be noted that some direct (e.g. tourism), indirect and non-uses were not considered.

Alternative	Mangrove area	Beneficiaries	Forestry	Fishery
Preservation	Maintained	Local communities	Not allowed	Gathering of fish and shellfish allowed
Subsistence forestry	Maintained	Local communities	Harvest for own needs allowed up to a maximum	Gathering of fish and shellfish allowed
Commercial forestry	Maintained	Local communities	Specified volume can be harvested commercially	Gathering of fish and shellfish allowed
Semi-intensive aquaculture	Converted to fishponds	Outside investors	Not relevant	Sustainable aquaculture - 4 crops of Milkfish per year

Alternatives for the Pagbilao mangrove

Table I.

### Quantifying social equity

In the study, "social equity" was equated as the benefits for the local poor under the various alternatives.

### Results

Based only on direct-use economic value, conversion of Pagbilao to semi-intensive aquaculture is the most preferred alternative. The fact that fishponds in Pagbilao can be operated sustainably over many

decades, increases their value. Fishponds in the area that were constructed in 1950, are still operating. This contrasts with the experience of fishponds in for example Thailand, that are often abandoned after 5 years due to outbreaks of diseases and soil acidification.

However, there is a strong conflict between economic value and social equity. In the alternatives of "preservation" and "sustainable or commercial forestry", the products and services of the mangrove benefit the local population. In contrast, the fishponds require large capital outlays that are definitely out of reach of the local population. The fishponds are owned by wealthy individuals who neither live in the community nor employ local residents to manage them.

If local government could find a way to reallocate part of the benefits of the fishponds from the fishpond owners to the local community, the equity of this alternative could be raised to a level that could make fishponds the preferred alternative both on the objectives of economic value and of equity. High licence fees for fishponds could be such a mechanism; however, attempts to increase licence fees have met with political resistance. A second mechanism is to lease rather than sell mangrove area; fishponds can then be developed in a "build-operate-transfer" scheme and be transferred to the local community when the lease term expires.



Prawn farming

M.J. Sivius

	Preservation	Subsistence forestry	Commercial forestry	Semi-intensive aquaculture
<b>Direct use</b>	US\$/ha/year	US\$/ha/year	US\$/ha/year	US\$/ha/year
Forestry	0	125	150	0
On-site fishery	58	57	57	3
Aquaculture	0	0	0	6,775
Tourism	Indexes; not expressed in money			
<b>Indirect use</b>				
Off-site fishery	1	1	1	0
Shore protection	Indexes; not expressed in money			
Soil accretion	Indexes; not expressed in money			
<b>Non-use</b>				
Biodiversity	Indexes; not expressed in money			
<b>Total value (US\$/ha/year)</b>	59	183	208	6778
<b>Equity (US\$/ha/year)</b>	59	183	208	3

Annual values of management alternatives for the Pagbilao mangrove (US\$ of 1998). Table II.

### 3.5 Establishing the Social and Cultural Values of Wetlands

The expression of wetland values in economic terms can often represent a very effective and persuasive argument for wetland wise-use. However they can also unduly bias development arguments to purely economic terms when some of the most significant issues may concern local communities and involve social and cultural values that may not be easily included in such considerations. In such cases it is necessary to consider wetland values also in non-economic terms. These might be quantifiable in terms of the number of people utilising a site for a specific purpose or qualitative such as by expressing the role of a site in local culture or lore. Combining economic and social valuation tools contributes to balanced decision-making and increased support from the local population for the decisions that are made.



*Workshop on wetland management*

to respect the jointly agreed outcomes and related measures and they are more likely to participate actively in their implementation. This enables knowledge from the local population to emerge and inform the wise-use of wetlands. There are two main appraisal approaches.

There are methods that can be used to establish the socially expressed values of wetlands. These are frequently used within approaches to integrate people more strongly into decision-making concerning their environment and its management. The approaches themselves play an important role in the decision-making process. When populations have actively participated in planning they are more likely



*Interviewing local wetland stakeholders*

**Rapid Rural Appraisal (RRA)** emphasises the importance of learning rapidly and directly from local people. It involves an appraisal team tapping local knowledge and gaining information and insight from local people using a range of interactive methods.

**Participatory Rural Appraisal (PRA)** involves a facilitator working *with* local people, to do their own analysis of key issues and to plan, resolve conflicts, take action and monitor and evaluate according to a local agenda.

