

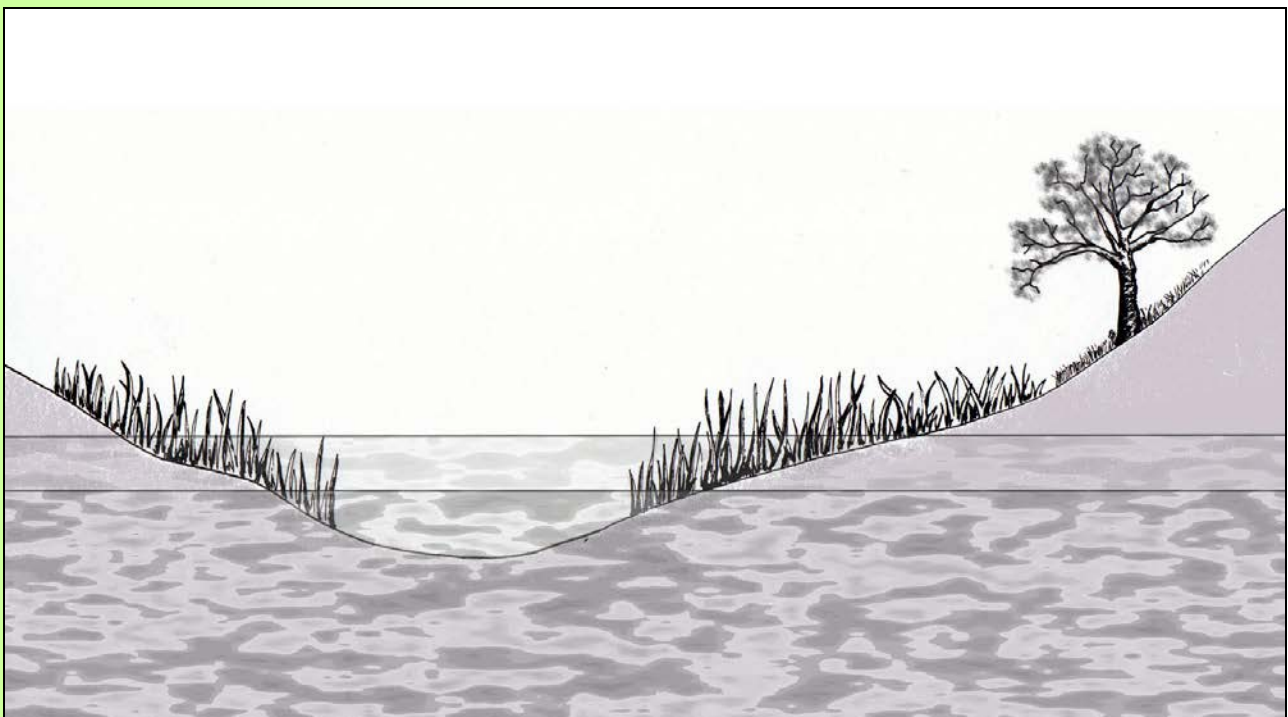
# Ethiopian Wetlands Research Programme

## Sustainable Wetland Management in Illubabor Zone, South-west Ethiopia

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# Understanding Wetlands and their Management

## A Guide for Extension



by

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## Notes

This final revision of “Understanding Wetlands and their Management” has been developed with the participation and co-operation of wetland farmers and staff of the Ministry of Agriculture in Illubabor Zone. The range of management practices and information outlined in this report are based upon farmers' own extensive knowledge of wetlands and their use, which has been compiled and tested through discussions in the field.

**Ethiopian Wetlands Research Programme (EWRP)** is the operational name given to the project “Sustainable Wetlands Management in Illubabor Zone, South-west Ethiopia” which was funded by the European Union from 31<sup>st</sup> January 1997 to 30<sup>th</sup> April 2000. This was a collaborative research project between Huddersfield University (UK) and Addis Ababa University with technical assistance provided by the University of East Anglia (UK) and EARO, the East African Regional Office of IUCN, the World Conservation Union.

**Ethio Wetlands and Natural Resources Association (EWNRA)** is a recently established local NGO whose prime objective is to address wetland issues within Ethiopia. EWNRA is committed to developing wetland management capacity within Ethiopia, thereby facilitating the wise use of wetlands and developing awareness and skills for the sustainable management and conservation of wetlands and their resources. EWNRA is keen to co-operate with other institutions that are interested in improving the current wetland management within the country. Founding members of EWNRA come from various backgrounds and work in many different institutions including the Ministry of Agriculture, National Environmental Protection Authority, Ethiopian Agricultural Research Organisation, Coffee Authority, an international NGO, the Woody Biomass Project and a donor embassy.

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## 1.0 What are wetlands?

Wetlands can be described as being both land and water at the same time. A wetland is an area where the soil is flooded or full of water (**saturated**). Under these conditions there is no air in the soil. Such airless conditions are said to be **anaerobic**.

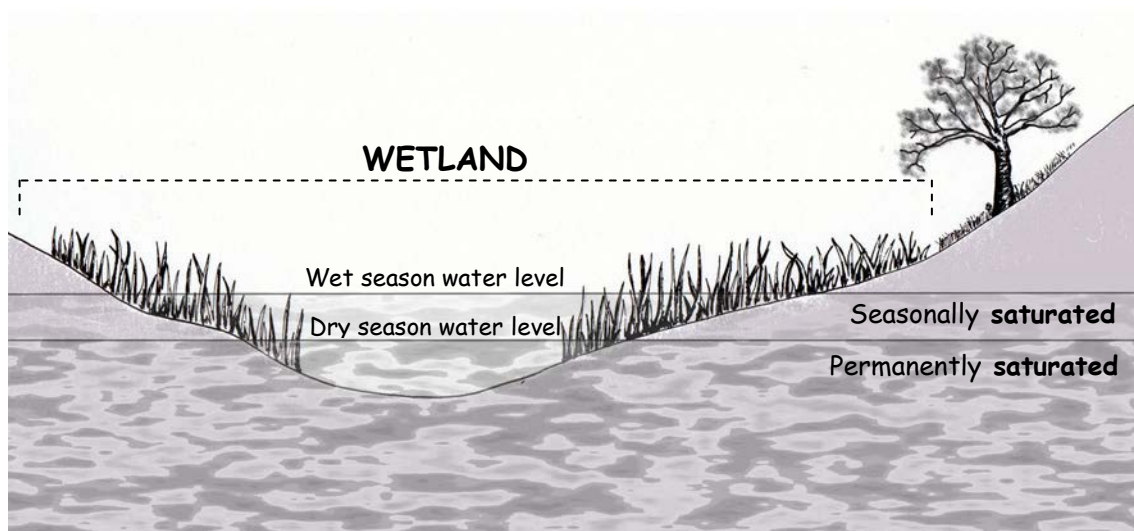
The presence of saturated and anaerobic conditions affect the type of plants found in a wetland and the characteristics of the soil. Under these conditions water-loving plants can grow. Many other plants will not be present as they cannot survive if their roots are in water for long. Wetland soils tend to be high in organic or vegetative matter because this does not decompose rapidly under flooded conditions. As a result, these soils tend to be quite fertile and produce good crop yields for a few years when they are drained.

