







# Sustainable Wetland Management in Illubabor Zone

EU Project B7-6200/96-05/VIII/ENV

## Research Report Summaries


**A collaborative project involving the University of Huddersfield**

**and**

**Addis Ababa University,**

**with**

**the University of East Anglia and IUCN - East Africa Regional Office.**

Edited by Adrian Wood and Alan Dixon

This study was achieved with the financial contribution of the European Union's Environment in Development Countries Budget Line (B7-6200). The authors are solely responsible for opinions expressed in this document, and they do not necessarily reflect those of the European Union.

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Wetlands and Natural Resources Research Group,
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# SUSTAINABLE WETLAND MANAGEMENT IN ILLUBABOR ZONE, SOUTH-WEST ETHIOPIA

(EU Project B7-6200/96-05/VIII/ENV)

## Introduction to the Summaries Volume

This booklet and the attached CD-ROM provide for public dissemination the findings of the project "Sustainable Wetland Management in Illubabor Zone, South-west Ethiopia" which was run by the Ethiopian Wetland Research Programme between April 1997 and June 2000. These are now released for public consultation following approval of the final reports by the European Union which provided the majority of the funds for this study.

The booklet provides summaries of the nine **Research Reports** produced by the project. These will allow readers to have a quick insight into the project findings and decide which reports they wish to study in detail. The full texts of the Research Reports are provided on the attached CD-ROM. Also provided on the CD-ROM are the **Policy Briefing Notes** which were prepared by the project to disseminate the policy relevant findings amongst policy makers. These Notes provided the basis for a one-day workshop with senior government officials which was run after the end of the project. The CD-ROM also includes the **Proceedings of the National Workshop on Sustainable Wetland Management** which was held in December 1999 to disseminate the preliminary findings of the project to national researchers, NGO experts and government officials.

The CD-ROM and document menu should run automatically once the CD-ROM is inserted into the appropriate drive in your computer. Follow the on screen instructions to view the documents in Adobe Acrobat format.

This booklet has been produced with the financial support of the **Wetlands and Natural Resources Research Group (WeNReG)** of the University of Huddersfield, the contractor for this project. Other support for this production has come from **Wetland Action - EEIG**, the European Economic Interest Grouping established to apply and explore more widely the ideas and findings of this project, and from the **Ethio Wetlands and Natural Resources Association (EWNRA)** which is continuing to work on this topic in the field area and other parts of Ethiopia.

For further details of these organisations see:

| | |
|---|---|
| WeNReG : | http://wetlands.hud.ac.uk |
| Wetland Action: | http://www.wetlandaction.org |
| EWNRA: | http://wetlands.hud.ac.uk/ewnra |

Full contact details are on the rear cover of this booklet.

### Origins of the Project

The work reported here originates from an interest in two major concerns with respect to natural resource management in Africa :

a) the sustainable intensification of land use, and
b) the spontaneous development and dissemination of sustainable natural resource management regimes.

Both are seen as seen as critical under the current conditions of rural population growth and land degradation and given the limited resources for formal research and extension. Over the last decade or so, some research has suggested that intensified land use is possible under specific conditions and that degradation of the resource base is not inevitable as agronomic density grows (cf: Tiffen, Mortimore and Gichuki, 1994). Further there has been increased recognition of the ability of rural communities to undertake their own experimentation and to disseminate such local knowledge through indigenous networks (Rhoades and Bebbington, 1995; Moris, 1991).

This project sought to address these issues in wetlands, which in many parts of Africa are becoming the new agricultural frontier as forests are cleared and additional arable land has to be sought in other ways. Many wetlands are now suffering from over-drainage, erosion and degradation, so that areas once rich in water and natural resources, and which provide many functions and benefits, are becoming virtually useless.

The traditional response to these problems has been to point out the fragility of wetland ecosystems and the need to protect them by keeping people out of these areas and designating them as protected areas. However, this raises the question of whether there are alternative responses to the growing use of wetlands by rural communities. In particular, there is the question of whether there are sustainable use regimes for wetlands which can meet the growing needs of communities and whether these are being adjusted and disseminated spontaneously by communities without external assistance.

These questions, first raised in 1995 following a visit to Illubabor Zone, fitted rather uncomfortably into the wetland debate at that time which was dominated by the predominantly conservationist approach and to a lesser degree the contrasting agricultural transformation approach (typified by the Inland Valleys Consortium in West Africa). This research instead explored the middle ground. It was recognised that "putting up the fences" around all wetlands was not going to be successful with the growing pressures on land in many parts of Africa. But its was also understood that wetlands fulfil critical roles in the hydrological cycle and that their ecological functioning must be respected. This led to the search for sustainable wetland use regimes and an assessment of their environmental impacts and socio-economic implications. It was hoped that sustainable use regimes could accommodate some elements of agriculture and other wetland uses which benefit communities, while also maintaining the basic ecological functioning of the wetlands, especially their hydrological role.

## Aims of the Project

In this context the EWRP project sought to investigate the environment and socio-economic dynamics of wetland utilisation in Illubabor Zone and to identify ways of achieving sustainable wetland use. While the project document spoke about achieving "sustainable wetland management in Illubabor Zone" in reality in the three and a quarter years of field activities, it was only possible to make a contribution toward this goal through understanding the processes associated with, and the impacts of, wetland use, especially wetland cultivation, and raising awareness of these.

There were six specific objectives specified in the project document. These were:

- identification of the nature, extent and trends in wetland drainage and the use of wetlands,
- assessment of the ecological impacts of different types of wetland use and drainage, including changes in hydrology, pedology and biodiversity,
- identification and assessment of the socio-economic processes which are leading to changing uses of wetlands and the community organisation of natural resource management,
- identification of appropriate management practices which will ensure the sustainable use of the wetlands, building on the existing indigenous knowledge where appropriate,

- dissemination of an understanding of wetland dynamics and sustainable management practices, and the support and development of local monitoring and management capacity, and
- the contribution of material to debates, at national and regional levels in Ethiopia, and more widely, where policies which impact upon wetlands are discussed.

## Approach of the Project

This project was a collaborative initiative of Huddersfield University in the UK and Addis Ababa University in Ethiopia. Additional support was provided by the East Africa Regional Office of IUCN – the World Conservation Organisation and the University of East Anglia in UK.

The project was implemented in liaison with the Illubabor Zonal Administration of the Oromia Regional State and with the close co-operation of the Agricultural Bureau in Metu, the zonal capital. The project also worked with NGOs operating in that area, notably Menschen fur Menschen. Strong links were developed with the communities in the study sites and they as well as NGO and government staff were involved in various training and awareness raising exercises to improve capacity for wetland management.

The project had five specific characteristics in its work:

a) a systems and integrative perspective,
b) an inter-disciplinary approach,
c) emphasis on participatory methods,
d) focus on local knowledge,
e) capacity building for community management.

## Ongoing activities

Although funding for this project terminated in mid 2000, several initiatives have been taken to continue this work and especially to disseminate the project findings so that these benefit the rural communities involved in the research and other wetland using communities in Ethiopia.

Continuity of work in the field area has been provided by the establishment of an Ethiopian NGO, the **Ethio Wetlands and Natural Resources Association** (EWNRA). This association runs an office in Metu, the capital of Illubabor Zone, and has a three year agreement (2001-2004) with the zonal authorities to provide wetland extension training and support for wetland-using communities. This work uses the extension material developed by the EWRP `project and also supports community institutions which have been develop in order to share wetland information and manage these areas. EWNRA currently has support from the embassies of the Netherlands and Sweden in Ethiopia. It has also undertaken wetland awareness raising workshops in other regions of Ethiopia and with NGOs, and supported individual wetland researchers.

Specific research activities continue in Illubabor with the monitoring of wetland hydrology having now produced almost five years of continuous data. The British Academy has also provided support for research to identify the strengths and weaknesses of the different local knowledge dissemination networks, and so follow up the project's work on indigenous knowledge systems.

Further application of the concepts developed in this project, especially sustainable, community-based wetland management; community institutions for wetland management; indigenous wetland knowledge and knowledge systems; sustainability analysis using locally recognised indicators; and the need for multiple use of wetlands (Howard et al, in press) has been taken forward by **Wetland Action (EEIG)**. This a European Economic Interest Grouping which links two NGOs, Huddersfield University and RDP Holland, BV. Wetland Action benefits from the complementary skills of its different members to help develop, disseminate and apply these concepts in research, field projects and training activities.

## References

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Tiffen, M., Mortimore, M., & Gichuki, F. (1994) More people, less erosion. Environmental recovery in Kenya. Chichester, Wiley.

## Acknowledgements

The project was undertaken with financial support from the European Union's Environment in Developing Countries budget line. This met 80% of the project costs. The remaining 20% was provided mostly by the University of Huddersfield. Some further support in kind was provided by the University of Huddersfield, Addis Ababa University and the University of East Anglia.

Assistance in preparing these summaries was provided by placement assistants, Ed Coleman and Andy Workman.

**Summary Report for Objective 1**

# Nature, Extent and Trends in Wetland Drainage and Use in Illubabor Zone, Southwest Ethiopia

By Afework Hailu, Alan Dixon & Adrian Wood

The first objective of the EWRP work was to "identify the nature and extent of the wetland drainage practices, both past and present, in Illubabor Zone, and the trends in the drainage of these areas." In meeting these objectives this report provides an introduction to Illubabor Zone as a whole and then reviews the wetland situation, including the history and trends in wetland use in this zone and threats to wetlands. The report also explains how the eight study sites in the Metu and Yayu-Hurumu weredas (districts) were selected and discusses the characteristics of these wetlands.

## Data Acquisition

The data used in this report are drawn from a variety of sources including individual interviews and group discussions undertaken during a survey of the whole zone, which was undertaken in 1998. As part of that survey a variety of government documents and records were consulted and a unique long-term view of wetland use developed.

## Illubabor Zone

Illubabor Zone is located in south-west Ethiopia. The area is underlain primarily by basalt, although the basement complex is exposed in the north and west. From this parent material nitosol and lixisol soils have developed. The altitude varies from 1500 - 2000 m asl, with an average annual rainfall of approximately 2000 mm. The annual average temperature in the zone varies between 16ºc and 24ºc and the climax vegetation is tropical montane rainforest.

The population of Illubabor was estimated in 1994 to be 847,048 persons, with an average population density of 58 pers/km$^2$. The dominant ethnic group in the zone are the Oromos (c. 90%). Approximately 40% of the area of the zone is covered with forest whilst agriculture, which is dominated by maize cultivation, accounts for 20% of the area. Coffee is the major cash crop. This grows wild in the forest but is increasingly cultivated in domesticated stands.

## Wetlands in Illubabor

The common occurrence of valley bottom wetlands in Illubabor is a result of the high rainfall and the lightly incised plateau terrain which has many poorly-drained depressions, facilitating the build up of sediment and water. These wetlands range in size from less than 10 ha to more than 300 ha, although the smaller wetlands at the heads of valleys are the most abundant. The soils in Illubabor's wetlands are mainly gleyisols, being composed of recent alluvial or fine colluvial deposits and show hydromorphic properties. The texture of these soils varies from silt loam to silty clay loam with an increase in clay below a depth of 20 cm. Valley bottom soils also tend to be strongly acidic.

Illubabor's wetlands constitute important natural resources which provide a range of hydrological and socio-economic functions and benefits to local communities, including:

- the storage of water throughout the year and the regulation of water flow,
- the retention of fertile sediment,
- the provision of a wildlife habitat,
- the supply of natural plant materials, for medicinal and craft uses and for thatching,
- the provision of agricultural land for cultivation and grazing, and
- the provision of clean drinking water.

The benefits from the functions and products provided by wetlands are widely distributed through the community with most households benefiting from these in several ways (Table 1).

**Table 1: Wetland uses and beneficiaries in Illubabor Zone.**

| Uses | Estimate of households benefiting |
|---|---|
| Social / ceremonial use of sedges | 100% (including urban dwellers) |
| Thatching reeds | 85% (most rural households) |
| Temporary crop guarding huts of sedges | 30% |
| Dry season grazing | Most cattle owners (30% of population) |
| Water for stock | Most cattle owners (30% of population) |
| Cultivation | 25% |
| Domestic water from springs | 50 – 100% |
| Craft materials (palm products and sedges) | 5% |
| Medicinal plants | 100% (mostly indirectly by purchase from collectors / traditional doctors) |

## Wetland Cultivation

There is widespread agreement throughout Illubabor that wetland cultivation has been initiated at different times during the last 100 years in response to food shortages occurring between May and early August. In most weredas it appears that wetland cultivated originated at the beginning of the 20$^{th}$ century when the governor of Illubabor instructed the landlords to have their tenants cultivate these areas so as to increase food production. In some weredas, however, wetland cultivation appears to be more recent dating back to the latter part of the reign of Haile Selassie (1930-1974) when commercialisation and market forces became stronger in this area. Policies and developments during subsequent governments have also stimulated wetland cultivation, especially the search for national food security since the mid 1980s.

Wetland cultivation has involved a process of trial and error in the development of appropriate drainage and cultivation techniques. This process still continues today when new communities take up wetland farming, although there is a considerable body of local knowledge about wetland management and specific terms and tools relating to wetland use.

An examination of the trends and patterns in wetland cultivation in Illubabor by wereda between 1988 and 1999 revealed that:

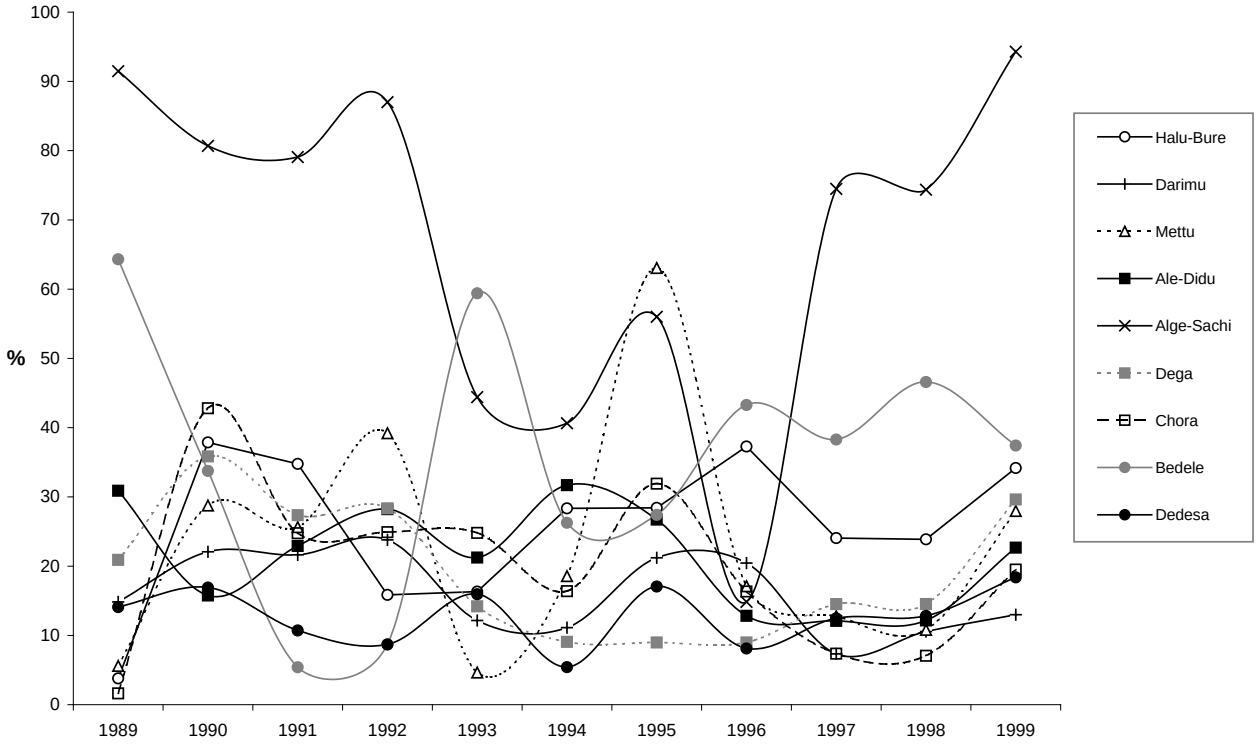
- the general trend has been one of a decline in wetland cultivation in recent years, (although 2000 saw a major (c.30%) increase),
- the extent of wetland cultivation in each wereda varies from year to year (Figure 1),
- fluctuations in the extent of wetland cultivation in one wereda do not, in general, follow fluctuations in other weredas, i.e. they appear to be independent,
- there does not appear to be a significant relationship between the extent of a particular land use and wetland cultivation in the weredas.