Both PRA and RRA have created a shift from a top-down, blueprint approach to planning and decision-making a bottom up, people centred, process oriented approach. This means that outside institutions (public sector, NGOs, international organisations etc.) no longer view themselves as 'implementers' who are responsible for planning, implementing, managing and evaluating projects for local people, but 'enablers' or 'facilitators', who help local people to plan, implement and manage their own projects.

<b>Methods</b>	<b>Description</b>
<b>Secondary Data Review</b>	Published or unpublished data relevant to the issue. This includes research papers, annual reports, computer data files, survey results, maps, photographs and satellite images.
<b>Direct Observation</b>	Any direct observation of field objects, events, processes, relationships or people that is recorded by the appraisal team.
<b>Semi-structured Interviews</b>	Basic technique, taking place in informal, guided interview sessions, either with individual stakeholders, households, key informants or group interviews, depending on the information required.
<b>Ranking</b>	Quick means of finding out an individuals' or groups' list of priorities or preferences e.g. by asking what is most important, second most important etc.
<b>Stories and Portraits</b>	Short colourful descriptions of situations as recounted by the local population. They describe information that is difficult to incorporate into diagrams. In particular they draw attention to the ways in which rural people themselves perceive local conditions, notably problems and opportunities.
<b>Diagrams</b>	Simple schematic devices which present information in a readily understandable visual form. Examples are maps, transects, seasonal calendars e.g. dealing with crops, historical profiles, decision trees illustrating strategies local people use. They are valuable in understanding local peoples' strategies for managing their resources and the reasons why they take up or give up particular technologies.
<b>Workshops</b>	The workshop is a means of bringing people together. People actively participate in reviewing, analysing and evaluating the information gathered. They can be used for understanding perspectives. They aim to arrive at a consensus of opinion over priorities for action.

Within the approaches are a number of methods for establishing socially expressed values from various stakeholders; these are summarised in the table below.

Like other approaches, RRA and PRA also have their limits. For instance sometimes decision-making can be a little too hasty and based on insufficient information. Another common problem is that over-familiarity with an approach or a particular situation can result in a facilitator leading the stakeholders rather than the other way around.

#### **Wetland Valuation; Benefits of linking economic and social approaches**

- Participatory methods can be used to describe the context. This is needed to help identify relevant economic research questions and to design more appropriate questionnaire surveys.
- Participatory methods help challenge existing disciplinary boundaries by seeking diverse local interpretations of value, notably indirect value and non-use values.
- Economic models can outline the research questions and participatory research methods can be used to find the information needed.
- The economic values derived from questionnaire surveys can be verified using participatory research methods<sup>9</sup>.

Table 3<sup>8</sup>



# Case 6

## The Cost of Changing to Sustainable Forestry Practice, North Selangor Peat Swamp Forests, Malaysia

### Site description

The North Selangor Peat Swamp Forests (NSPSF) are on the West Coast of Peninsular Malaysia and cover over 72,816 ha. The peat swamp forests are rich in biodiversity including many species of fish and birds and some primates. The two-horned Sumatran Rhinoceros, one of the most endangered animals in the world, resides in the Sungai Dusun Wildlife Sanctuary, adjacent to the NSPSF.

### Threats

The survival of the above-mentioned species is severely threatened by logging practices. Currently both canals and tramlines are used for transporting logs in the NSPSF. Damage to the forest using tramlines is relatively localised as the lines are removed after logging and re-used in the next logging area. In comparison, damage to the forest and forest floor from canals is more extensive and often irreversible with regeneration being made impossible by the changed soil structure. The use of canals also causes increased siltation of the river system and general habitat disturbance and fragmentation.

### Reason for the valuation study

A CBA of two different strategies was conducted in order to determine the cost of changing from canals, (the standard practice) to using tramlines (the alternative practice).

### Values quantified

The CBA was confined to cost accounting and only those components for which additional costs or costs avoided were incurred, in shifting from standard to alternative forestry practice. The costs were derived for two stakeholder groups: private individuals (the loggers) and society (national). This distinction is made to demonstrate who pays for the costs and who benefits from the cost savings.

### Potential benefits of the alternative practice

Results from a previous valuation demonstrate that the adoption of the alternative practice would yield benefits such as lower treatment cost for water, more assured supply of water for agriculture, whilst the continued practice of the standard practice would undermine these (e.g. would manifest as disbenefits or losses). Furthermore, the benefits or disbenefits of the forestry practices within the NSPSF extend beyond the physical boundaries of the site itself. The single most important group of beneficiaries of these benefits is the agricultural community who lives and farms downstream of the peat swamp forests. This community is dependent on the water supply coming from the peat swamp forests, for domestic and agricultural use.