There are a number of definitions of wetlands. The most important ones come from the Ramsar Convention. This is an international treaty which plans to protect wetlands. However, for practical purpose a general definition is provided here:

*“wetlands are defined as areas where water is the primary factor controlling the environment and the associated plant and animal life. They occur where the water table (level of water within the soil) is at or near the surface of the land, or where the land is covered by shallow water.”*

The water does not have to be at the surface for the land to be considered a wetland, but it has to be close enough to the surface and for long enough to allow airless (anaerobic) conditions to develop. Some wetlands may be permanently flooded, whilst others may have water close to the surface for only a few months in a year.

**Figure 1 – The formation of a wetland depends upon a high water table.**



### Question 1:

How are wetlands defined or described in your part of Ethiopia?  
Is it by reference to water or vegetation?

### Answer:

In Illubabor wetlands are described as *cheffe*. This is the typical vegetation in most wetlands.

## 2.0 Does Ethiopia have many wetland resources?

Yes, there are quite large areas of wetlands within Ethiopia. According to the FAO (Food and Agriculture Organisation of the United Nations) land use map of the country made in 1984, two types of wetlands dominate in Ethiopia:

- **Swamps** – which are permanently flooded areas with herbaceous vegetation (usually greater than one metre in height) , and
- **Marshes** - which are also permanently flooded areas with herbaceous vegetation (usually less than one metre).

These two wetland types cover an estimated 1803 km<sup>2</sup> (0.16%) of the country's surface. In addition there are other important types of wetland areas throughout the country, such as the floodplains of major rivers (e.g. the Baro-Akobo and the Awash), the Rift Valley lakes, human made lakes (e.g. Koka dam), and swamp forests. As a result, the total area of wetlands in Ethiopia may exceed 22500 km<sup>2</sup> (2%).

It is estimated from Ministry of Agriculture land use records that 256 km<sup>2</sup> (1.6%) of Illubabor is covered by swamps and marshy wetlands (Afewerk Hailu, 1998). When floodplains, lakes, ponds and swamp forests are included this may reach 800 km<sup>2</sup> (5%) (Wood 1996).

### Question 2:

What percentage of the area in your wereda or zone is covered with wetlands?

**Answer:** In Illubabor 1.6% of the zone is covered by swamps and marshes (excluding floodplains, swamp forests and lakes). The figure for swamps and marshes varies from 0.8% in Gechi Wereda to 2.7% in Yayu-Hurumu Wereda.

### Question 3:

From where can you get data on the size of wetlands in your area?

**Answer:** The Ministry of Agriculture collects records of wetland areas on an annual basis through its development agents. In addition, maps, air photos and satellite images are sources of such information, although the smaller wetlands are not visible on such sources.

### 3.0 Benefits of natural wetlands to the community

Wetlands are often considered to be wastelands which are of little use to anyone. They are thought of as nuisances and are associated with problems such as mosquitoes, diseases and floods. They are also regarded as obstacles to human development. However, in reality wetlands provide a range of benefits in their natural state.

There are two types of benefits (see Figures 2 and 3) which come from wetlands in their natural state:

#### a) Ecological benefits and functions

Wetlands help maintain the ecological well-being of an area in several ways:

- Wetlands recharge the water table which means that springs do not dry up.
- The reeds in wetlands help to clean the water so that it is safer to drink.
- Wetlands are able to store water so that:
  - a) there is less flooding in the downstream areas, and
  - b) there is a supply of water throughout the year for people around the wetland but also for those downstream. (Downstream irrigation and hydro-electric schemes also depend upon wetlands for a more constant supply of water.)
- Wetlands remove soil from the water so that water flowing out of them is relatively clean and downstream dams do not fill up with soil or sediment.

#### b) Socio-economic benefits and products

Wetlands provide a range of benefits which are of use to people:

- Water can be collected from springs around the wetlands for human use.
  - Water in the wetlands can be used for clothes washing and cattle watering.
  - The reeds in wetland can be used in thatching or crafts.
  - Papyrus can be used as a construction material, e.g. boats.
  - Wetland fringes are a source of palm plants which can be used as a craft material.
  - Wetlands are a source of medicinal plants.
  - Cattle can be grazed in wetlands during the dry season.
- ( In some places wetlands provide other benefits such as fish).

#### Question 4:

What ecological benefits do people get from wetlands in your area?

**Answer:** In Illubabor these include the continued functioning of the water system as it has been in the past, so that water is available and clean, with floods controlled.

#### Question 5:

What natural items do people collect from wetlands in your area? (These are socio-economic benefits.)