## Wetland Threats

Several potential threats to the survival of wetland characteristics in wetlands which are under cultivation have been identified. These include:

- complete drainage and cultivation of wetlands,
- double cropping in wetlands which extends the period of drainage,
- "destructive" crops, e.g. those with a high water or nutrient demand such as tef (*eragrostis tef*) sugar cane and eucalyptus trees,
- grazing pressures, which result in the loss of wetland vegetation, soil compaction, and reduced moisture storage,
- deforestation, especially in wetland catchments, which can induce extreme hydrological events leading to erosion in wetlands, and also reduce water storage for wetland recharge.

**Figure 1: Percentage of wetland area in each wereda under cultivation (1989 - 1999).**




## Study Wetlands

The wetlands chosen for detailed study by the EWRP project were selected following an analysis of the topographical maps. These showed that small headwater and small mid-valley wetlands are the most common. Field surveys showed a range of land use in these wetlands ranging from pristine sites through partially and fully drained ones to degraded and regenerating ones (Figures 2 and 3).

**Figure 2: A conceptual model of wetland development.**

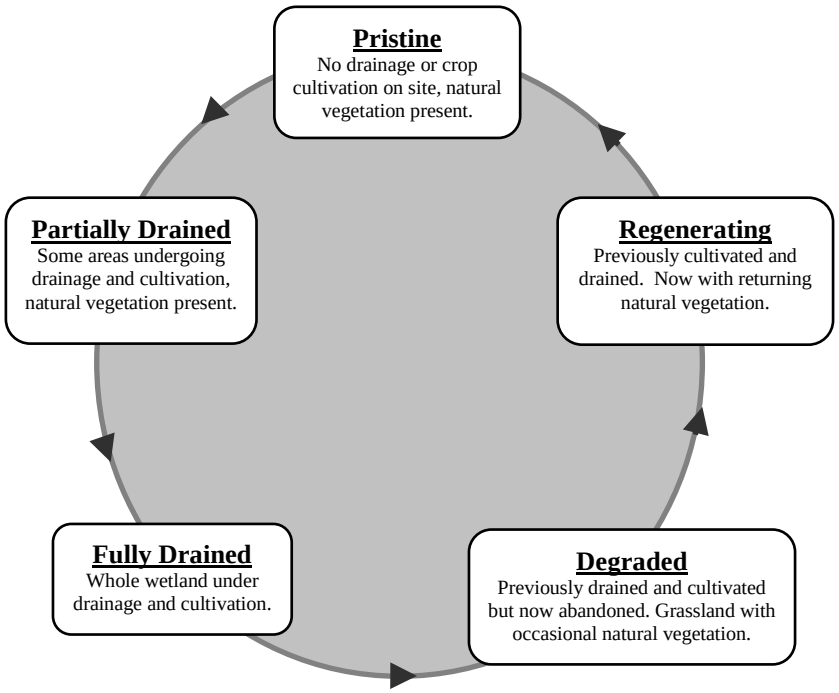


**Figure 3: The various states in which wetlands are found in Illubabor Zone.**

**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.

Eight wetlands were chosen to be representative of the most common wetlands and the variations in land use in these wetlands. The sites chosen were six small headwater wetlands and two small mid-valley wetlands (Figure 4). The characteristics of each are shown in Table 2.

**Figure 4: Location of the study wetlands in the study area and Illubabor Zone.**

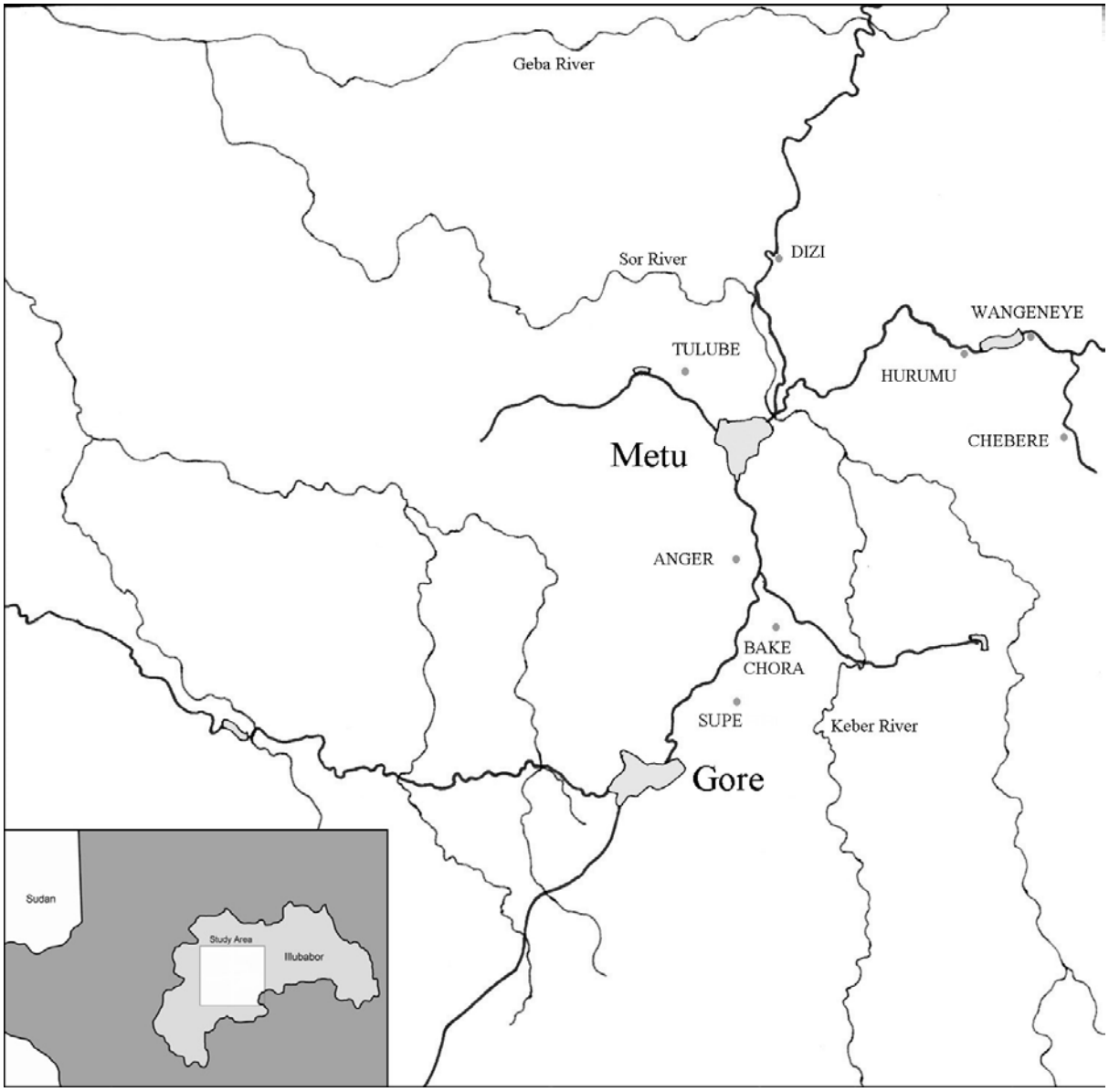
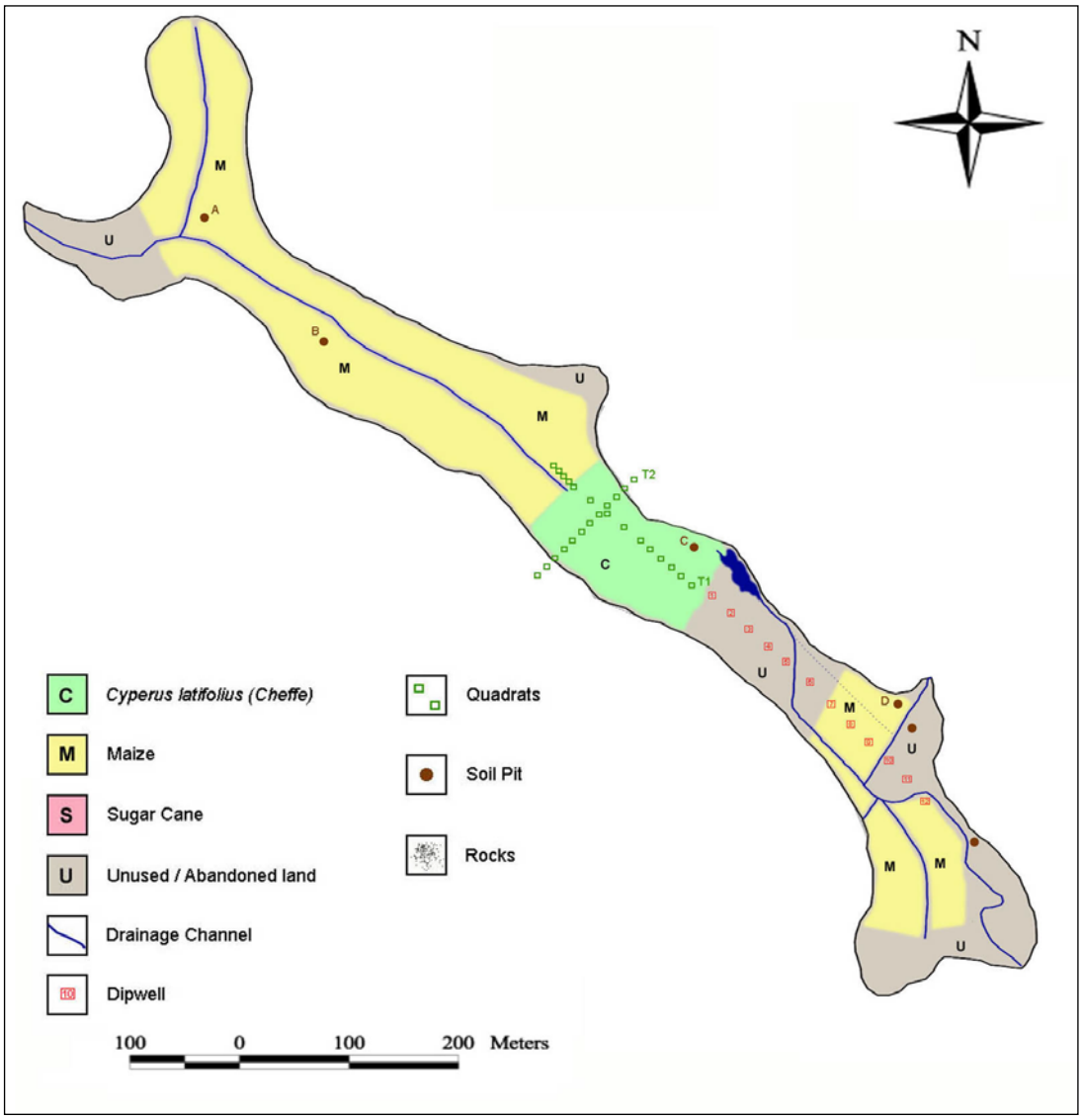



**Table 2: The characteristics of the eight study wetlands.**

| | Altitude (m asl) | Size (ha) | Hydrological Classification | Main water source | Drainage | Key hydrological conditions |
|---|---|---|---|---|---|---|
| **Chebere** (pristine) | 1780 | 10 | Small Headwater | Springs / runoff | no clear channel | high water table throughout year |
| **Wangenye** (partially drained) | 1780 | 6 | Small Headwater | Springs / runoff | artificial drainage | spatially variable water table |
| **Bake Chora** (fully drained) | 1700 | 8 | Small Headwater | Springs / runoff | artificial drainage | low water table throughout year |
| **Hurumu** (degraded) | 1760 | 4 | Small Headwater | Springs / runoff | artificial drainage (abandoned) | Permanent and very low water table |
| **Tulube** (regenerating) | 1680 | 8 | Small Headwater | Springs / runoff | Intermittent channel | high water table throughout year |
| **Dizi** (fully drained) | 1560 | 4 | Small Mid-valley | Inflow stream | natural stream & artificial drainage | low water table |
| **Anger** (partially drained) | 1640 | 16 | Small Mid-valley | Inflow stream | natural stream & artificial drainage (some abandoned) | spatially variable water table |
| **Supe** (partially drained) | 1720 | 10 | Small Headwater | Springs / runoff | artificial drainage | spatially variable water table |

In each of these wetlands a range of environmental monitoring was undertaken, including weekly hydrological records, soil analysis and seasonal vegetation assessments (Figure 5). With the wetland communities extensive participatory rural appraisals and surveys were undertaken looking at a range of socio-economic and institutional issues.

**Figure 5: Location of hydrological, soil and biodiversity monitoring regimes in Anger wetland.**




## Conclusions

The wetlands of Illubabor represent important natural resources for much of the zone's population because of the range of environmental and socio-economic functions they fulfil. In particular, through their agricultural use and provision of craft and other materials they contribute to food security of the zone.

The agricultural use of wetlands has been accompanied by a process of experimentation in terms of drainage and cultivation techniques. In some cases this has been successful with a set of practices developed which ensure the sustainability of the wetland agricultural system and have permitted several decades of annual cultivation with few signs of degradation. However, in some cases, wetland cultivation has led to wetland degradation with heavy grazing and catchment deforestation exacerbating over-drainage. These dynamics of wetland use are explored further in the following reports of the EWRP series which specifically address the other research aims.

**Summary Report 1 for Objective 2**

# The Hydrology of Wetlands in Illubabor Zone

By Declan Conway & Alan Dixon

The aim of this part of the project was to establish an understanding of the hydrological characteristics of wetlands in Illubabor Zone and the impact of utilisation, especially drainage for agriculture, on hydrological functioning. This was achieved through a field monitoring programme which focused on the dynamics of the groundwater table, hydraulic conductivity and hydro-chemical changes in wetlands undergoing different types of land use management. During the research period (August 1997 - March 2000) monitoring was undertaken at 8 wetland sites (Table 1), with between 9 and 20 dipwells installed in transects across each site. Water table elevation was measured in these dipwells at weekly intervals. The dipwells were also used to measure the hydraulic conductivity of the wetland soils, thereby establishing the rate at which water moves through the wetlands. Rainfall data was obtained from several gauges located throughout the study area. A range of participatory field methods, such as seasonal diagramming, transect walks and Venn diagrams, were also used with groups of farmers in each wetland community, to explore the variations in community wetland management practices and the indigenous hydrological knowledge on which these are based.

**Table 1: The study wetlands and their development stages.**

| Land Use | TYPE –1 (small headwater wetlands) | TYPE –2 (small mid-valley wetlands) |
|---|---|---|
| **Pristine*** | Chebere | Anger (lower) |
| **Partially cultivated** | Wangeneye / Supe | Anger (lower) |
| **Fully cultivated** | Bake Chora | Dizi |
| **Degraded** | Hurumu | Anger (upper) |
| **Regenerating** | Tulube | Anger (upper) |

*Pristine status given to those with natural vegetation and no obvious or recent indications of human influence.