Logging

Stakeholder	Activity	Standard	Alternative	Addition	Alternative	Increment
			<i>New Equipment</i>		<i>Restored Equipment</i>	
Private	Timber extraction	0.59	0.75	0.16	0.66	0.08
Social	Forest rehabilitation	1.05	0.86	-0.19	0.86	-0.19
	Water treatment	1.99	1.39	-0.59	1.39	-0.59
Incremental costs		-0.63/year			-0.71/year	
NPV of incr. costs		-3.91			-4.39	

**Aggregate Incremental Costs in Shifting Forestry Practices** (In million US\$)  
**Negative incremental costs implies cost savings, NPV= present value**  
**(10% discount rate, 10 years)** (US\$ of 1997).

**Table I.**

### Results

Table I summarises the additional costs of shifting from the use of canals to the use of tramlines. The estimated overall additional cost for the private logger is 155,608 US\$/year if new tramlines and locomotives have to be obtained. If the logger is already in the business of using tramlines, the availability of restored equipment reduces the

annual additional costs to less than half, to 75,809 US\$/year. Malaysia as a society could make substantial savings from the shift to the alternative strategy. The reduced impact through logging with tramlines would require less intensive rehabilitation by the Forest Department, saving an annual of 191,517 US\$. The shift to tramlines also

reduces the water treatment costs by 598,492 US\$ annually. The additional savings exceed the additional cost net by -634,401 US\$, if using new equipment and -714,200 US\$ if using restored equipment.

### Discussion

The study has demonstrated that, although economically it would be very beneficial for Malaysia, it is not financially viable for the logger to shift to the tramline option. The private loggers have no incentive to make this shift to the alternative strategy, especially since it does not constitute a national goal, priority or regulation. Over the years, the Forest Department has been issuing short logging tenures as far as possible to different agencies or individuals so as to achieve a more equitable distribution of concessions. This directly conflicts with the feasibility of ensuring a shift to the alternative practice, as new concessionaires are unwilling to invest in an option that is more expensive and for which they do not possess the required skills.

### 3.6 Economic Incentives: An Example of How Wise-Use Can Benefit From Awareness of Wetland Value

A crucial issue in the future of many wetlands is to find mechanisms to capture and convert the economic values of these wetlands into money flows. Conserving wetlands must be made to make more economic and financial sense than modifying, converting or degrading them. These money flows must be sufficient for local stakeholders to use the resources sustainably, for wetland owners to oppose degradation and resist the temptation of converting their wetland and for wetland managers to fund their conservation activities.

Economic incentives are one such mechanism for assisting planning and management of wetlands. They work by motivating people to act in particular ways or to modify their economic activities so as to conserve nature.



*Preparing fish to sell at the market*

Degradation occurs because short-term livelihood needs place unsustainable demands on natural systems such as wetland ecosystems. Once it is known how and why local economic activities result in nature degradation, incentives can be designed to combat this based on knowledge of social and economic values.

Table 4 gives a number of economic incentives and disincentives that can be considered when thinking about the capture of economic values of wetlands. In Box 1 some interesting ideas are developed for financing the conservation of the Nile Basin wetlands.

However, there is a danger in these developments: as soon as a wetland starts to generate money, outside stakeholders may move in and appropriate the source of money with little consideration for the sustainability of their activities or the consequences for local stakeholders. So an important requirement is that the government at the various levels is committed to fair play, poverty alleviation and wetland conservation.

	<b>Direct Incentives</b> Targeted to specific objectives.	<b>Indirect incentives</b> Set in place general enabling conditions.	<b>Disincentives</b> Mechanisms that discourage degradation.
<b>Property rights</b>	Well-defined forms of ownership, access and use of wetlands.		Dispossession of ownership, or exclusion from using wetlands.
<b>Livelihood measures</b>	Improving efficiency and sustainability of wetland use	Rural development and livelihood diversification.	
<b>Market measures</b>	Improving and developing markets for wetland products.	Developing alternatives for wetland products.	Bans or quotas on wetland products.
<b>Fiscal measures</b>	Subsidies or tax relief for sustainable wetland use.		Taxes on wetland products or wetland use.
<b>Financial measures</b>	Targeted rewards for wetland conservation. Compensation for terminating unsustainable activities.	Sharing the benefits of wetland use. Provision of loans, grants and credit to development activities.	Fines and penalties for unsustainable or illegal resource use.