**Answer:** In Illubabor people collect water, reeds, craft materials and medicinal plants.

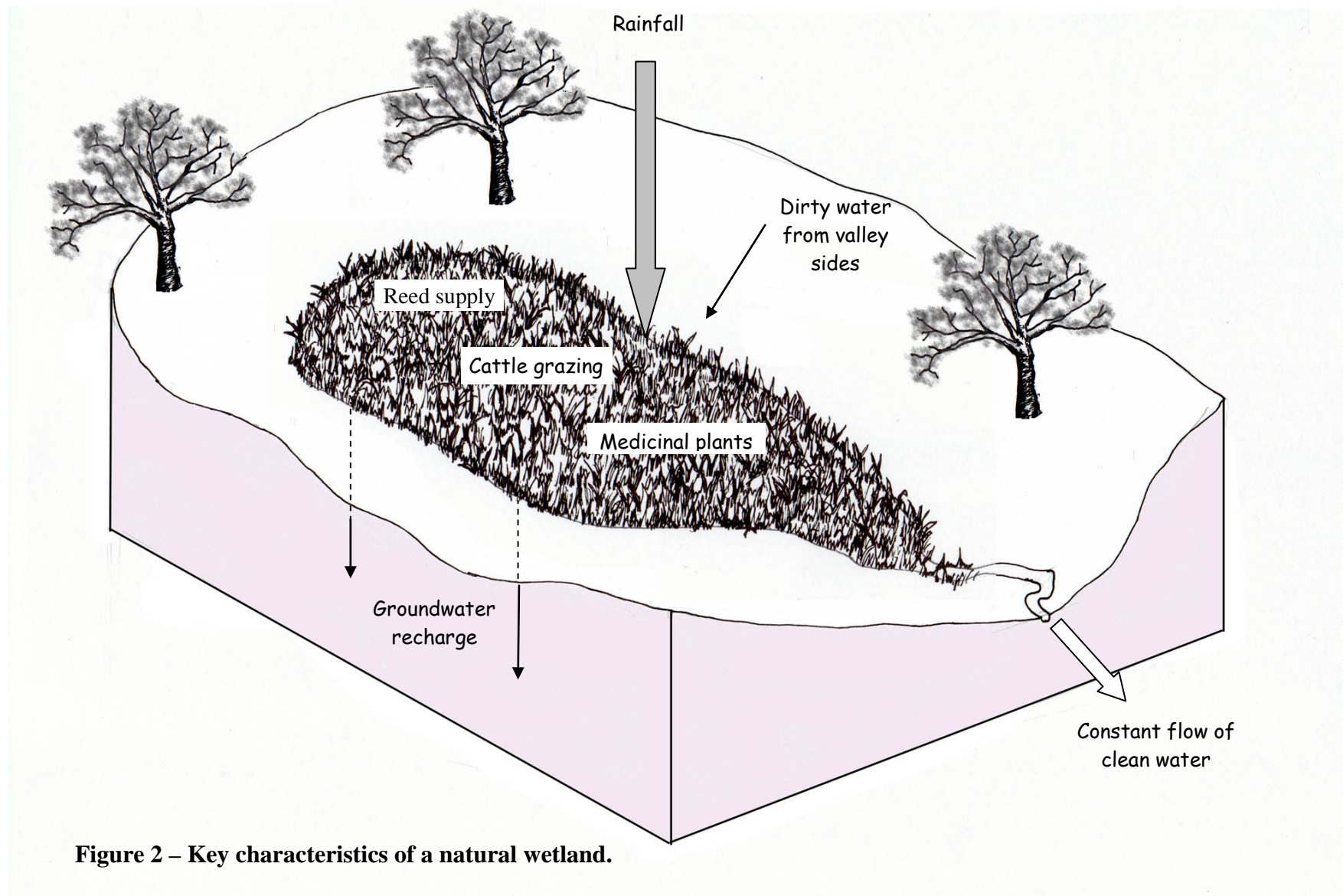
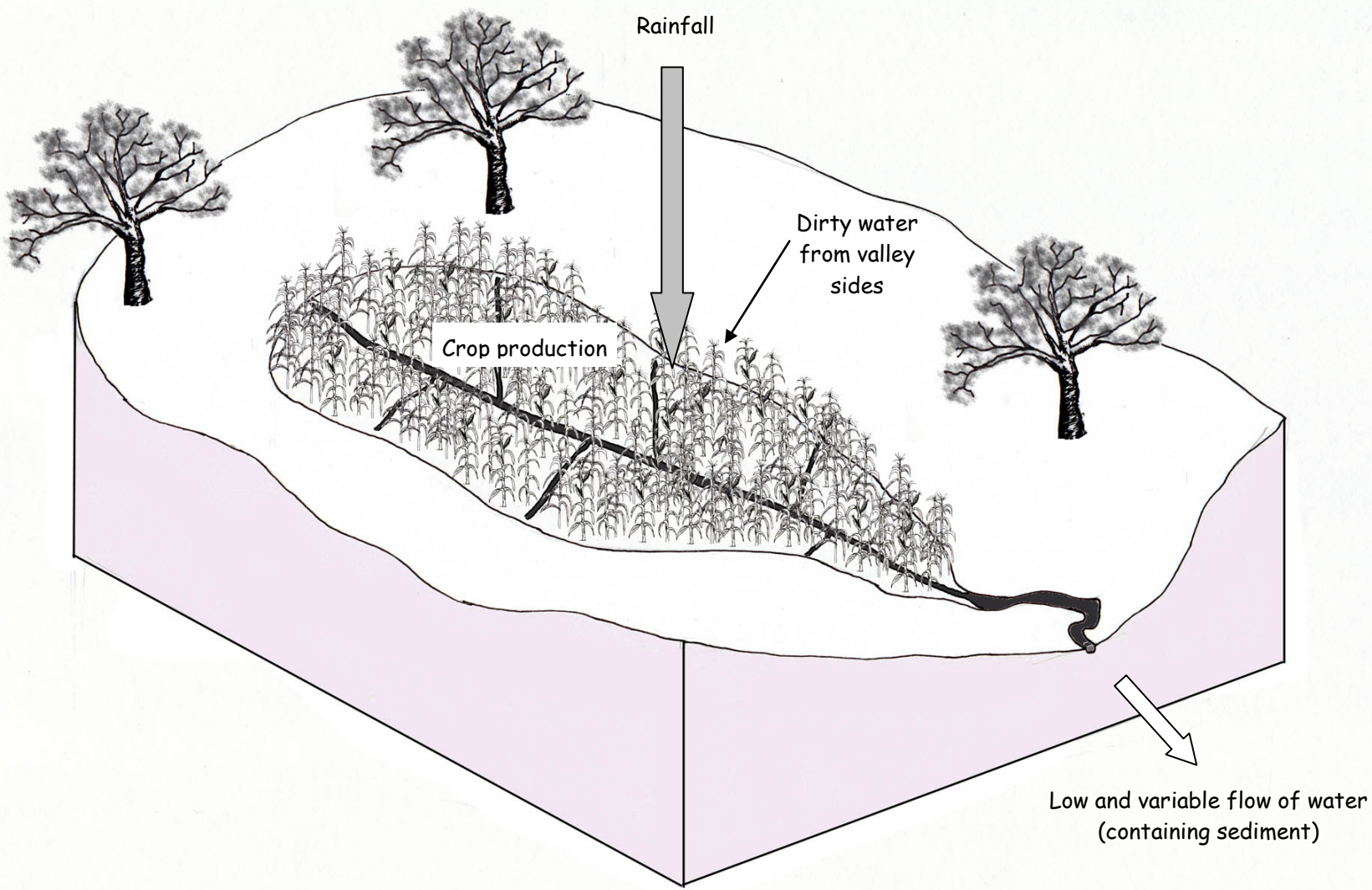