## Water Table Regime

The annual climate of the study area shows two very different seasons, a wet season that occurs from May until September and a dry season for the remainder of the year. This pattern tended to be reflected in the water table data collected, in that water table elevation declined until the onset of the rains during May, after which it increased dramatically, reaching a peak between August and October. Water table fluctuations, however, exhibited clear differences between each study wetland. In particular, water table behaviour in undrained wetlands tended to be less “flashy” or variable, exhibiting a gradual decline until the onset of the rains, followed by a steep rise (Figure 1). In contrast, the water table of those sites undergoing drainage was characterised by considerable weekly variations (Figure 2). It is suggested that this is the result of drainage and drain blocking interventions, which affect the response of the wetlands to rainfall and runoff. In most drained wetlands, the mean water table elevation was 20 cm below the surface of the wetland for most of the three year study period. In undrained wetlands it was above the surface for much of each year.

Analysis of the water table data, using the cluster analysis statistical technique, suggested that the wetlands are composed of a series of specific sub-units, each exhibiting a distinct pattern of hydrological behaviour. It is suggested that these sub-units are characterised by particular land-use histories, drainage regimes and geomorphological characteristics.

**Figure 1: Mean weekly water table elevation in the undrained study wetlands (August 1997 – July 1998).**

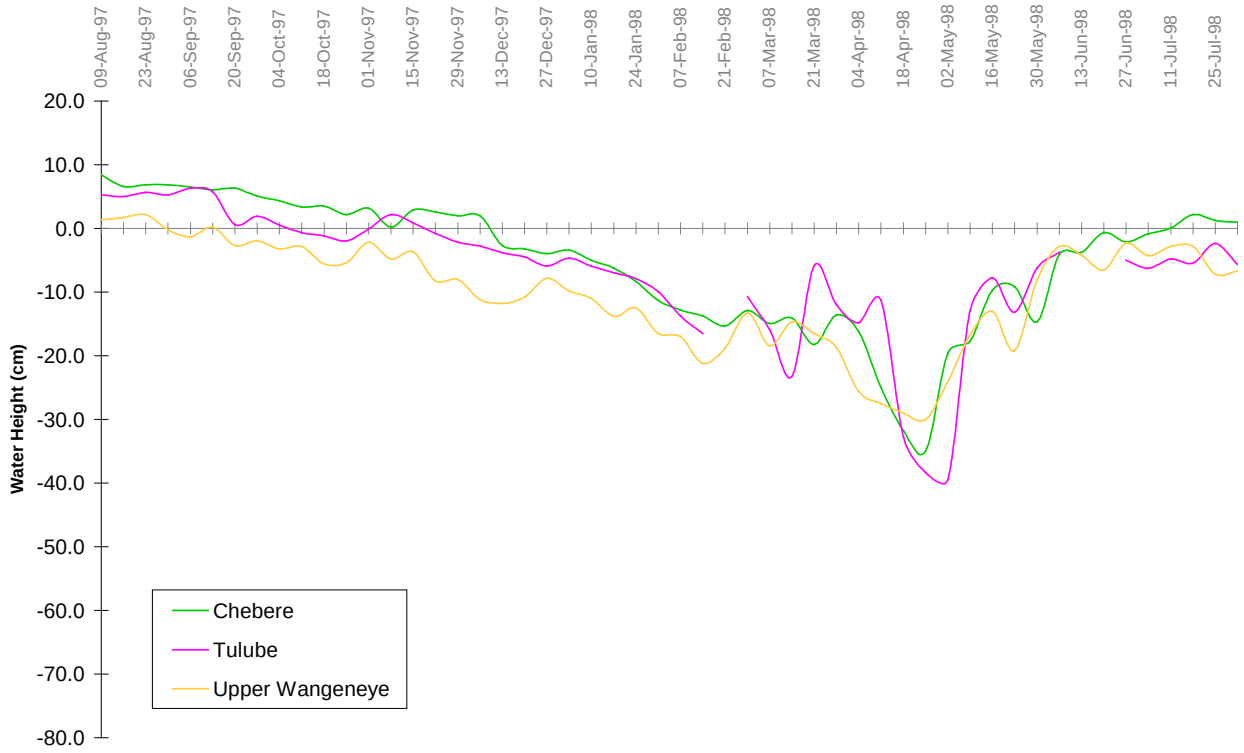
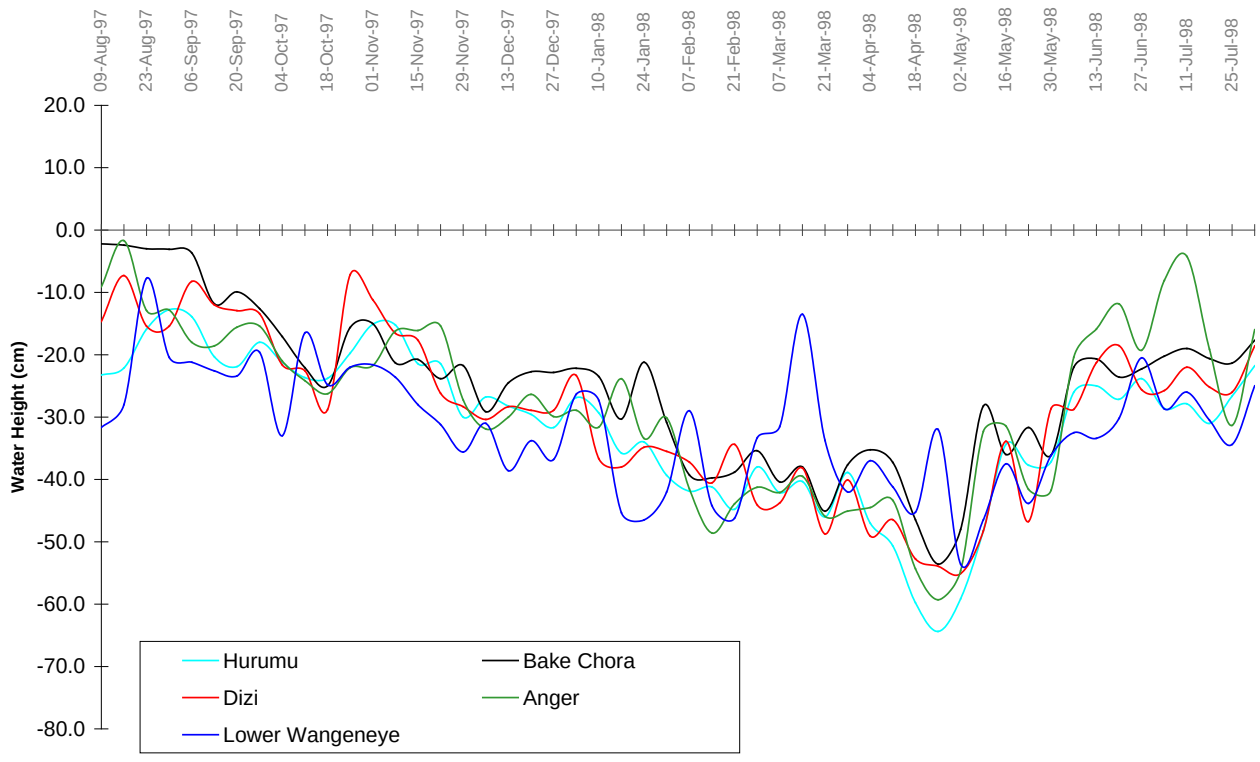



**Figure 2: Mean weekly water table elevation in the drained study wetlands (August 1997 – July 1998).**



## Hydraulic Conductivity

Investigations of the hydraulic conductivity (Ksat) of wetland soils revealed the existence of high Ksat within undrained sites, suggesting that infiltration and transfer rates within the soil are very high. In comparison in those wetlands which have experienced some alteration through drainage and cultivation, the Ksat ranged from very low to high suggesting wide variations in conditions. When *Cyperus latifolius* (known locally as *cheffe*) is found growing naturally or a wetland is in the regeneration phase, high Ksat figures also dominate. In drained wetlands, low and spatially variable $K_{sat}$ is indicative of conditions under which compaction has occurred as a result of oxidation and the loss of organic matter. This is confirmed by higher bulk density figures which also point to physical alteration of the soil structure through the effects of human and animal disturbance.

## Local Hydrological Knowledge and Wetland Management

The management of the wetlands by the farmers is based upon their own knowledge which has accumulated and developed over a long period of time. Participatory Rural Appraisal (PRA) sessions focused on three key themes:

- farmers' perceptions of wetland hydrological processes;
- the practices of wetland utilisation;
- farmers' strategies for wetland management.

Farmers demonstrated extensive knowledge of trends in rainfall and how this affects both the spatial and temporal variation in wetland water table elevations. In addition, farmers also highlighted the various factors which influence wetland hydrological processes, including vegetation, geology and gradient.

Wetland utilisation strategies and the practices on which these are based have developed over many years as farmers' experience has increased. In many cases, the layout and design of drainage ditches are adapted to specific hydrological conditions and are altered during the season in response to rainfall. Many farmers fallow their wetland plots and allow the colonisation of natural vegetation periodically in their plots. These act as local reservoirs of moisture even in the driest periods of the year. Ditch blocking, which facilitates wetland flooding, was identified as an important action for helping restore soil fertility and ensuring water table recharge during the wet season.

Although based on an extensive body of indigenous knowledge, farmers reported several problems associated with wetland use. In particular, wetland crops are often damaged by waterlogged wetland soils. This appears to be a result of the non-adaptation of drainage practices to hydrological conditions. It is suggested that this may be a result of a range of socio-economic and environmental constraints which divert farmers' time and labour away from wetland management. Another key constraint was found to be wild pests, which if not guarded against, can cause the complete loss of a wetland crop. Shortages of oxen were also identified as a limitation on sound wetland management.

## Conclusions

In conclusion, it can be seen that the utilisation of the wetlands for cultivation has had a major impact on their hydrology. Drainage networks have lowered the water table and lead to greater spatial and temporal variations in the water table elevation. This alters the baseflows from these areas. This has major implications for on-site wetland users and downstream beneficiaries.

**Summary Report 2 for Objective 2**

# The Characteristics and Management of Wetland Soils in Metu Wereda, Illubabor Zone

By Belay Tegene & Chris Hunt

This report presents the findings of the study on Illubabor's wetland soils in order to identify the impacts of different types of wetland use. These soils have high potential for agricultural use on account of their high fertility compared to these soils of the surrounding slopes. The constant rejuvenation of the wetland soils is facilitated by runoff from the uplands, which provides a supply of nutrients and organic matter. Wetlands are, however, very fragile ecosystems. Drainage needs to be carried out in a sensitive manner otherwise soil degradation and erosion can occur.

## Research Methods

The soils in six valley head wetlands were studied, while less intensive investigations were carried out on two mid-valley wetlands. Transects were set up within wetlands and the areas surrounding them and the characteristics of the soils at differing landscape positions and land uses assessed. The soil characteristics were noted to a depth of 200cm and at a later date boreholes and geomorphological observations were made. Samples from these boreholes were analysed in the laboratory for particle size, pH and organic carbon. Participatory interviews were also held with local farmers to identify the indigenous knowledge and soil management practices at each locality.

## Soil Formation Context

The wetlands sites are gently sloping to almost flat. The wetland soils are developed on alluvium (river deposits), colluvium (hillwash deposits) and on peats. Only in rare cases are they formed on residuum (weathered material) derived from the bedrock. Colluvium deposits are found at the valley margins as a result of the accumulation of eroded soil. The colluvium is usually clay rich. Alluvium derived soils are located in the centre of the valley bottoms but in some cases can extend across the whole valley floor. This occurs when the colluvium is deposited across the valley floor, but then redistributed by water. The vegetation in the valley will affect the deposition of the sediment as the dense arrangement of sedge stems impedes the flow of water. While there is colluvium continually being washed into many of the wetlands, the colluvium underlying the wetlands is clearly of some antiquity and may well relate to the extensive 19$^{th}$ century cultivation in the area. A common depositional sequence is present in the studied wetlands with an ancient ploughsoil, probably of 19$^{th}$ century origin, at its base overlain by colluvial and alluvial clays. In the less degraded wetlands these grade upwards, near the valley centres, into thick peats. However, extensive peat deposits are rare, being found only across whole wetlands where the water table is continually high and where the sediment flux is low, due to low levels of erosion on the upland slopes or because sediment entering the wetland is intercepted by sedge beds which act as a filters.

It is clear that drainage has a marked impact on wetland soils encouraging erosion and degradation. In some study sites over 2 m of wetland sediment have been lost because of a combination of erosion, gullying and microbial degradation of the peats. While this is happening at the present time in heavily cultivated sites, it appears that this was a common phenomenon over 150 years ago before the Amhara conquest of this area when it appears the regional water table was lower. As a result a model of wetland soil formation, degradation and recovery is proposed based on a cycle of depositional and erosion phases depending on the land use within them and in their catchments.

## Soil Formation and the Characteristics of Wetland Soils

Rainfall exceeds evapo-transpiration from the end of April until end of October. Combined with other information this suggests that wetlands soils under natural conditions are saturated for at least

215 days (7months) per year. The wetlands become saturated not only because of rainfall but also as a result of overland flow from the surrounding slopes and through flow through the ground. The surface flow also transports significant quantities of eroded soil, a portion of which is deposited in the wetland and contributes to soil formation. The soils in the lower parts of the valley bottoms are permanently saturated, although the higher areas of the valley bottoms experience a lower water table during the drier months giving alternating wet and dry periods for the top soil. Where cultivation occurs the dry period for the top soil is extended.

Wetland soils have highly variable depth from less than 60 cm to more than 200cm. These soils generally have distinct A and B horizons, the boundaries between which are usually abrupt and smooth. The A horizon is generally less than 50 cm and underlain by a thick 150cm dark olive brown heavy clay B horizon. The A horizon contains a percentage of organic carbon generally between 2.5 - 4.5%. This compares with less than 1% found within the B horizon.

In cultivated areas some vertic properties are observed suggesting the presence of smectite clay. Cracks open up to 3cm wide and can extend to depths of 60cm. The strong greyish colours found within the B horizon indicate gleying, whilst vertical yellowish mottles indicate root prints where root channels are lined with iron oxide.

The soil structure is a moderate medium to coarse sub-angular blocky structure. These soil profiles are very hard when dry and very firm when wet. Almost all of the wetlands have matrices that are free of stones, whilst being made up of clays, with some considerable amounts of silt being present.

The organic carbon content in the topsoils is between 2.63% and 15%, much higher than in the adjacent slope soils. In those wetlands under *Cyperus latifolius* vegetation, the organic content is higher, whilst those areas under cultivation have a lower organic content as a result of drainage and ploughing.

The pH of the wetland soils was found to range between 3 and 6, with over 70% of the values below 5, indicating very strongly acidic soils. The cation exchange rate varies from 6 to 51 cmol (+)/kg soil), indicating the presence of kaolinite and smectite. Kaolinite has a very low cation exchange rate leading to very unfertile soils.

The wetlands in the Metu area demonstrate the strong influence of hydrology, in terms of wetting and drying cycles. The properties observed in the wetland soils suggest that the predominant units are immature umbic, gleyed and histic fluvisols.

### Indigenous Knowledge of Wetland Soils

The farmers classify soils into two groups:

- shallow soils (less than a cubit) - these are not suitable for cultivation,
- deep soils (greater than a cubit) – suitable for crop cultivation.