**Economic Incentives for Community-Based Nature Conservation**

After: L. Emerton<sup>10</sup>

**Table 4**

## How to finance the conservation of wetlands in the Nile Basin?

### Introduction

The Nile Basin covers more than 3 million km<sup>2</sup>, spans 11 countries and contains about 150 million people. Wetlands of all types cover some 6% of the Nile Basin. In order for these wetlands to survive, they need to demonstrate their economic and financial profitability to the countries and communities who live by them. There are many pressures to modify or develop the lands and water flows upon which wetlands depend. All of the Nile States have pressing needs to generate food, employment and economic growth. The most immediate threats to Nile Basin wetlands include land clearance and reclamation for agriculture and settlement.

### Financing Mechanisms For Wetlands Conservation In The Nile Basin

Very little money is currently available for wetland conservation in Nile Basin States. They have extremely limited budgets and many other pressing demands for investment. The rural people who live by or in the Nile wetlands are among the most marginalised and vulnerable groups in these countries and have few economic opportunities or secure sources of livelihood. Mechanisms must be set in place to ensure that funds are received at the adequate level and in the appropriate form, by the people whose economic activities have the potential to impact on Nile Basin wetlands.

Potential mechanisms are:

- **Increase local control over wetlands**

Rural populations in low-level wetlands of the Nile Basin such as the Sudd and parts of southern Sudan, Central African Republic and lower Ethiopia are mainly pastoralists who depend on a marginal and insecure livelihood base and have poor access to market and urban centres, infrastructure and communications.

*Increasing the degree of local control over, and value added from wetlands may, however, present an effective means of minimising the costs and increasing the financial sustainability of wetlands conservation at the local level.*

- **Return a share of taxes derived from wetland functions for wetland conservation**

A high proportion of the urban, commercial and industrial activities which take place in Nile Basin States outside wetland areas partly or wholly depend on water-related ecosystem functions, including irrigation, hydropower generation, urban water supply and maintenance of its quality. These generate substantial revenues and profits at the national economic level for both governments and the private sector. Most of these economic activities are already subject to a range of fees, taxes and levies, for example urban water and electricity tariffs, irrigation water charges, industrial taxes and various development fees, bonds and deposits. Returning a share of these

existing revenues to wetlands could form a readily available source of finance for watershed and upstream conservation.

- **Permit commercial development of wetland values**

Several wetland areas and species on the Nile Basin may have potential for further development, applications or private sector interest- especially areas that contain high or commercially valuable biodiversity and lie close to well-developed markets.

*Developing these potential markets and uses or permitting the entry of commercial partners and prospectors (in ways which are sustainable and subject to proper charges and fees) provides a potentially significant source of revenues for wetlands conservation.*

- **Negotiate international financing for cross-border wetland benefit**

The River Nile and its associated wetlands have historical, cultural, ecological and economic significance to the global community as well as for each Nile Basin State. Much economic activity in downstream countries such as lower Sudan and Egypt relies on the off-site benefits and conservation of catchments and watersheds of upstream States, most notably Ethiopia and Uganda. *Wetlands in the Nile Basin which have high global, downstream or off-site commercial, ecological or existence values all present the potential for generating finance from international sources, within and outside the Nile Basin States.*

## 4. So what can you do?

The intention of this booklet is to introduce of the importance of wetlands and their values and persuade you that it is essential that they are fully integrated into decision-making. We hope that you have found the information of interest and relevance. Moreover we hope that you are now seriously considering the question of the values of the wetlands you are responsible for and how these can be integrated into decision-making.

If so, then you will undoubtedly need further information, whether it be to plan specific projects or gather more detail on the information contained in this booklet. The following contacts and Internet sites may be of use in this respect. In addition, the organisations that authored this booklet are eager to share their thoughts on your project proposals.

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### Sources Of Information:

- **IUCN Economics Library**

Internet:  
[biodiversityeconomics.org/index.htm](http://biodiversityeconomics.org/index.htm)

- **RAMSAR Library**

Internet:  
[www.ramsar.org/wurc\\_library.htm](http://www.ramsar.org/wurc_library.htm)

- **Ecosystem Valuation**

Internet:  
[www.ecosystemvaluation.org](http://www.ecosystemvaluation.org)



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The degradation and destruction of wetlands is a continuing concern in most parts of the world.

Arguments for sustainable management of particular sites have generally centred on their importance for biodiversity, or historical/cultural significance. These have achieved a measure of success, but many wetlands around the world are still being over-exploited and degraded.



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