Figure 2 – Key characteristics of a natural wetland.



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Figure 3 – Key characteristics of a drained wetland.



## 4.0 Gains and losses to the community due to transforming of wetlands

Wetlands are often transformed, or altered by people. The most common form of transformation is to drain the wetland to lower the water table. This reduces the period of flooding and can even completely stop flooding. This process can lead to a number of new benefits from the wetlands, as shown in Figure 3.

Additional benefits (gains) obtained from drained wetlands include:

- an early cereal harvest, which can help improve food security and provide food during the “hungry season”,
- cash crops such as vegetables or sugar cane which can be sold, and
- wet season grazing when the upland fields are all under cultivation.

Although wetlands can provide these additional benefits, many of the original benefits from the natural wetland may be permanently lost when they are transformed. Some of the benefits which may be lost include:

- spring water supplies,
- cleaned stream water,
- flood control,
- soil / sediment trapping
- reeds for thatching.
- palm products, and
- medicinal plants.
- dry season cattle grazing

Hence there is a trade-off of gains and losses of benefits when wetlands are transformed by draining.

In addition, drained wetlands may lose their fertility because of changes to the soil caused by the presence of oxygen (a process called oxidation) and there may even be a shortage of water, which makes cultivation impossible. Soil compaction may also occur as a result of cattle grazing. In this way wetlands can become degraded and some or all of the additional benefits may be lost. If this occurs wetlands may end up providing few benefits at all.

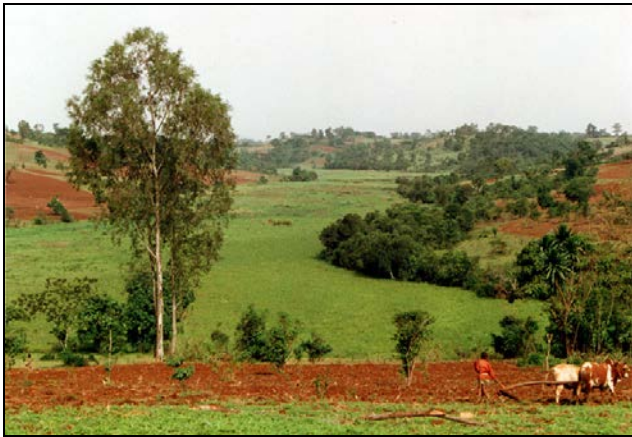
### Question 6:

When wetlands are transformed what are the main dangers in terms of reduced benefits for communities?

**Answer:** The main dangers come from over-drainage, the oxidation of the soil and soil compaction which can not only reduce the ecological benefits provided by wetlands, but can also destroy socio-economic benefits including the new agricultural benefits.

The next page shows the various states in which wetlands are found in Illubabor Zone.

## The various states in which wetlands are found in Illubabor Zone.



### Left: From dryland to wetland

The gradation from upslope areas to valley bottom wetlands is associated with increased influence of water upon the vegetation and soils. At the edges of wetlands there is a change from the water table being below the surface to it being above the surface.

### Right: A pristine wetland

Pristine wetlands provide a range of ecological functions such as groundwater recharge, flood control and water quality improvement. They also provide various products such as thatching reeds and medicinal plants as well as drinking water.



### Left: A degraded wetland

Wetlands can be degraded even when they are dominated by plants such as *cheffe* which are good at recolonising such sites. Degradation is primarily caused by drainage, but cultivation practices and cattle grazing can also damage these areas.

### Right: A multiple use wetland

The careful mixing of land use within a wetland and control over the length and extent of drainage can help achieve long-term sustainable production of a range of benefits as well as maintaining the wetland's ecological functioning.



## 5.0 The beneficiaries of wetlands and how this can change

### Who uses the wetlands?

The benefits from wetlands are not evenly distributed in communities. Most households in Illubabor will collect reeds and water from natural wetlands and use sites in them for washing. Not all households, however, make craft goods using wetland products, and only a few households have the knowledge to collect medicinal plants.

When wetlands are drained, use of the new benefits is often restricted as not all households have the labour, oxen and skills with which to cultivate wetlands. Hence as wetlands are drained only some groups gain. In fact some groups may lose out if other benefits are destroyed, for instance when springs dry up and medicinal or craft plants are destroyed.

Also as the ecological functions are disrupted by draining wetlands many people can be affected. Local people may no longer find water in their springs, while people a long distance downstream may be seriously affected by worsened floods, or lack of water in the dry season.

In planning the use of wetlands it is important to ask:

- a) **Who are the people who benefit from wetlands locally?**
- b) **Who are the people who benefit from wetlands downstream?**
- c) **Who will be affected by any changes made in the way wetlands are used?**

### Question 7:

How do the beneficiaries of wetlands change with drainage?

**Answer:** The people who benefit from wetland drainage may primarily be the better-off farmers who have the resources with which to cultivate wetlands.