Within each of these farmers recognise two major horizons: a dark topsoil and underlying sandy greyish subsoil. The dark topsoil is seem to be capable of holding a high level of moisture and farmers associate the dark colour of the topsoil with fertile soil. Once the lower subsoil is exposed farmers report that crop yields are significantly reduced. Farmers also report that when abandoned from cultivation these subsoils will only support poor growth of the sedges which dominate natural wetlands in this area. Farmers also report that cultivation leads to soil erosion, and reduced soil depth.

### Indigenous Wetland Management Practices

The conversion of wetlands to cultivated areas involves the creation of a shallow drainage network. Once the drainage network is completed, the vegetation is cleared. The vegetation is cut and left to

dry for some weeks before being burnt. The ash, according to farmers, improves the soil fertility. Careful regulation of the water within the wetland is then needed as crops reacts differently to varying hydrological conditions, e.g. maize turns yellow when there is excess water. Efforts are made following sowing to ensure that the seedlings gain the required moisture prior to developing their full root system.

Newly drained wetland soils are invariably rich in organic matter. In time, however, these wetland soils lose their organic matter content, and hence their productivity, as well as other characteristics. At present, farmers usually drain and cultivate only a small proportion of any given wetland. Most of these farmers point out that they use this small-scale cultivation as a security against food shortages that may follow poor upslope harvests. It appears that it may be possible to use these wetland soils sustainably for subsistence cultivation of crops, provided efforts are made to rotate the cultivated area allowing *cheffe* regeneration, and to ensure annual flooding and sediment trapping which can help maintain the soil fertility. It is critically important for the long-term fertility of wetland soils that soil and water conservation are practised in the uplands and that the elements of forest cover are maintained in the hillslopes throughout the region, to maintain the recharge of the regional water table.

## Summary Report 3 for Objective 2

# Plant Biodiversity in the Wetlands of Illubabor Zone

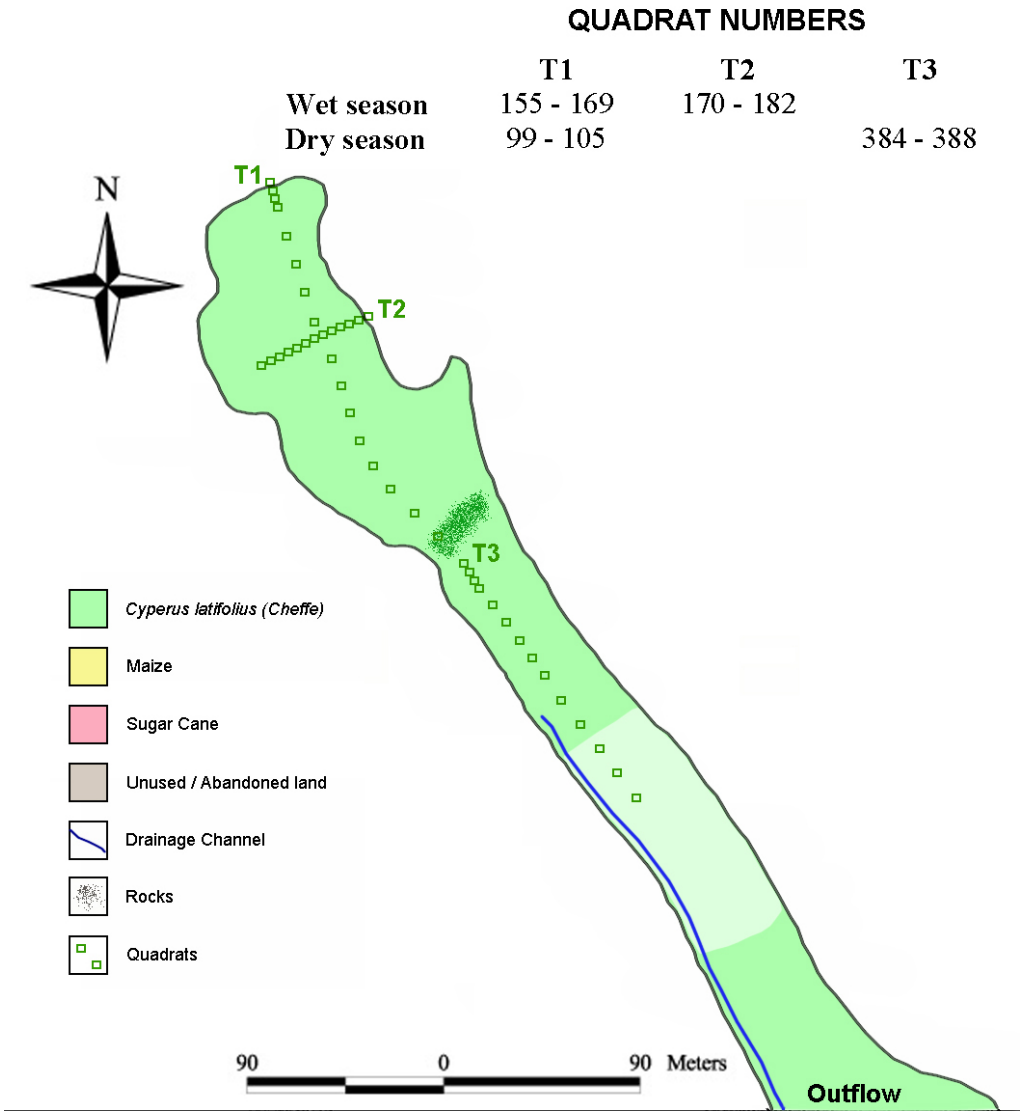
By Zerihun Woldu

This report addresses the impact of wetland drainage on wetland plant biodiversity. Throughout the study, plant communities and species diversity were used as indicators of biodiversity.

## Methodology

Vegetation sampling for this study was conducted between November 1997 and January 1998, at the end of the wet season, and between February 1998 and April 1998, during the dry season. Sampling took place in seven of the core wetlands on the first occasion but at only five of these sites on the second occasion as two of the original sites were under cultivation. Within each wetland sampling was undertaken along transects across those areas demonstrating successional changes or marked environmental gradients (Figure 1).

**Figure 1: A typical sampling transect, shown here at Chebere wetland.**



A total of 19 transects and 185 quadrat samples were placed across the wetlands beginning at the edges and extending towards the middle. In addition biomass sampling was undertaken during the second field season. The clipped vegetation was grouped into species, dried at air temperature and then dried in an oven at 105°C for 48 hours.

The concept of plant communities was used in the analysis. In this study the Branublaquet 1-9 scale was used for data conversion and the programme SYNTAX was used for classification and ordination. Distinct clusters were identified at appropriate hierarchical levels and a Dendrogram was produced indicating the quadrats with associations. The Shannon diversity index was used to compute the diversity of the clusters using the mean cover of species in the clusters as the input matrix.

### Floristics

Floristically, the core study wetlands are dominated by grass (Poaceae) and sedge (Cyperaceae) species, with a few shrub species also present. In total, 89 vascular plants were found. During the end of wet season sampling 72 species of vascular plants belonging to 28 families were recorded in the seven study sites. Forty four species of vascular plants belonging to 22 families were recorded from the five study sites during the dry season. On both occasions the plants were dominated by Cyperaceae and Poaceae. An increase in species was found to occur with the level of wetland disturbance, this mainly leading to the invasion of plants requiring drier conditions.

### Plant Communities

Six clusters, representing six plant communities, or assemblages, were recognised at the higher hierarchical levels in both the wet and dry seasons. The communities were named after the dominant or characteristic species. A dominant species is defined as a species with a mean cover value of 30% in the community type, and a characteristic species is a species present in the community but absent in most of the other types.

The communities of plants found at the end of the wet season in the seven core wetland sites were as follows:

1. *Snowdenia petitiana-Guizotia scarba* - only occurs in Dizi.
2. *Cyperus latifolius-Panicum hymeniochilum* - most abundant community type in the wetlands studied.
3. *Leersia hexandra-Panicum hymeniochilum* - only occurs, and is dominant in, Chebere.
4. *Cyperus latifolius-Thelypteris confluens* - occurs in Chebere, the near pristine site.
5. *Hygrophila auriculata-Digitaria ternata* - occurs in a fully cultivated site, Bake Chora.
6. *Cyperus brevifolius-Fuirena stricta* - occurs in submerged part of the vegetation in Hurumu, the degraded also in Bake Chora and Wangenye

The dry season plant communities were:

1. *Cyperus latifolius-Schenoplectus corymbosus* - occurs in Hurumu
2. *Anagallis serpens-Leersia hexandra* - occurs in Hurumu
3. *Cyperus latifolius-Pancum hymeniochilum* - occurs in Wangenye, Anger and Tulube
4. *Leersia hexandra-Thelypteris confluens* - occurs in Chebere
5. *Cyperus latifolius-Asechynomene abyssinica* - occurs in Wangenye
6. *Commelina diffusa-Pennisetum thunbergii* - occurs in Bake Chora

In order for similarities and differences to be identified between the study sites in the two seasons, the data was subjected to classification by average linkage clustering. The resulting dendrogram indicated two clear groups; the first consisted of Dizi, Wangeneye, and Anger during the wet season and Chebere from both the wet and dry seasons. The second group consisted of the wetlands of

Wangenye and Anger in the dry season, Bake Chora from the wet season and Tulube and Hurumu in both seasons. The reasons for this aggregation may be sought in the history of the wetlands as well as their present management conditions. The results suggest that the partially cultivated wetlands and mid valley wetlands, that experience heavy flooding during the wet season, have plant compositions similar to pristine wetlands by the end of the wet season. Only the pristine wetland retains this plant community into the dry season.

Diversity and evenness analysis were undertaken in terms of community type. This showed that during the wet season Dizi wetland is the most diverse wetland and has the most even distribution of species, whilst Chebere wetland is the least diverse and has a less even distribution of species. Chebere is a relatively small pristine head valley wetland, whilst Dizi is the most altered site, being fully cultivated, and has a range of habitat conditions. In general, the results show that the cultivated and abandoned wetlands have higher diversity than the non-cultivated wetlands.

### Species Biodiversity

All the plants collected from the studied wetlands were classified into wetland plants and non-wetland plants based upon their tolerance to water. The wetland plants were classified into wetland dependant and wetland associate plants. The wetland dependant plants accounted for 31% of the total plants identified, wetland associated plants for 60%, and 8.2% of the plants were non-wetland associated species. The non-wetland plants are indicative of the changes taking place as a result of drainage and cultivation.

Bake Chora and Wangenye wetlands were found to have the highest biodiversity value, whilst Chebere had the lowest value. Bake Chora also had the highest score for the combination of the wetland dependant and wetland associated plants, while Chebere the pristine site had the lowest. The wetland of Dizi has been drained and fully cultivated and this will account for the limited number of wetland dependant plants. The wetland of Chebere supports little diversity in terms of wetland plants and wetland associated plants, probably on account of its climax swamp community.

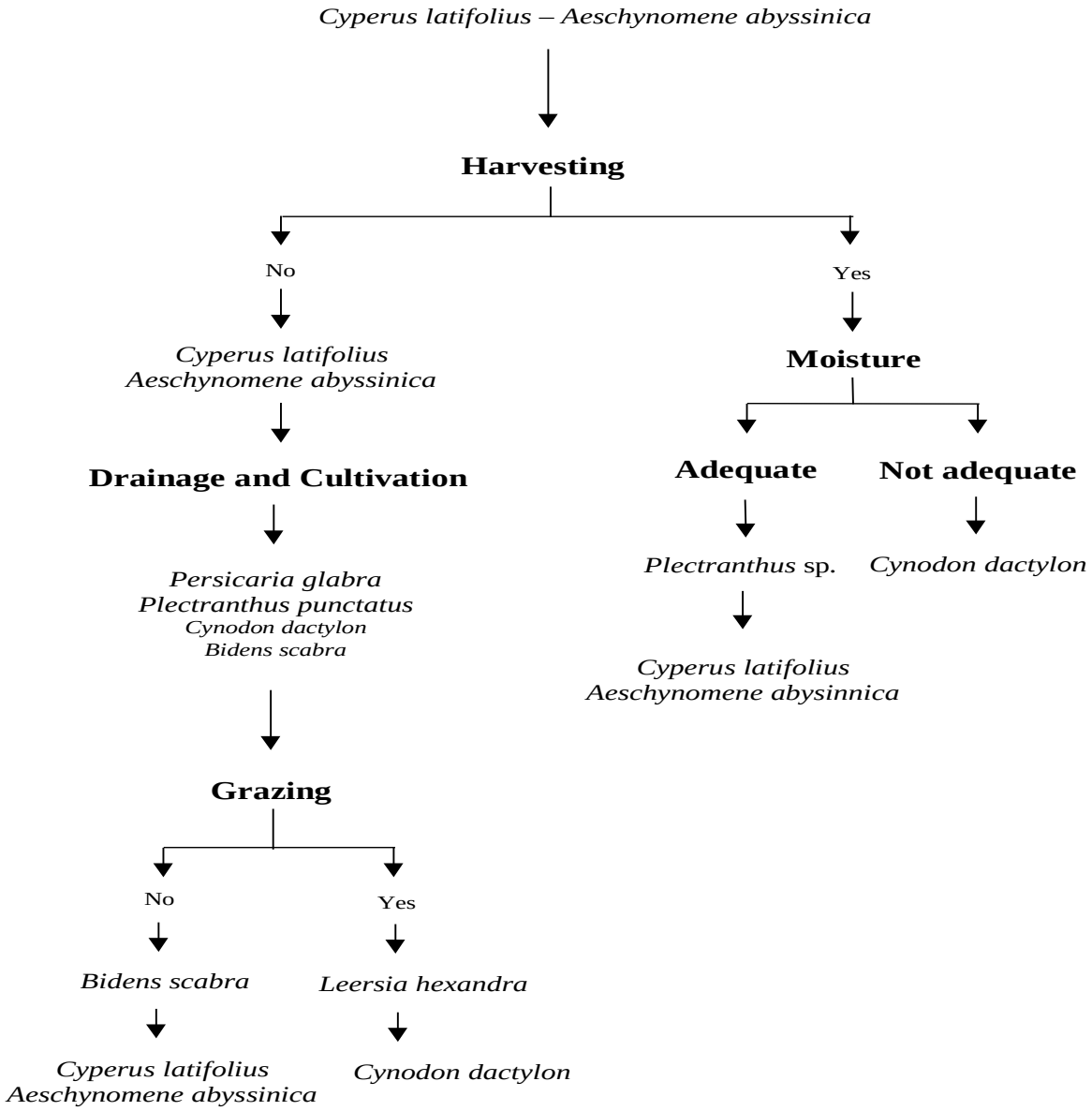
### Wetland Use and Biodiversity

In relatively pristine wetlands, various wetland dependant plants that require a high water table are dominant. Where wetlands are used for cultivation, the habitat conditions have been altered and this influences the plant species composition leading to progressive changes (Figure 2) with varying possibilities for regeneration of the original conditions. While changes in habitat lead to an increase in the diversity of plants in total, this involves a reduction in the diversity of wetland plant species, replacing them with more common meadow grass and weeds. As a result many of the more useful and valued plants which grow in wetland conditions disappear. In particular, as drainage and grazing occurs many of the plants used for medicinal purposes are lost.

While plant diversity in wetlands often increases with human interference, this may only be a temporary feature as the experience at Dizi wetland shows. The complete transformation of wetlands for cultivation may lead to reduced plant biodiversity if uniform conditions are created and the ecotone from wetlands to drained land is lost.

The relatively low biodiversity of the near pristine site, Chebere, should not be allowed to hide the fact that there are a number of species, mostly wetland associated plants, are only found at this site. Hence the loss of pristine and near pristine sites, such as Chebere, although of low biodiversity, would most probably lead to the loss of some of these species from the region.