## 6.0 Changing benefits with different uses and the potential for sustainable use - some case studies

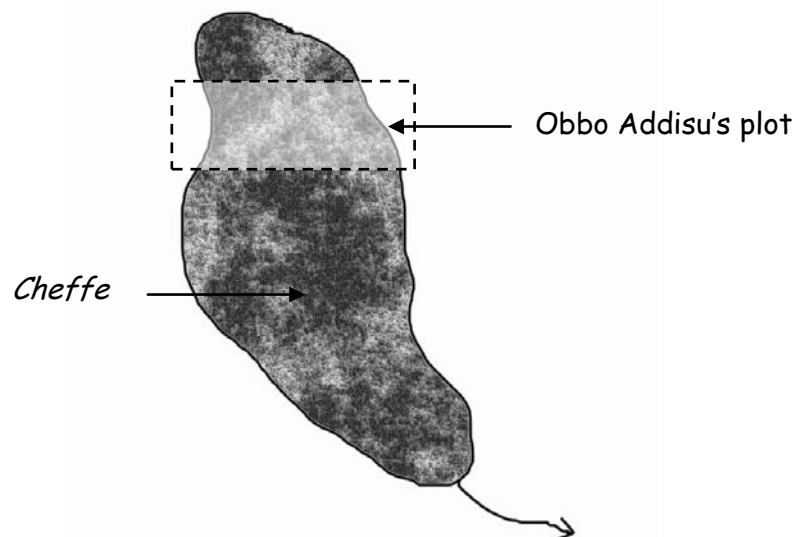
Wetlands are used in various ways depending on the decisions of the local community and those who control the plots of land within the wetlands. These uses can be classified according to the **intensity of use** and the **degree of transformation, or alteration** from the natural state, which is undertaken. In general, as intensity and transformation increase, there is an increased threat to the sustainable, or continued, ability of these areas to produce things which communities want.

### **CASE STUDY 1: Low intensity uses - No transformation - Sustainable**

#### **Collecting of Reeds and Medicinal Plants**

Obbo Addisu Mekonnen owns part of a wetland which is covered with *cheffe* vegetation. He uses his wetland plot in the same way he has done for many years - as a source of *cheffe* which he uses as a roofing material for the family home. In addition, he sometimes collects other medicinal plants from his plot which he uses for the treatment of headaches. His use of the wetland can be considered **sustainable** because he does not use more natural wetland products than the wetland is able to produce. He is also careful not to collect too much *cheffe* because it takes several years for good quality *cheffe* to grow again once it has been cut. This way he always has a supply of strong, mature *cheffe*. At the same time, the wetland continues to provide the full range of ecological benefits because human disturbance is limited.

**Figure 4 – Case study 1.**



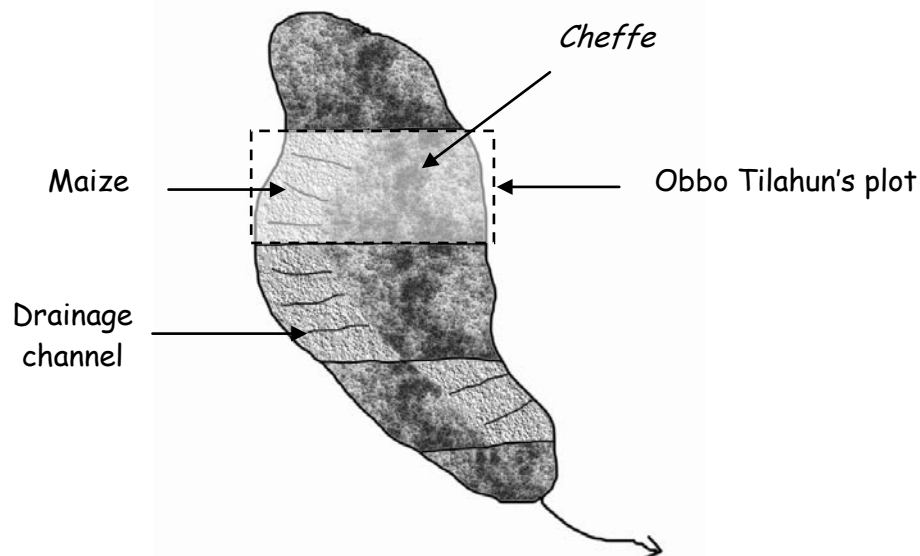
### **CASE STUDY 2: Medium intensity uses - Some transformation - Sustainable**

#### **Collecting and Edge Cultivation**

Obbo Tilahun Legese collects reeds from his wetland plot but in addition, he also cultivates maize on a small area of land on the edge of his wetland during the dry season. To cultivate this area he has to dig a number of drains in November so that the water level goes down and the land is suitable for the crops he grows between January and June. At the same time, he also recognises that it is important not to make the drains too deep so that when the rains come after the harvest, the area becomes waterlogged and the reeds can start to grow again in

this land. As long as the reeds continue to grow during the wet season this is a sign that the land will continue to be productive the next time it is drained. Used in this way, Obbo Tilahun is able to gain several benefits from the wetland – a reed supply and a crop – from year to year, but only if the wetland benefits are not used too intensively. Overall, the ecological impacts of his wetland use is only small and the range of wetland functions are maintained. This strategy of collecting and low intensity cultivation is usually **sustainable**.

**Figure 5 – Case study 2.**



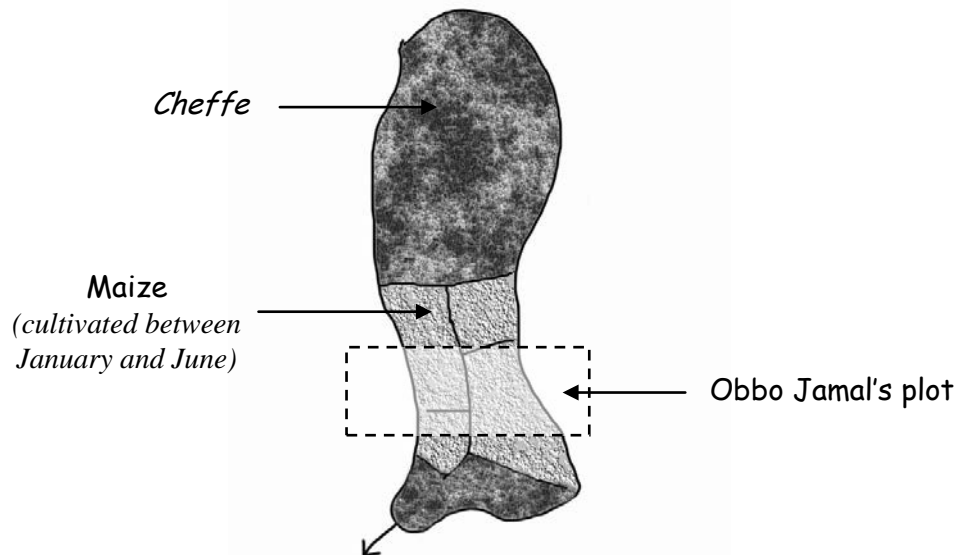
**CASE STUDY 3: Higher intensity uses - major transformation - Partially sustainable Mixed land use, Fuller drainage, Cultivation and Collecting**