**Figure 2: Scheme of development of plant communities after drainage and grazing.**




## Conclusions

In conclusion, it can be proposed that there should be less of an emphasis on protection of biodiversity per se and more attention should instead be given to conserving the biodiversity which is of value to communities or which is dependent upon specific conditions, such as undisturbed wetlands. The aim, therefore, should be to reduce conversion of wetlands that brings about any loss in biodiversity.

**Summary Report 1 for Objective 3**

# Socio-economic Determinants of Wetland Use in the Metu and Yayu-Hurumu Weredas of Illubabor

By Solomon Mulugeta, Patrick Abbot, Tegene Sishaw and Afework Hailu

Part of the third objective of the project was to identify the demographic and socio-economic factors that influence farmer decision making in the use of wetlands. Both quantitative and qualitative methods were employed to collect data in Metu and Yayu-Hurumu weredas of the Illubabor Zone between April 1997 and September 1999. A questionnaire survey was undertaken among farming households in six of the sites selected for environmental monitoring and from this, key informants were identified and invited to take part in in-depth interviews. In total, 957 households were surveyed. The data were analysed using the SPSS statistical package and discriminant analysis. In addition Participatory Rural Appraisal (PRA) techniques were also used with groups of wetland users over a two and a half year period, with techniques such as resource mapping, wealth ranking and transect walks employed.

## Population Dynamics

Illubabor Zone, including Metu and Yayu-Hurumu weredas, is inhabited by rural dwellers who account for approximately 91% of the total population. Ethnically the overwhelming majority of people in the communities studied were Oromos. In terms of religion, some kebeles were predominantly Muslim, others Christian, whilst most were composed of a mixture of Orthodox Christians, Muslims and evangelical Christians.

More than 80% of the heads of the households surveyed were married, and up to 10% of the household heads in Kemisse Kebele, which is predominantly Muslim, had more than one wife. The average household size varied between 4.8 and 6.2 persons. Nearly two thirds of the heads of households interviewed were found to be literate. This is partially due to the nation-wide literacy campaign launched by the Derg government during the late 1970s and 1980s. Approximately 15% of respondents reached had reached grade seven or above and some have finished high school.

The birth rate in the communities studied was above the national average at 50/1000 and the death rate at 15/1000 was below the national average. The age-sex structure shows that 47% of the population was below 15 and only 6% above 65. Considerable migration occurs in this area with 3.4% of the interviewees having arrived during the 12 months preceding the survey and 2.6% of the population reported to have left their communities in the same period.

## Economic Activities

Over 90% of the rural population surveyed depend on farming for their survival. Table 1 shows the occupational structure of Kemisse.

**Table 1: Occupational structure of Kemisse Kebele.**

| Occupation | Number | % of total |
|---|---|---|
| Farming | 180 | 68.7 |
| Trading | 5 | 1.9 |
| Farming and trading | 43 | 16.4 |
| Daily labour | 15 | 5.7 |
| Trading and daily labour | 2 | 0.8 |
| Farming and daily labour | 16 | 6.1 |
| Live on the help of others | 1 | 0.4 |
| **Total** | **262** | **100** |

Approximately 15% of the respondents surveyed also had secondary occupations (Table 2).

**Table 2: Secondary occupations.**

| Occupation type | Number | Percentage |
|---|---|---|
| None | 592 | 85.2 |
| Mat/ basket making | 28 | 4.0 |
| Woodworker | 25 | 3.6 |
| Bee hives | 13 | 1.9 |
| Blacksmith | 7 | 1.0 |
| **Totals** | **665** | **95.7** |

Agricultural land holdings average between 0.9 ha and 1.4 ha per households (Table 3). These are small despite the extensive areas of forest remaining in the lands belonging to many of the communities studied. On average one hectare of farmed land supports between 6 and 12 persons, depending on the community. Cultivation is by oxen and 73% of farmers report using manuring to fertilise fields, although 44% of households do not have oxen. Only 6% of the upslope cereal crop (primarily maize) is sold compared to 21% of the wetland crops of maize, tef and vegetables. Coffee is the most important cash crop and provides the major source of cash income.

**Table 3: Land use and the importance of wetlands.**

| Principle land use | Kemisse | | Dizi, Geba, Kawo & Chatu, Tulube | |
|---|---|---|---|---|
| | Mean Area (ha) | Median Area (ha) | Mean Area (ha) | Median Area (ha) |
| Upslope cereals | 0.47 | 0.44 | 0.76 | 0.63 |
| Coffee | 0.30 | 0.25 | 0.35 | 0.25 |
| Wetland crops | 0.14 | 0.13 | 0.35 | 0.25 |

## Food Security

Between 40% and 70% of the households interviewed reported facing a food shortage in the year preceding the survey. In general, these households had faced food shortages for at least three of the preceding twelve months. Table 4 shows the immediate coping strategies used for addressing food shortage. Wetland cultivation is relatively unimportant in this respect because of the time needed for preparing the land, although it is widely used as a long term strategic solution to repeated food insecurity.

**Table 4: Food shortage coping strategies.**

| Strategy | Number reporting | % of total |
|---|---|---|
| None | 323 | 46.5 |
| Save food | 178 | 25.6 |
| Borrow money from family | 30 | 4.3 |
| Borrow money from others | 45 | 6.5 |
| Borrow crop from family | 7 | 1.0 |
| Borrow crop from others | 5 | 0.7 |
| Selling farm products | 17 | 2.4 |
| Selling farming materials | 22 | 3.2 |
| Daily labour in kind | 13 | 1.9 |
| Daily labour in town | 22 | 3.2 |
| Daily labour in cash | 12 | 1.7 |
| Selling hand crafted products | 1 | 0.1 |
| Cultivating wetland | 2 | 0.3 |
| Other | 11 | 1.6 |
| Not stated | 7 | 1.0 |
| **Total** | **695** | **100** |

## Socio-Economic Differentiation of Households

A wealth ranking exercise was performed at a number of the core wetland sites, using a proportional piling method, to identify the relative importance of rich, medium, poor or very poor households. The key indicators of these different categories were then explored. These were found to include:

- Ability to be food self-sufficient,
- the growing of coffee,
- ability to employ labourers, and
- ownership of oxen,
- the amount of land used,
- the materials used for building.

Several of these have implications for wetland cultivation.

## Wetland Stakeholder Analysis

Wetland stakeholders were defined as a person, group or institution that is dependent (partly or wholly) upon a wetland function, the use of wetlands, or wetland products. Stakeholders at the wetland level were identified as belonging to one of a number of non-exclusive groups: livestock owner/herder; wetland cultivator; reed collector; water collector; palm collector, minor plant collector. In addition, other groups, such as coffee traders and palm product makers, who have no direct contact with wetland resources but nevertheless rely indirectly upon benefits from wetlands, were also identified as stakeholders. It was recognised that the Ethiopian government itself is a key stakeholder.

## Purpose of Wetland Use

The primary use of wetlands is to provide reeds for roofing material, with the provision of materials for the construction of granaries the second most important use. Wetland cultivation was identified as the third most important wetland use. Of the household heads interviewed 80% were interested in wetland cultivation, 71% had cultivated wetlands at least once, and 30% were still cultivating wetlands. Of the latter group 43% said they undertook this cultivation for the purpose of food security.

## Characteristics of Wetland Farmers

Wetland cultivation is limited by a number of socio-economic consideration. Access rights to wetland is a key consideration because, despite land reform and land redistribution, not all households have access to such land. Access to oxen and labour are also important as wetland cultivation is a heavy task. Shortage of labour for crop guarding combined with depradations from wild animals had led many farmers to abandon wetland cultivation. In addition, problems of farmer co-ordination were also identified as reasons for halting wetland cultivation.

Discriminant analysis of the survey data showed that those who had cultivated wetlands tended to be more prosperous, have above average land holdings, own more oxen and implements than the norm, and be of a more commercial orientation in their activities. However, those still cultivating wetlands were somewhat less wealthy, younger and with smaller upslope arable holdings than the richest. Thus it appears that wetland cultivation may be a route to wealth, but is given up by farmers as they become older and can achieve food security from other sources. Older farmers with smaller households may also face labour shortages.

## Farmers' Perceptions of Wetland Cultivators

The survey data analysis was confirmed by the PRA work which showed that those involved in wetland cultivation were generally perceived by community members to be those economically better-off. The relationship between wealth and wetland use is, however, complex with the PRA data suggesting that the most wealthy farmers have little interest in cultivating wetlands as they have no need for additional food production. If they do have access to wetland areas, they are more likely to set up sharecropping arrangements with poorer farmers who will cultivate this land.

## Conclusions

The cultivation of wetlands is an important way of addressing food security problems for many farmers in Illubabor Zone. With increasing population pressure and the growth of coffee cultivation on the uplands, wetlands have become an important source of food and income for the wealthier members of the community who possess the labour and resources to cultivate them. Some of the poorest members of the community who are landless also benefit either through sharecropping of wetlands or from employment as labourers involved in wetland drainage and cultivation. Most farmers, however, regard the natural functions and benefits of wetlands, especially the provision of reeds, as ultimately more important than their agricultural potential, and this may offer some explanation for the still relatively small proportion of wetlands (32%) under cultivation in central Illubabor at the present time.

**Summary Report 2 for Objective 3**

# Community Organisation for Natural Resource Management and the Potential for Community-based Wetland Management

By Patrick Abbot, Afework Hailu and Adrian Wood

Part of the third objective was to analyse the ways in which community organisations and government policies affect wetland management. This report identifies the different organisations found at the community level in the study area and explores their potential for supporting sustainable wetland management. The methodologies used in this work included participatory techniques such as Venn diagramming to identify the influences of the different institutions and to indicate the type and degree of linkage between them. Group discussions were held in each site with between five and 15 participants, in conjunction with historical analysis and institutional ranking exercises.

## Decision Making Levels in Wetland Management

Four main decision-making levels for wetland management were identified:

1. **the household level:** At this level decisions are made to cultivate a certain crop in the wetland, or not to cultivate at all in a particular season. The decision to cultivate a wetland is based on the cost and availability of alternative sources of produce, i.e. wetlands will be cultivated if labour exists, land is available and wetland cultivation is more economical than upslope cultivation or the purchase of food. If, however, wetland cultivation compromises the capacity of wetlands to maintain water supplies and natural products, cultivation may cease.
2. **the community level:** This can be a geographically defined community, such as a catchment, or a political group such as a Shennie. This is where decisions are made to manage a wetland and determine the pattern of land use within it using locally created by-laws.
3. **the Kebele level:** This lowest official government institutional level and the whole country is divided into kebele areas. This is where decisions are made about wetlands in the kebele area in general, including the reservation of certain wetlands for reed extraction or grazing and the granting of permission for cultivation in others.
4. **higher levels:** These levels, which are external to the community, include the regional and central government. At these levels policies are made concerning a range of issues which may impact on wetland use (see Report for Objective 6). These include the need for food security and wildlife preservation which both impact on wetland use.

## Community Institutions

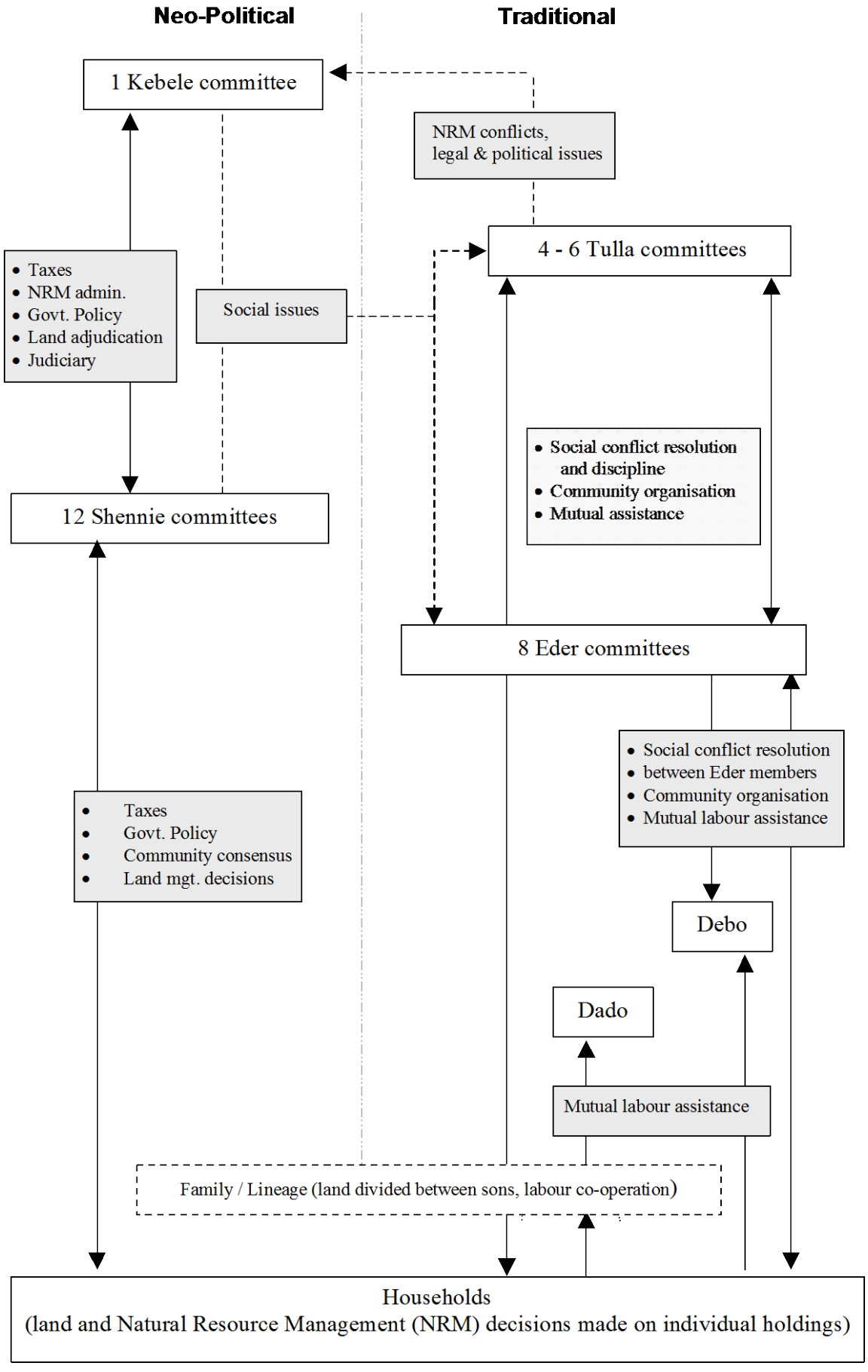
Figure 1 shows the links between the range of existing community institutions. Among these, three reciprocal labour institutions were identified during the course of the research:

- ***Dado***, where a group of householders work for each other in turn. The household being assisted is expected to provide food and/or drink to the workers, the wealthier the household the more payment is expected.
- ***Debo***, where the poorer households often work for the wealthier for food. *Debo* may have up to thirty members and is used for large-scale work.
- ***Jige***, which in some cases is used interchangeably with *debo*, but usually represents a grouping between *dado* and *debo*.

These institutions are important for wetland agriculture as they affect the way in which labour can be mobilised for the heavy tasks of ditch digging when a wetland is first cultivated.

In addition, a number of socio-cultural / traditional institutions, which have evolved from the *Gadda* system of the Oromo people, can still be found today:

**Figure 1: Operational structure of community-based institutions.**



- ***Eder*** usually consists of around fifty households. The *Eder* deals with problems such as taking sick people to hospital, and cooking for people who participate in funerals of *Eder* members.
- ***Tulla*** usually consists of around a hundred to a hundred and twenty household members formed from villages that are close to each other. Members are elected and dismissed by their constituents. Among other things, the *tulla* is responsible for investigating misdemeanours, dispute resolution, organising *debo* activities, and implementing penalties for minor offences

These institutions provide mechanisms through which information about wetland management may be transferred and decisions made about wetland use. Whilst these traditional institutions are not recognised by the current government structures, most farmers suggested that they retained greater respect from the people than the neo-political ones (see below).

- ***Wetland Management Co-ordinating Committee (WMCC).*** In one wereda, the research found that a Wetland Management Co-ordinating Committee had been established. This had developed from the traditional Oromo *Abba Laga* institution which after the Oromo settlement in this area managed the water resources for each community. Today the WMCC is responsible for ensuring wetland management is carried out in an efficient, environmentally sensitive and sustainable manner.

Two neo-political institutions influence wetland management less directly :

- The ***Shennie***, which was once a traditional institution, has now been incorporated into the government administrative structure. There are usually between ten and thirteen shennies in a Kebele and they have a direct relation with the Kebele administration. The community elects the shennie members but the Kebele administrators can dismiss them. This is the lowest level institution through which the government can influence land use.
- The ***Kebele*** administrative unit makes decisions on natural resource management, land use and land access arrangements. The committee administers the allocation of wetlands for particular uses, but this such decisions are also based on community wishes, as well as being based on the policies and decision of the wereda administrations.

### Government Institutions and Policies

A number of individual government policies were identified which affect wetland use. These include policies relating to land tenure, natural resource management, taxation and food security. It was clear that many current and past policies have hampered sustainable wetland management, and in some cases have led to conflicts between community interests and government imperatives. (See Report for Objective 6 for further details).

One cause of this situation is that government policies tend to be implemented by setting targets and following narrow technocratic approaches. The state frequently takes a myopic view, seeing one objective as dominant, with the result that policies and measures are developed without consideration of their context, including the wider natural resource situation. In addition, state policies are often formulated without consultation with the population they are designed to benefit, with the result that goals and objectives are either unclear or inappropriate. Further, the field experiences of the project suggest that when implementing policies a ridged central government led system is inappropriate. What is needed is a decision-making system that reflects the micro-environment specificity of the wetland situations and resource situations of households.

It is also clear that policy making must become more sensitive to the need for sustainable wetland management. In order to create more sensitive policies, both the government, and the communities, must be made aware of the issues that affect the production of policies and ensure that they support sustainable use. Several key areas need be addressed by the government and local communities. The main points are that the government should:

- recognise the nature and dynamics of wetlands as entities which require particular attention,
- acknowledge local knowledge of wetlands and consider this when developing policies,
- undertake strategic environmental impact assessments of policies, and
- recognise the importance of the long-term sustainable use goals of local people and give these goals due attention when developing policies for short-term production-orientated national development needs.

Conversely the wetland communities should:

- understand their rights to wetlands, and take responsibility for the way wetlands are managed,
- be involved in debates with the government over wetland use,
- ensure that their local knowledge is identified and used in the debates with government, and
- ensure that their various uses of wetlands and their goals for these areas are recognised.

### Principles for Community-Based Management

Three essential elements are needed to achieve sustainable wetland management:

- local communities must have control over their wetlands,
- government policies must be sensitive to wetland dynamics and conditions, and
- there must be comprehensive stakeholder involvement.

In order to achieve effective natural resource management the local community will require an organisation that:

- is small in its constituency (and so close to the people and their environment),
- can provide technical guidance and support operational management,
- is able to adapt policies to suit the local, social and natural environments,
- will invoke policies that are culturally understandable and flexible enough to accommodate the community's social differences,
- is free from control by an elite or a single stakeholder group,
- promotes equitable benefit sharing,
- incorporates gender-related needs,
- is transparent and democratic,
- has the trust and respect of the community,
- is able to enforce management decisions.

### Steps Towards Community-Based Management

The research findings suggest that a change in government attitudes towards communities and their institutions is needed in order to achieve sustainable wetland management through community-based organisations. One key problem to overcome is the way many traditional institutions have had their role and authority usurped by the neo-political institutions.

At the community level two possible solutions can be proposed, either developing a new wetland institution or to strengthening an existing one, such as the WMCC. It is suggested that this community level institution should, however, be expanded to embrace catchment land uses and processes. Hence its role could include:

- raising awareness of the need for sustainable use of wetlands and the risks of degradation,
- negotiating with all wetland users, including people in the catchment and downstream, to achieve appropriate land use in the wetlands,
- co-ordinating and managing wetland use to ensure the most efficient and sustainable use of those areas, and
- negotiating and implementing, with catchment land users, appropriate land use in the catchment to help ensure the sustainability of the wetland.

## Developing a Management Plan

Three basic steps were identified in preparing a wetland management plan. These are:

1. Status Review - which involves examining the environmental, social, economic, cultural and organisational contexts in which the plan will have to operate,
2. Objective Setting - identifying the goals sought through wetland management, and identifying the requirements or objectives of the plan,
3. Action Identification, which involves identifying the actions required to achieve these objectives.

Such wetland management plans should be created by the wetland user community through a participatory planning process which identifies the needs of the various households in the area the management plan will affect. This would also include an examination of the different wetland stakeholders and their needs.

An assessment of the ecological condition of the wetland itself is required to ascertain its ability to meet various demands proposed for it. The supply and demand for the various products from the wetland can then be used in order to gauge sustainability. The resources and resource use of the whole Kebele needs to be examined as certain wetlands may be given over to a specific purpose in order to optimise the use of the wetlands overall. Once these assessments have been considered the objectives of the management plan need to be identified, and how these objectives can be achieved should be identified. The plans should also be considered in the light of the overall resource demand and supply, and the government priorities and strategies.

## Conclusions

Wetlands should be managed by the community of users, and should not be dominated by state instructions imposed from above. The formation of Wetland and Catchment Management Co-ordinating Committees (WCMCCs) will facilitate the community management of wetlands. Sustainable wetland management will only be achieved if negotiations and two-way relationships are established between the government and wetland communities, with WCMCCs representing the long-term sustainable use interests of the rural communities.

**Summary Report for Objective 4**

# Appropriate Techniques for Sustainable Wetland Management

By Afework Hailu, Patrick Abbot & Adrian Wood,
with contributions from Alan Dixon, Belay Tegene & Zerihun Woldu

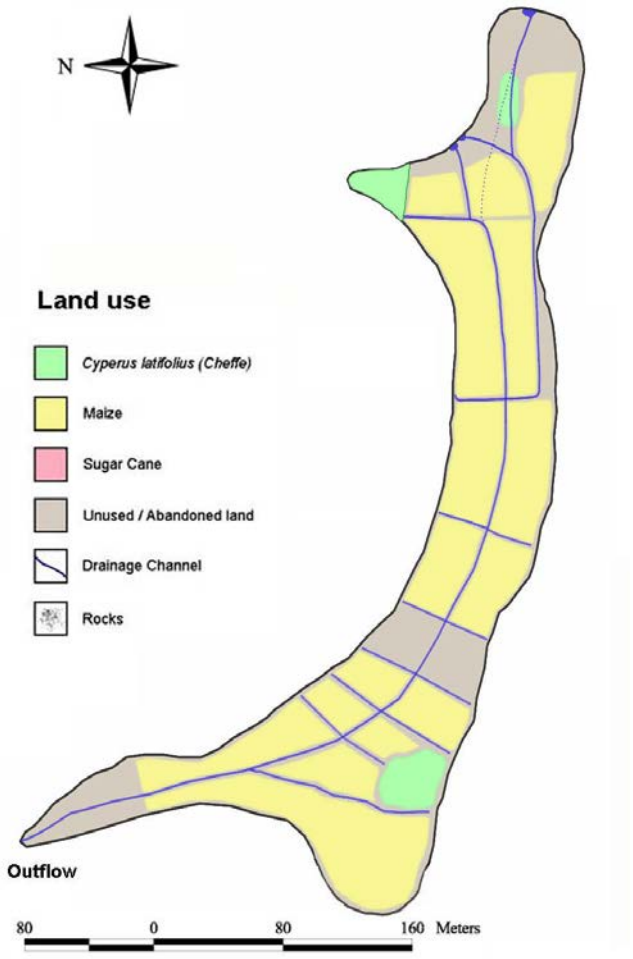
Objective Four required the identification of appropriate techniques for sustainable wetland management. This was sought through the recording and analysing the varying histories of management in a range of different wetland sites, as well as through the in-depth discussions in the eight study sites. From these discussions and case studies, a range of examples of practices which support sustainable wetland management were identified, as well as ones which lead to wetland degradation. Particularly important for acquiring the data for this report was the use of participatory rural appraisal (PRA) tools such as transect walks and semi-structured interviews, as well as key informant interviews.

## Case Studies of Sustainable Wetland Management

Four case studies were carried out at wetlands with signs of sustainable management. These were:

- **Bake Chora** – cultivated as part of multiple use regime for 80 years. The site benefits from forested catchment, areas of *cheffe* at the head of the wetland, control of grazing and rotational fallowing of plots (Figure 1).

**Figure 1: Bake Chora - a sustainable, multiple-use wetland.**



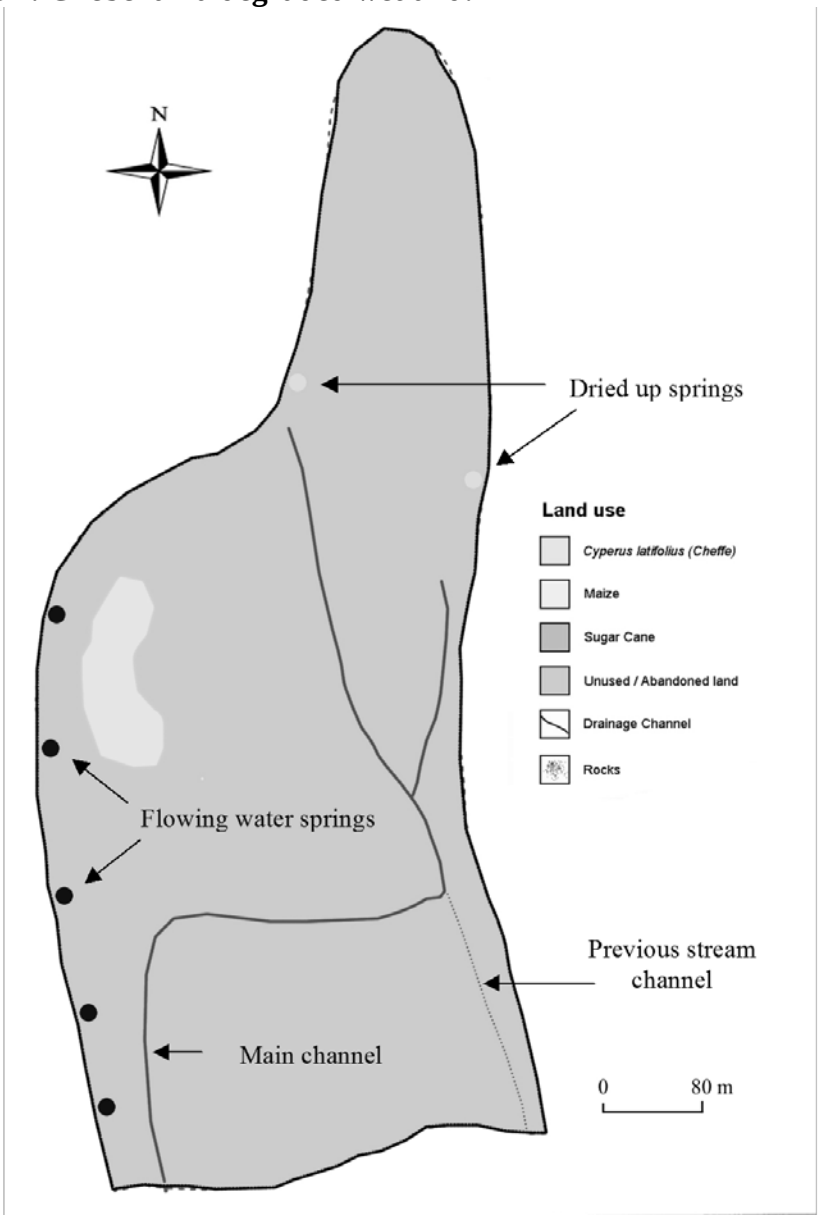
- **Supe** – has been used for cultivation, as well as other uses, over the last 40 years. It has a number of different land uses due to the community's recognition that multiple wetland use sustains a wide range of benefits for them. Cattle grazing is controlled and an experiment with sugar cane cultivation has recently been stopped due to its impact on water availability.
- **Dire -** under partial cultivation for 40 years. There is good co-operation between farmers and well adapted hydrological control strategies such as ditch blocking and annual flooding. No grazing is allowed.
- **Mene** – under partial cultivation for 40-50 years with no apparent decline in crop yields, good farmer co-operation and stable hydrological regime due to maintenance of swamp area at the head of wetland and annual flooding.

## Case Studies of Wetland Degradation

Three case studies were carried out at wetlands suffering from poor management. These were:

- **Chebeka** – a wetland which has been over-drained following 60 years of cultivation and other uses. Poor co-ordination amongst the farmers led to a failure to develop regimes for fallowing or flooding to maintain wetland characteristics. The former wetland is now used only for grazing and is suffering further degradation (Figure 2).

**Figure 2: Chebeka - a degraded wetland.**



- **Hurumu** – after 20 years of cultivation this site was abandoned by the local community. Accessibility led to it being chosen as a demonstration site by an international NGO but it was quickly over-drained and abandoned for grazing use.
- **Soma** – subject to over-draining with deep channels not adjusted to the varying (declining) water table as the deforestation of the catchment. This former wetland is now subject to heavy grazing which prevents regeneration.

### Case Studies of Wetlands under Threat of Degradation

Two case studies were undertaken at wetlands which were currently regarded as being under threat from degradation:

- **Meko -** a recently cultivated wetland (started in 1989) with fertile peat soils which are used for double cropping of vegetables and maize. It has started to suffer from declining agricultural productivity because of intensive use, and there are dangers of soil damage through the burning of crop residues and prolonged drainage.
- **Bulgea -** under partial maize cultivation for 40 years but threatened by increased intensity of use with double cropping of *teff* before the maize cultivation. The prolonged drainage period and intensive cultivation could lead to hydrological problems and soil fertility loss.