In one wetland, Obbo Jamal Mohammed and several other farmers with neighbouring plots have used their wetland holdings for maize production, whilst in a different part of the wetland a group of other farmers do not cultivate their plots which remain covered with *cheffe*. For crop cultivation to succeed, Obbo Jamal and the other wetland cultivators have dug a drainage channel through the centre of the wetland and several smaller drains which direct water away from individual plots. These are maintained each year through clearance in November. These drains allow water from the cultivated parts of the wetland to easily drain out of the wetland. Obbo Jamal and the other farmers who cultivate, grow only one crop each year in their wetland plots (from January to June). This is so that *cheffe* can grow during the wet season and in addition, so that the ecological impacts of drainage and cultivation are minimised. Furthermore, because other farmers do not cultivate their wetland plots at all, a large area of the wetland remains in a natural state and this ensures a permanent supply of water throughout the year. As a result, Obbo Jamal and his fellow farmers are able to continue cultivating their wetland plots for several years at a time and the other farmers can continue to collect *cheffe* from their wetland plots. There is, however, some loss in ecological functions mainly because of drainage and for this reason this pattern of wetland use can be considered only **partially sustainable**.

If Obbo Jamal and his colleagues were to stop cultivation for several years, allowing the return of natural conditions in their plots, the wetland as a whole would regain all of its ecological functions so that in the long term, this type of use could be fully sustainable.

It is important to note that in this case there is maintenance of *cheffe* at the head and outlet of the wetland. This helps to retain the water in the wetland, maintaining supplies of water and controlling the outflow.

**Figure 6 – Case study 3.**



**CASE STUDY 4: High intensity uses - Major transformation - Unsustainable Agricultural land use, Full drainage, Double cropping and /or grazing**

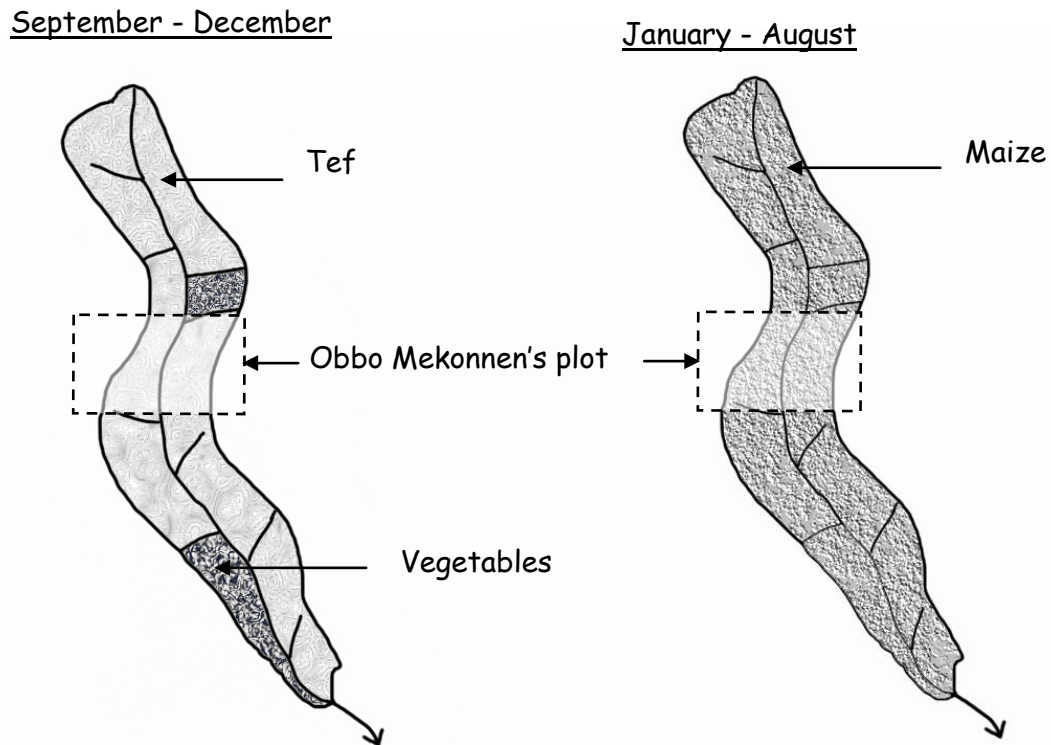
In another wetland Obbo Mekonnen Hailu and several other farmers used to cultivate their wetland plots twice a year. They completely drained the wetland early in the season, starting in August or September, with a central channel and many small channels. By the end of October it was dry enough for cultivation and some farmers grew vegetables whilst others grew teff. After this crop matured, they maintained the drainage channels and grew a second crop, this being maize which was sown in January / February. Each year they would completely clear the wetland of all its natural vegetation so that all of the area could be used for crop production. After several years, however, Obbo Mekonnen discovered that his wetland plot was becoming very dry even before he maintained his drainage channels. Furthermore, each year the wetland was flooded for a shorter period of time during the wet season. Although he and the other farmers continued to use their wetland plots in this way for several years, after some time they began to notice that their crops were not growing properly and few reached maturity because the wetland was too dry. As a result, Obbo Mekonnen and the other farmers had to stop cultivating their wetland plots because it was not worth their while to continue.

In this case, because drainage was carried out in an intensive manner throughout the wetland, there was a loss of most of the wetland’s ecological benefits, making this type of drainage and cultivation **unsustainable**. In fact, so many ecological benefits were lost that after a while the wetland also had very few socio-economic benefits.

A similar situation will be reached if heavy grazing occurs in wetlands. When too many animals graze on the wetland, the soil becomes compacted which means that it is less able to

store any water. If this happens in a wetland, the area will become suitable only for grazing sites and the wetland ecology will be destroyed. When sugar cane and eucalyptus are planted in wetlands, these also use up very large amounts of water and the result is that the wetland will dry out. Using the wetland soils for brick making will destroy the wetland completely.