### Case Studies of Wetlands Undergoing Rehabilitation

Wetlands which have undergone different rehabilitation experiences were also studied in five cases. These were:

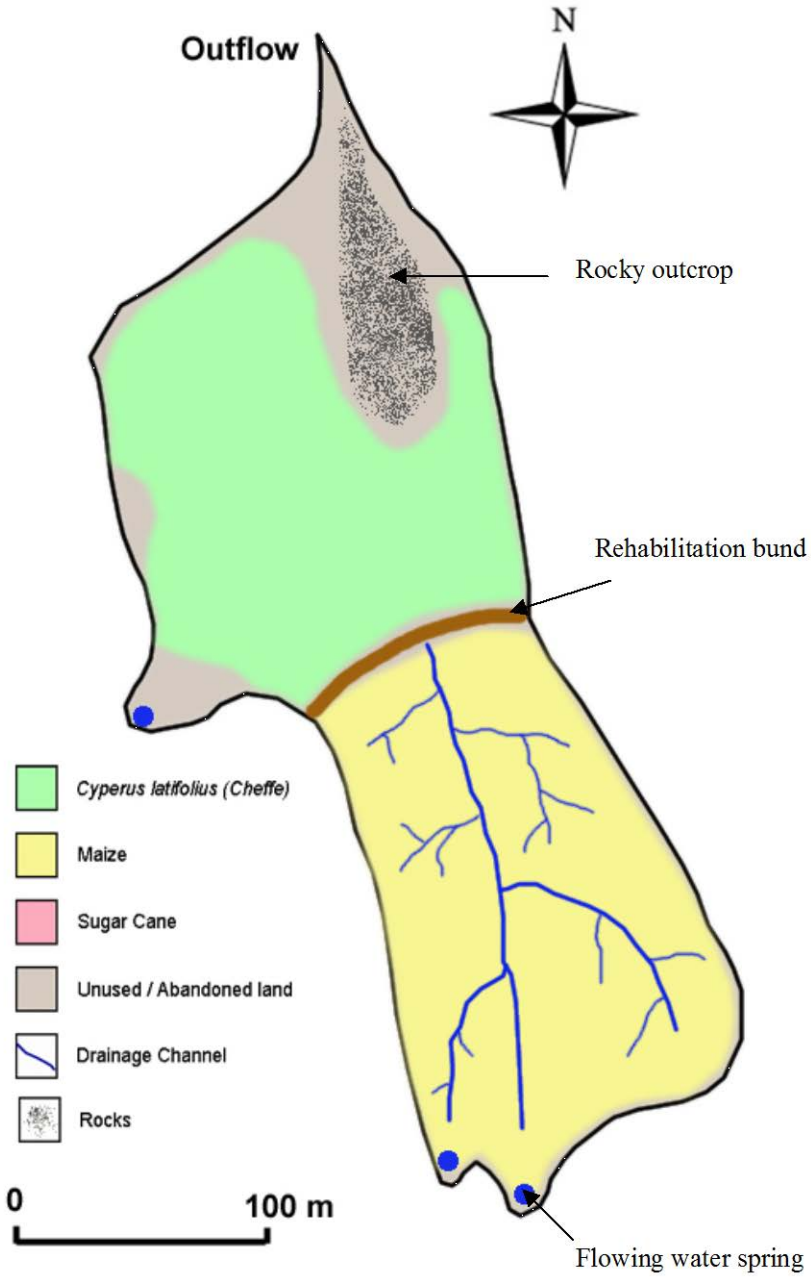
- **Chebere** - an example of rapid and successful natural regeneration, possibly due to its geomorphological characteristics which creates a narrow outlet and so has facilitated a rapid return to waterlogged conditions after cultivation was abandoned. Apparently natural, near climax conditions were re-established after only six years.
- **Tulube** – a situation where natural regeneration has been prevented even after 10 years of abandonment because of intensive grazing and associated soil compaction.
- **Goma Gabriel** – a wetland which was intensively cultivated for eight years due to the resettlement of famine victims from the north. An international NGO assisted the settlers and supported intensive agriculture, but decided rehabilitation measures were necessary after crop yields fell and farmers lost interest in cultivating the wetland. Bunds were used to try to encourage the return of wetland conditions and terracing of the catchment was undertaken. There is some evidence of rehabilitation after only two years.
- **Bishan Gore** - where an NGO initiated partial rehabilitation measures after reports of declining crop yields, the aim being to maintain the water level in the upper part of the wetland to permit dry season cultivation in that area (Figure 3),
- **Inago** - which was abandoned after 23 years of cultivation, and immediately following a three year period of intensive vegetable growing in part of the wetland which altered the hydrological regime and led to declining productivity. Control of grazing and the end of drainage have led to some natural regeneration, although dry season cattle use is slowing the process.

### Practices Leading to Sustainable Wetland Use

From these case studies, and also discussions with farmers, NGO staff and government experts, it was possible to draw conclusions concerning key practices which affect the sustainable use of wetlands. The most important of these are:

- **Reducing the spatial and temporal extent of non-natural land use in wetlands:** Having a number of different land uses within a wetland and rotating them to reduce the environmental pressures caused by spatially or temporally extensive drainage and non-natural use in a wetland. Prolonged drainage and cultivation, such as with double cropping, in any one year should also be avoided.

**Figure 3: Bishan Gore - a wetland undergoing partial rehabilitation to sustain cultivation.**




- **Maintaining flooding and water storage:** Wetlands should be flooded annually to maintain the natural hydrological regime. This is also important for assisting the decomposition of plant materials and for sediment trapping, both of which help maintain soil fertility. Flooding also helps the natural vegetation continue to maintain itself. Water storage is facilitated where wetland vegetation is protected at the head and outlet of the wetland.
- **Control of grazing:** This should be limited to the dry season, and if possible prevented, in all wetlands, especially those under cultivation. Soil compaction by cattle is a major cause of wetland degradation.
- **Soil management:** Crop residues should be allowed to decompose to maintain soil fertility and structure. Burning of these residues should be avoided despite the benefits of ash for crop growth.
- **Wetland selection for uses:** Wetland with shallow soils should not be drained and cultivated. Nor should ones with grey or red soils. Deep black soils are best for wetland cultivation.

- **Adjusting drainage to needs:** Drainage should be undertaken with an intimate knowledge of hydrological and meteorological conditions and adjusted accordingly. Standard drainage regimes are inappropriate. Drainage systems should be monitored throughout the year and altered in response to changes in moisture and soil fertility, using ditch blocking, clearance and other practices as needed. Care must be taken to prevent over-drainage.
- **Co-ordinated management and local knowledge development:** An institution framework to co-ordinate farmers in their activities in a wetland and to share wetland management knowledge will assist in the achievement of sustainable use.

### Farmers' Indigenous Knowledge for Sustainable Wetland Management

Farmers were found to possess extensive knowledge of wetland characteristics and processes. These have allowed the development of sustainability indicators, e.g. specific soil colours or the presence of particular plants as indicators of soil fertility and hydrological conditions. Through such indicators, farmers are able to establish the status of their wetlands.

Farmers also possess detailed hydrological knowledge, including the seasonal changes in the wetland water table, how this is influenced by changes in rainfall and catchment runoff, and the spatial variations in wetland hydrological characteristics. With this knowledge, farmers employ a range of hydrological management practices that facilitate the cultivation of crops. For example, the drainage layout is adjusted in accordance with the prevailing soil moisture conditions and throughout the farming calendar, modifications are made to drains as adaptive responses to the effects of rainfall or drought.

### Lessons for rehabilitation

From the various rehabilitation case studies it is clear that wetland rehabilitation is a natural ecological process which can occur if human and livestock intervention is prevented. It is, however, difficult to prevent interference in wetlands, especially when faced with increasing population pressure and a shortage of agricultural and grazing land. The complete rehabilitation of cultivated wetlands to their natural state is unfeasible, hence there is a need to explore multiple use regimes whereby some parts of wetlands are rehabilitated whilst others parts are cultivated or used for other purposes in a sustainable manner. It is critical, therefore, that knowledge of wetland rehabilitation is disseminated within the farming communities, and essential that this knowledge is applied.

A series of techniques were identified which could contribute to the rehabilitation of degraded wetlands. These include:

- **Water retention**, through the blocking of drains and the wetland outlet is essential for wetland rehabilitation. In addition, terracing or re-vegetating of wetland catchments, will also contribute to this process.
- **Protection of the head and outlet** of the wetlands, retaining their natural wetland vegetation, can play a major role in aiding the recovery of the original hydrological regime. This can be achieved by reserving these areas for the natural wetland vegetation, *cheffe*, which helps store moisture.
- **Control of invasive plant species** is critical, as these alter the hydrological regime and soil characteristics. Natural *cheffe* vegetation should be allowed to re-colonise as it reduces the rate of water flow and retains silt in the wetland during floods.
- **Prevention of grazing** is essential for the re-colonisation of *cheffe*. It will also reverse soil compaction, which reduces water storage.

**Summary Report for Objective 5**

# Training and Dissemination of Technologies to Develop Management and Monitoring Capacity for Sustainable Wetland Management

by Afework Hailu and Adrian Wood

Objective five was "to develop capacity within communities, local authorities and development organisations working in this area (Illubabor Zone) to address wetland management issues". This was to be achieved through training and information dissemination activities. While these activities were undertaken throughout the project, as many research findings did not become available until the end of the project, extension and dissemination activities were concentrated in the last few months of the project. These have continued beyond the project through the work of a local NGO, the Ethio Wetlands and Natural Resources Association (EWNRA).

## Activities

Key activities have included:

- project information and wetland awareness dissemination through PRA discussions, information dissemination meetings and workshops,
- wetland research capacity training and development at various levels, both informally and through training courses and workshops,
- farmer to farmer facilitated demonstrations and information sharing of local wetland knowledge,
- wetland management training through workshops and the production and circulation of training / extension material on wetland management (Figure 1),
- dissemination of interim and final project findings and discussion of implications at various levels in Ethiopia, and
- international networking and information dissemination, including creation of a web site (http://wetlands.hud.ac.uk) and preparation of a CD ROM.

In total the following information and awareness raising activities took place:

- two Farmers Workshops in Illubabor for participating farmers,
- two farmer to farmer field demonstration workshops,
- on-going dissemination of extension material on sustainable wetland management,
- 78 Participatory Rural Appraisals with farmers for two way flows of information,
- two radio broadcasts for the population of the south-west of Ethiopia,
- two Zonal Workshops for government and NGO staff in Illubabor
- three Training of Trainers Workshops for Wereda Experts and Development Agents across the whole of Illubabor,
- a National Level Workshop on Sustainable Wetland Management, plus contributions to IUCN's Wetlands Awareness Workshop and to Biological Society Meeting,
- a National Level Wetland Policy Workshop for senior government staff,
- three international presentations, and
- participation of staff at international wetland management training course.

## Impacts and Indicators

The overall impacts of the activities has been:

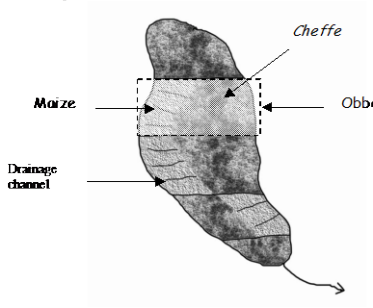
a) increased awareness and concern for sustainable wetland management by farmers and other rural dwellers in the study area,
b) improved awareness of, and capacity for, wetland management and training within Illubabor among government and NGO officials and farmers,

## Figure 1: Extracts from the extension material for development workers.

**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.**



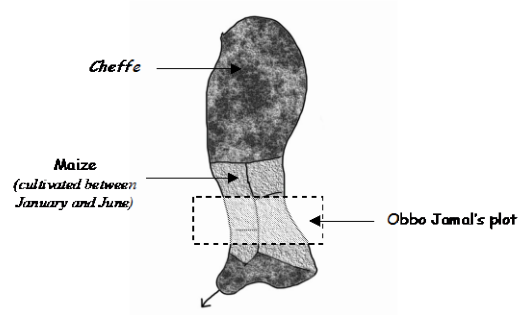

**CASE STUDY 3: Higher intensity uses – major transformation – Partially sustainable**
**Mixed land use, Fuller drainage, Cultivation and Collecting**

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.**



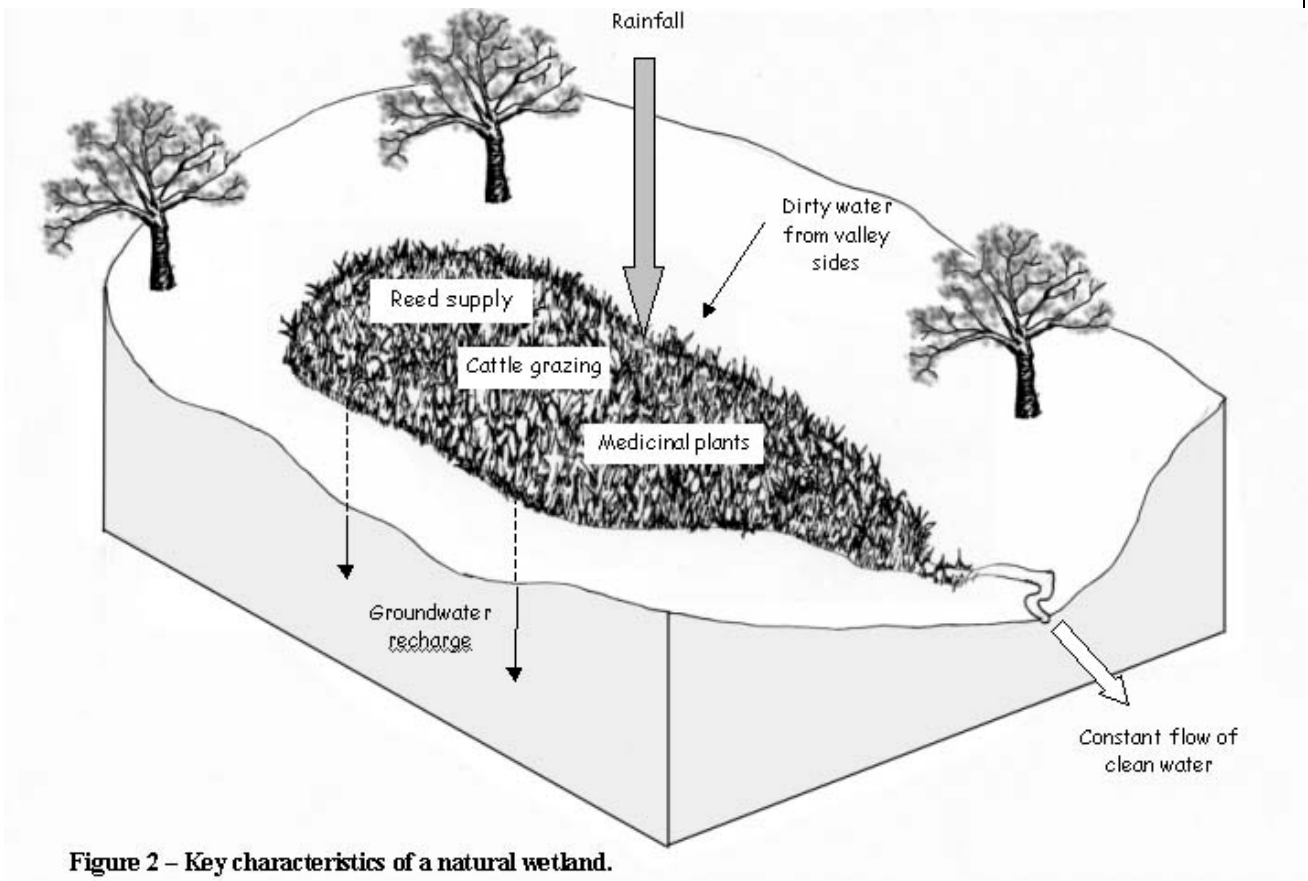




**Figure 2 – Key characteristics of a natural wetland.**

c) a higher level of awareness in Ethiopia and internationally about Ethiopia's wetland issues, and
d) availability of research, extension and policy briefing materials for use in Illubabor, nationally and internationally

Indicators of these four areas of impact, which are to varying degrees a result of this project include:

a) Farmer Awareness and Concern

- increased debates by farmers concerning wetland management for sustainable use and interactions on this with officials involved in the government's Zonal Wetland Drainage Task Force, especially in the 1999 / 2000 wetland cultivation season.

b) NGO and Government Capacity

- establishment of a Technical Committee at Zonal Department Office of MoA to follow up wetland issues,
- development of a group of government and NGO officials at the zonal level with interests in sustainable wetland management,
- allocation of wetlands responsibilities to an agricultural expert in each of the eleven weredas in Illubabor Zone which have wetlands,
- involvement of EWRP and the subsequent NGO (EWNRA) in the Regional Research and Extension Linkage Committee (RELC).

c) Awareness of Ethiopia's Wetland Issues

- initiatives over wetlands in national agencies, especially the Conservation Strategy of Ethiopia and the Environmental Protection Authority, including consideration of joining the Ramsar Convention,
- increased national awareness of wetland issues and the holding of a national workshop on wetlands through one of the EWRP project partners, IUCN's East African Regional Office,
- establishment of a Wetlands Core Group to push wetland issues in Ethiopia (including former EWRP project members),
- establishment of a local NGO that focuses on wetland management (Ethio-Wetlands and Natural Resources Association) and commitment of a group of Ethiopian professionals from different institutions, including EPA, to support this,
- contributions at three international meetings on wetland issues in Ethiopia.

d) Availability of Research and Extension Information

- agreements with fourteen institutions to house wetland materials from this project for public access, and
- widespread availability of wetland extension material in Illubabor Zone.

## Beneficiaries

Beneficiaries of EWRP's training and dissemination activities have been diverse. It is estimated that the programme has benefited:

- over 1,500 farmers,
- 55 kebele leaders,
- 157 wereda agricultural staff,
- 9 zonal officials in a variety of miniseries,
- 18 wereda administrative officials,
- 11 wereda Ministry of Agriculture managers and team leaders,
- 70 regional and national level officials in ministries and agencies, including all regions of Ethiopia,
- 8 managers and technical staff amongst NGO's working in the study area,

- 20 academic researchers in Ethiopia and Britain,
- 60 members of the international wetlands research community,
- up to half a million farmers through radio broadcasts.

### Long Term Impact

In addition, the project will have longer term impacts through continuing dissemination and awareness raising which will continue through:

- extension materials and posters being circulated and used in farmer discussions,
- trained wetland experts operating in each wereda of Illubabor Zone,
- Technical Committee operating at the Zonal Department Office of MoA to follow up wetland issues,
- Wetlands Core Group operating at National Level, including former EWRP members,
- trained wetland researchers operating in two Universities and one college in Ethiopia and two Universities abroad,
- 14 information dissemination sites in Ethiopia,
- a website (which had over 10,000 hits in its first year of operation), and
- the activities of a local NGO, the Ethio Wetlands and Natural Resources Association, which focuses on wetland issues and which is supported by donor embassies in Ethiopia and other sources.

### Conclusions

The awareness of wetland issues related to changing and intensifying use of these areas has been raised in Ethiopia, both at the national and local level, by this project. This is one contribution to getting wetlands onto the agenda for action in Ethiopia so that more appropriate policies and actions at all levels are developed with respect to wetlands and will help ensure their use is sustainable.

**Summary Report for Objective 6**

# Policy Issues in Sustainable Wetland Management

By Adrian Wood

Objective Six sought 'to contribute to the development of national and regional policies in Ethiopia which impact upon wetland use' and to 'achieve the preparation and use of material relating to wetland policy issues'. The report specifically focuses upon:

- the ways in which policies can influence sustainable wetland use,
- the types of policies which have been important for wetlands,
- the formulation process for policies that are relevant to wetlands,
- the ways policies may need to be adjusted to ensure the sustainable contribution of wetlands to development, and
- the methods by which policy development may be achieved.

Information for this work was obtained through a range of methods including literature and database searches, and discussions with researchers and policy makers in national and international government and non-governmental organisations.

## Framework for Wetland-Related Policy Analysis

Policies can be made at a variety of levels: international, national, regional and community. They can also be made by organisations to affect their own actions. All five levels were found to have policies which in some way interact with the wetlands of Illubabor Zone.

The other dimension of policies relating to wetlands is the nature of the interaction with wetlands. In some cases policies may be wetland-specific, but in other cases they may impact upon wetlands either directly or indirectly (see Figure 1).

**Figure 1: Framework for wetland-related policy analysis.**

| | **Type of Policy** | | |
|---|---|---|---|
| | Wetland Specific | Non-Wetland Specific | |
| **Level of Policy Formulation** | | *Direct Impact* | *Indirect Impact* |
| International | Ramsar Convention | | Structural adjustment |
| National / Regional | Environmental policy | Food security | Wildlife protection |
| NGOs | Wetland use / protection | Agricultural expansion | Catchment treatment<br>Afforestation |
| Community | Wetland management | Land use controls | Division of labour |

## Policies and Wetlands in Ethiopia

The research suggests that little attention is given specifically to wetlands in their own right in the policy and legislation of the Ethiopian government. To date there are only brief mentions of wetlands in the Conservation Strategy of Ethiopia (CSE) and the Water Resources Policy, and these fail to consider the full range of functions and benefits associated with wetlands. However, at the NGO and community level there are specific policies which affect wetlands.

**National Non-Wetland Policies with Direct Impacts on Wetlands**

a) *Food Security*: The drive towards food security seeks to ensure that "under-used" natural resources are developed for agricultural production. This policy has been subject to interpretation at the regional and zonal levels. In some parts of the country, diversion irrigation is being encouraged, while in others wetland drainage has been encouraged. The latter is especially attractive as it can lead to crop harvests during the food-shortage months before the main harvest.

b) *Resettlement*: The past policy of relocating people from famine-affected areas to the better watered south-west led to sudden increases in the demand for land in specific localities. Where resettlement was of the integrated type, local communities faced a dilemma as to which land they allocated to the settlers. In many cases it appears that wetlands were seen as the least desirable type of land by the local communities and were given to the settlers.

c) *Villagisation*: This process of concentrating rural communities increased demand upon natural resources in some localities. Demands for reeds for thatching tukuls put a heavy demand upon the wetlands near to the new villages and affected the quality of the reed beds, whilst the need for more accessible farm and grazing land led to the drainage of wetlands in the vicinity of these new settlements.

**National Non-Wetland Policies with Indirect Impacts on Wetlands**

a) *National Development and Commercialisation*: The need to eradicate poverty in Ethiopia has seen an emphasis upon the development of the country's natural resources, with agricultural expansion and forest clearance. The resulting devegetation of the landscape has impacted on the hydrological cycle with increased variations in stream flow, and more severe down-cutting in wetlands by streams at times of peak flow. One result is that wetlands start to dry up.

b) *Coffee Development*: Expansion of coffee production on the interfluves has impacted on wetlands in several ways. A direct one is the displacement of some cereal crop cultivation from the uplands into the wetlands. Indirectly, coffee production, by increasing wealth, leads to greater cattle numbers whose dry season grazing needs are often met from wetlands.

c) *Agricultural Research*: Agricultural research has introduced early maturing varieties of maize. Although designed primarily for upland cultivation, these varieties facilitate and encourage wetland cultivation as they can reach maturity before flooding damages the crops. Conversely, quicker maturing maize may help reduce the period for which wetlands are drained and hence the ecological damage caused by cultivation.

d) *Wildlife Protection*: Wildlife protection policies, when applied in the forested areas of the country, increase the level of crop losses to predators. This is especially high at wetland sites which are usually some distance from settlements and have forest nearby. As a result wetland cultivation is discouraged by this policy.

**Community policies**

Communities have the capacity for self-management. With respect to wetlands, they recognise the benefits from the natural functions and products obtained from wetlands and have developed specific policies for managing these areas. As wetland cultivation has increased, some communities, finding themselves short of reeds for thatching or with inadequate pasture for grazing, have established by-laws to protect wetlands from cultivation. Communities may also co-ordinate the cutting of reeds to ensure that the resource is not degraded through intensive use. Other rules have been made about drainage practices, the protection of springs and the maintenance of reeds at the head and outlet of wetlands. Enforcement of these rules, or by-laws, may be through community institutions developed specifically to manage these resources.

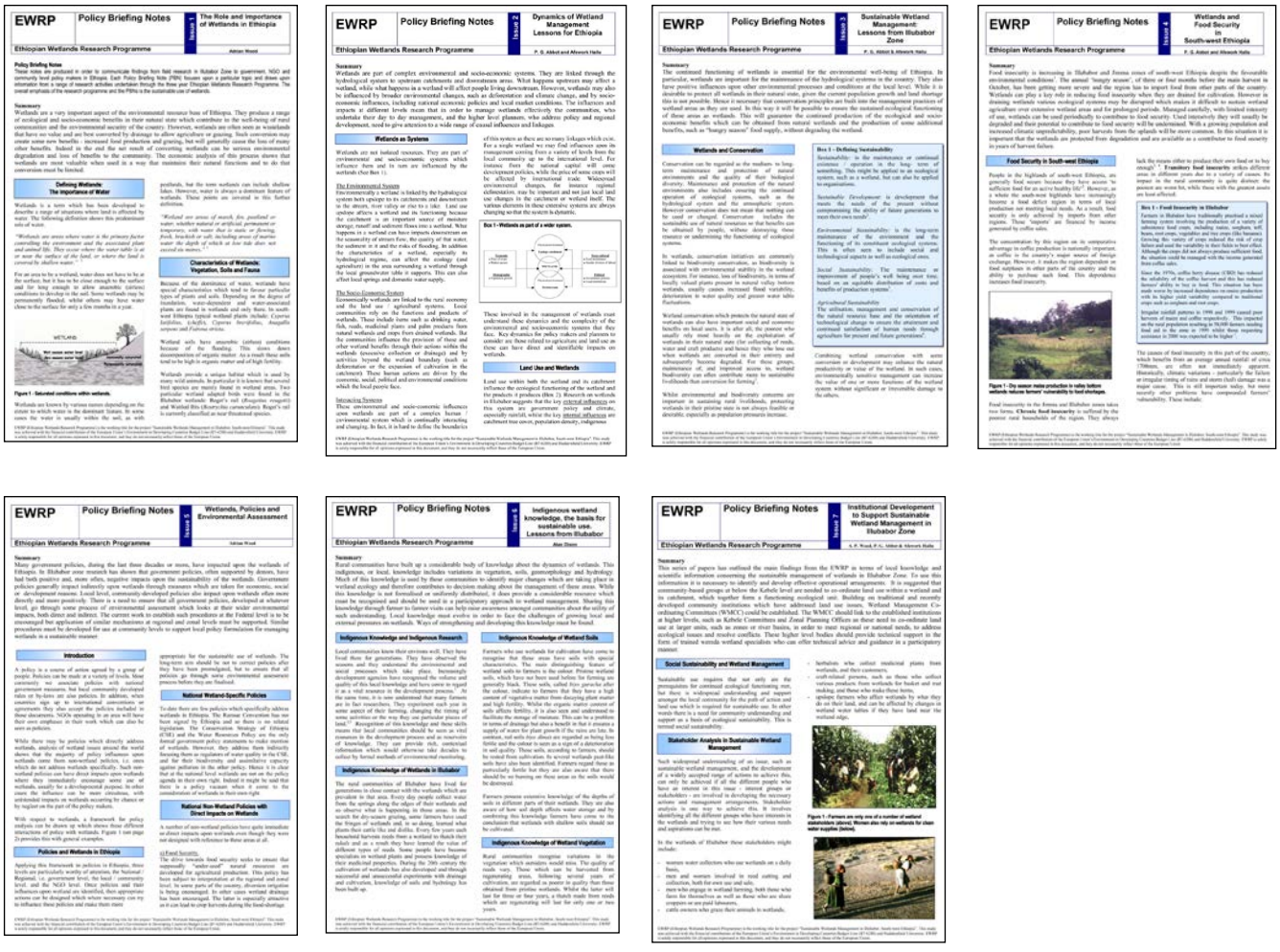
## NGOs and wetlands

NGOs are important actors in Ethiopia because of the financial and human resources they possess. The policies which they develop, while often agreed with government officials or communities in their area of work, may also be subject to influence from their donors. At one time wetland cultivation was seen by one NGO in Illubabor as a way of reducing pressure upon the forests for clearance and cultivation. However, later concerns about the environmental impacts led to a complete reversal of this policy.

## Wetlands Policy Formulation

In Ethiopia, wetland policy is in its infancy and wetlands remain a neglected issue. Responsibility for wetlands is unclear and in some cases it is a contested matter as the Ministries or Bureaus responsible for agriculture, water, natural resources and environmental protection compete for authority over these areas. In terms of the policy making process, Ethiopia is at the first stage of getting wetlands onto the agenda for consideration. Beyond that there are several further stages related to data collection, data analysis, policy option review and decision making. Once policies are declared they must then be monitored in implementation and where necessary revised. The EWRP has undertaken some awareness raising about wetlands and has initiated a number of policy debates through its various regional and national workshops. It has also run a Wetland Policy Workshop with senior government staff and contributed to the wetland debate through its series of Policy Briefing Notes (see Figure 2). From this initiative and the IUCN / EWNHS Workshop on Wetland Awareness a Wetland Core Group has been formed which should maintain the momentum on this issue and ensure that wetlands are given due consideration.

**Figure 2: The series of Policy Briefing Notes produced by EWRP.**



## Environmental Assessment of Policy

Besides the need for specific policies concerning wetlands, it is clear from the range of policies impacting upon wetland use that greater environmental sensitivity is needed in all aspects of policy formulation. This is one issue which has been raised repeatedly over the last decade by the Conservation Strategy Process in Ethiopia. Although as yet there has been no action in this direction, the recent strengthening of the federal level Environmental Protection Authority, and the start of the process of establishing these at the regional level should provide a basis for reviewing all government policies from an environmental perspective. In this situation wetlands should be given due attention as one natural resource which is fragile and can be destroyed by inappropriate economic development and other policies.

## Conclusions - Prospects for Ethiopian Wetland Policy Development

The Wetland Core Group and the strengthening of the environmental protection agencies are key developments which will help contribute to wetland specific and wetland sensitive policy formulation in Ethiopia. This situation is also helped by international developments which have linked wetlands more closely with development rather than conservation issues. The most important of these was the recognition by the Ramsar Convention in 1997 of the role of wetlands in the functioning of the hydrological system, and in protecting one of the world's scarcest resources, fresh water, which is essential for development. Secondly, in 2000 the Ramsar Convention recognised the role which people can play in managing wetlands and how human interaction with wetlands can lead to protection of these resources. Other members of the international community are also recognising the importance of wetlands from a community and sustainable use / development perspective, all of which are relevant to the interests of the Ethiopian government for achieving food and environmental security in the long term. It thus seems that eventually international interests in wetlands may be heading towards an approach that is relevant to Ethiopia by stressing that wetlands are for people.

# Sustainable Wetland Management in Illubabor Zone

## Contents:

### Research Report Summaries:

1. Nature, extent and trends in wetland drainage and use in Illubabor Zone, South-west Ethiopia.
2. The hydrology of wetlands in Illubabor Zone.
3. The characteristics and management of wetland soils of Metu Wereda, Illubabor Zone of Oromia Region.
4. Plant biodiversity in the wetlands of Illubabor Zone.
5. Socio-economic determinants of wetland use in the Metu and Yayu-Hurumu weredas of Illubabor Zone.
6. Community organisation for natural resource management and the potential for community-based wetlands management.
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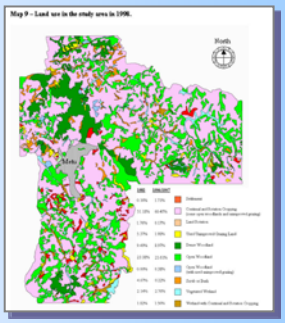

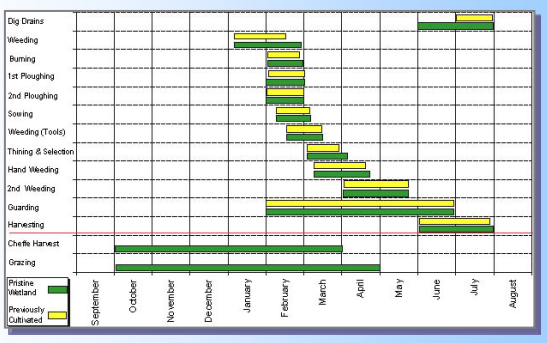


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