**Figure 7 – Case study 4.**



### **Summary of case studies**

In summary, the above case studies have demonstrated how different wetland management practices can result in both positive and negative impacts on the wetland resource. As illustrated in the case study 4, Obbo Mekonnen and his friend's management practices have resulted in the degradation of their wetland plots. Such practices should, therefore, be avoided.

In case studies 1 and 2, however, Obbo Addisu's and Obbo Tilahun's management practices have resulted in less negative impact on the wetland plots they have used. The wetland management practices they have adopted have enabled them to use their wetland plots on a sustainable basis. Their management practices should, therefore, be encouraged.

In case study 3, Obbo Jamal's management practices have also resulted in the partial degradation of their wetland. There is, therefore, a need for Obbo Jamal to either adopt new management practices or modify his existing practices so that he can avoid wetland degradation and use his wetland plot on a fully sustainable basis. Some adjustments are outlined in part 7 of this report which describes the various wetland management practices

observed and reported throughout Illubabor, which are regarded as making a key contribution to sustainable wetland management strategies.

**Questions 8:**

What activities do you find in the wetland in your area?

**Answer:** In Illubabor there are a range of different uses of wetlands: reed collecting, craft material collecting, medicinal plant collecting, water collection for human use, watering of cattle, grazing of cattle, and cultivation with drainage.

**Question 9:**

How do different land uses in a wetland change the ecological functions it provides?

**Answer:** In Illubabor collecting uses have little or no ecological impact. Cattle grazing and cultivation with drainage have much more significant ecological impacts which in some cases are difficult to reverse.

**Question 10:**

How do different land use patterns produced different benefits for different groups in society?

**Answer:** Different land uses in wetlands affect the rich and poor people, men and women, differently. Almost everyone needs reeds for thatching their *tukuls*. Only the rich who can afford corrugated iron do not use reeds for thatching. Many people get water from the springs along the edges of wetlands. If these springs dry up the women who collect the water have to walk further and that takes time away from their other activities. Rich households have the oxen and labour to cultivate wetlands; few poor people cultivate wetlands. Rich people have more cattle than the poor and so are more concerned about the grazing resources provided by wetlands. People with specific skills collect medicinal plants, craft product materials for weaving or pottery from wetlands. These are often poorer sections of the community.



## **7.0 Management recommendations for sustainable wetland use in Illubabor Zone**

From experiences such as those described above a number of management recommendations for the sustainable use of wetlands can be identified. The ones identified here are the result of research work undertaken by the EWRP in Illubabor Zone, south-west Ethiopia since April 1997. They are based on the experiences of farmers, development agents and researchers, who have many years of experience in this zone. These management recommendations are a first attempt to summarise the lessons learned and they could be improved in the future when more research and field testing has been undertaken.

### **7.1 Reeds harvesting management**

As shown earlier, reeds are an important wetland resource which can be collected and used in the construction of *tukuls* and granaries. Nearly 85% of the population in Illubabor live in reed-thatched *tukuls*. The best reeds for thatching are some 2-3 years old but this will depend on the local conditions and farmers will know from their experience what is best. Younger reeds will not last for more than one year as a thatch, whereas older reeds will last up to 4 years.

There are several ways of managing the wetland so that it can continue to provide a supply of good quality reeds:

- areas of the wetland should be conserved for reed production only so that there is enough to supply those who require them;
- it is important to ensure that nothing interferes with the flooding of the wetland during the wet season - flooding is necessary for the growth of the reeds;
- it is important that reeds are not harvested before they are mature - mature reeds last much longer than younger ones;
- ideally cattle should be kept out of the wetland as they damage reeds, other plants and the way in which the wetland floods.

### **7.2 Grazing management**

In the past, grazing in wetlands was restricted to the summer or dry season months (November to March). During the wet season it is often difficult for cattle to graze in a wetland because of flooding and because there are some diseases which affect the cattle at this time of year. However, due to the growth of the human and cattle populations in the area and the reduction in grazing land in the uplands, cattle are now grazing in the wetlands all year round.

There are no restrictions on the number of stock grazing in the wetlands due to the existing communal rights to these grazing areas. Over-stocking can easily result in over-grazing of the wetland and this might cause a complete change of the wetlands' natural characteristics with the loss of *cheffe* and the compaction of the soils. Both year round grazing and over-stocking

in the wetlands can result in damage which is difficult to reverse, so grazing in wetlands should be managed in a sensitive manner.

Several guidelines can be followed which will increase the chances of sustainable grazing in the wetlands:

- the time of the year and the duration of wetland grazing is important - this should be limited to the dry season (between November and March) whilst the wet season (between June and September) should be free of grazing so that the wetland can recover from the grazing pressure;
- it is important that the number of stock grazing in a wetland should be restricted to what the wetland can support - this depends upon how much fodder the wetland can provide and also how many cattle can be grazed without soil compaction occurring;
- there should be some rules which stop grazing if any problems start to occur - problems such as a drying out of the soil which is recognisable by the invasion of upland plants;
- if there are problems, cattle should be kept out of the wetland until the natural vegetation (*cheffe*) has fully recovered;
- heavily grazed wetlands should not be drained and cultivated - this may result in many more problems and the loss of ecological and socio-economic benefits; rather they should be allowed to regenerate fully.

### **7.3 Management of agriculture in the wetland ecosystem**

As shown in the case studies, wetland agriculture can cause a major loss in wetland benefits unless proper management practices are followed. The main problem is that drainage and cultivation alter the wetland ecology for a long period - reeds are removed from the wetland, in some cases as early as September, and human activity continues until June or early July when the harvesting of crops is completed. Usually only one crop is grown, maize, from February to June, but sometimes vegetables or *tef* are also grown from October to January.

Some agricultural management practices can be carried out which help minimise damage to the wetland ecosystem:

- flooding should be maintained during the wet season as the longer the flooding period will be, the greater the recovery of wetland ecological functions and soil fertility to ensure that the following cropping will be successful;
- some practices such as the blocking of drainage channels after the harvest can ensure the rapid flooding of the wetland;
- grazing should not be allowed at any time, not even after the harvest in cultivated wetlands - this can cause the compaction of the soil when it is moist;

- double cropping should be avoided because this extends the period of ecological disruption in the wetland and it means that flooding is very restricted; although this reduces food production, it is essential for ensuring the sustained production of food from wetlands;
- cultivation of hydrophilic (water loving) perennial crops, such as sugarcane and the like, should be completely avoided from wetlands at all times. These consume too much water.
- the depth and width of all drainage channels should be carefully planned according to the pattern of water in each wetland so that they are successful in lowering the water but do not over-drain a wetland; but they should not prevent flooding during the wet season;
- it is important to recognise that the cultivation of teff in the wetland over several years can permanently damage the wetland ecology - therefore it should be discouraged;
- maintaining an area of natural vegetation at the head of the wetland for at least 50 m will help ensure that the wetland does not dry out so quickly;
- maintaining an area of natural vegetation at the outlet of the wetland will help regulate the flow of water and prevent erosion around the outlet which can lower the water table;
- in large wetlands the whole area should not be utilised for continuous crop production, but rather a mix of land uses is preferred, especially including areas of natural vegetation every 100-150m and also along some of the edges where springs are located;
- a fallow period of several years should be encouraged especially in wetlands with shallow soils - this will allow soil and plant material from the uplands to build up in the wetland, which can restore fertility;
- where the soil is particularly shallow, wetlands should not be cultivated but allocated for reed supply.

#### **7.4 Management of wetland hydrology**

Wetlands need water so that they can provide a range of ecological and socio-economic benefits. It is important that the wetland hydrology is managed so that wetlands can continue to function and provide benefits. The quality and quantity of water available for domestic use is dependent upon good hydrological management.

There are several ways to ensure good hydrological management within a wetland:

- allow flooding of wetlands during the wet season as the store of water in the wetland will be recharged and this can then be used throughout the year and even during the dry season;
- if the wetland is drained and cultivated, small areas of natural vegetation should also be kept; the more reeds in the wetland, the more water is stored for the dry season, such areas of natural vegetation should include an area of at least 50 m from the head of the wetland;
- drainage ditches should be designed so that over-drainage is avoided;

- a forested or well-vegetated catchment ensures that rainfall will go into the ground and increase the amount of water which the wetland can store; where the land is bare in the catchment, rainfall will flow more rapidly into and through the wetland and less is stored;
- drainage ditches should not be constructed very close to water springs. Ideally there should be a distance of approximately 10m between the spring and the start of the drainage ditch, so too much water does not drain from the spring.

## **7.5 Wetland soils management**

Careful management of wetland soils is necessary to prevent irreversible damage to them and the wetland ecosystem. Over-draining can result in a change of the chemical and physical characteristics of wetland soils. Similarly overgrazing and compaction by cattle can result in changes in the physical characteristics of soils and their ability to store water.

Maintenance of the natural characteristics of wetland soils is partly possible through a number of actions:

- seasonal flooding should be maintained for as long as possible;
- plant material should be allowed to decompose in the wetland during seasonal flooding;
- the removal of crop material after the crop harvest should be prevented so that its decay in the wetland can help increase organic matter and soil fertility, and hence crop productivity;
- grazing should be controlled to prevent the compaction of the soil.

## **7.6 Vegetation management**

The natural wetland vegetation can be maintained if proper management of the hydrology and soil exists. If wetlands dry out, other non-wetland plant species can invade. Usually these plants which invade are of less value for farmers than the natural plants in wetlands. In this respect, the impact of wetland drainage has a direct impact on the survival of natural wetland vegetation.

If the wetland vegetation is to be maintained, several guidelines should be followed:

- the period of wetland drainage should be limited so that flooding can occur and the wetland vegetation can survive;
- reeds should be carefully harvested so that they are allowed to reach maturity;
- areas of natural vegetation should be retained at various places around a wetland when it is used for other purposes so that regeneration of the natural vegetation will be facilitated.

## 7.7 Wildlife management in and around wetlands

Wetlands are also a refuge sites for many wild animals. There are many wetland dependent bird species that breed and forage in wetlands. Some of these bird species are special to Ethiopia and should be protected from becoming extinct. An example of bird species that are endemic to Ethiopia and found in Illubabor specifically in the wetlands of Metu and Yayu-Hurumu Weredas include the Yellow-fronted Parrot (*Poicephalus flavifrons*), Banded Barbet (*Lybius undatus*) and White-backed Black Tit (*Parus leuconotus*). Other wildlife also use wetlands for water and as sources of food. Wildlife is threatened with extinction when its habitat is destroyed. This also brings it into conflict with people.

In order to minimise the conflict between people and wildlife in wetlands and to provide the habitats and access to water which wildlife need, it is important to try to ensure that:

- areas of natural vegetation are preserved in some parts of wetlands; it is best if this is as large as possible and isolated from other activities.

## 7. 8 Organising wetland management

The management of wetlands, as with other natural resources, is the responsibility of the individual communities. The actions of individuals are subject to co-ordination by the Kebele Executive Committee, while groups within a community who have particular skills or common interests, such as wetland use and cultivation, may organise themselves into groups which may be termed Wetland Management Co-ordinating Committees. These interest groups may build upon traditional groupings such as the *Abba Laga* system. Such groups should also make use of local experts in the Ministry of Agriculture where they have skills which can be of use. The following are some points for guidance in wetland management organisation:

- wetland utilisation should be undertaken in a participatory manner so that all the wetland users are involved and their different interests recognised;
- wetland users may wish to form management groups which will co-ordinate use of the wetland to ensure the long term sustained use of the area and to prevent degradation;
- wetland use should be planned using advice from the local Kebele administrators and the concerned wereda expert in the Ministry of Agriculture who can offer guidance on technical issues;
- local management rules for wetlands can be developed by communities and wereda agricultural experts can assist in the development of these.

## 8.0 Key practices

In conclusion it can be stressed that there are four main points which need to be recalled in wetland management to ensure the long-term production of the ecological and socio-economic benefits, including the benefits from drainage transformation. These are simply:

- retain flooding,
- limit grazing,
- plan use carefully, especially drainage, with sustainable use as the goal, and
- keep the period of drainage to a minimum.

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