

Summary

Wetlands are part of complex environmental and socio-economic systems. They are linked through the hydrological system to upstream catchments and downstream areas. What happens upstream may affect a wetland, while what happens in a wetland will affect people living downstream. However, wetlands may also be influenced by broader environmental changes, such as deforestation and climate change, and by socio-economic influences, including national economic policies and local market conditions. The influences and impacts at different levels mean that in order to manage wetlands effectively the communities, who undertake their day to day management, and the higher level planners, who address policy and regional development, need to give attention to a wide range of causal influences and linkages.

Wetlands as Systems

Wetlands are not isolated resources. They are part of environmental and socio-economic systems which influence them and in turn are influenced by the wetlands (See Box 1).

The Environmental System

Environmentally a wetland is linked by the hydrological system both upslope to its catchments and downstream to the stream, river valley or else to a lake. Land use upslope affects a wetland and its functioning because the catchment is an important source of moisture storage, runoff and sediment flows into a wetland. What happens in a wetland can have impacts downstream on the seasonality of stream flow, the quality of that water, the sediment in it and the risks of flooding. In addition the characteristics of a wetland, especially its hydrological regime, can affect the ecology (and agriculture) in the area surrounding a wetland through the local groundwater table it supports. This can also affect local springs and domestic water supply.

The Socio-Economic System

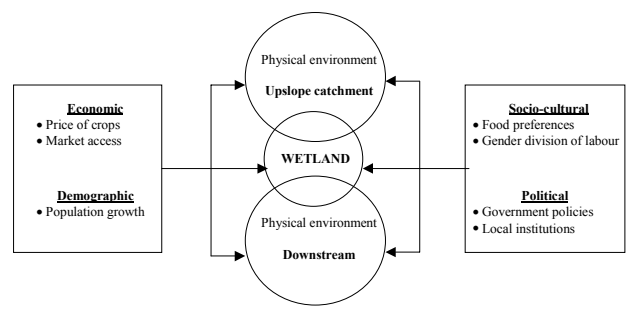
Economically wetlands are linked to the rural economy and the land use / agricultural systems. Local communities rely on the functions and products of wetlands. These include items such as drinking water, fish, reeds, medicinal plants and palm products from natural wetlands and crops from drained wetlands. But the communities influence the provision of these and other wetland benefits through their actions within the wetlands (excessive collection or drainage) and by activities beyond the wetland boundary (such as deforestation or the expansion of cultivation in the catchment). These human actions are driven by the economic, social, political and environmental conditions which the local people face.

Interacting Systems

These environmental and socio-economic influences upon wetlands are part of a complex human / environmental system which is continually interacting and changing. In fact, it is hard to define the boundaries

of this system as there are so many linkages which exist. For a single wetland we may find influences upon its management coming from a variety of levels from the local community up to the international level. For instance from the national capital will come development policies, while the price of some crops will be affected by international trade. Widespread environmental changes, for instance regional deforestation, may be important and not just local land use changes in the catchment or wetland itself. The various elements in these extensive systems are always changing so that the system is dynamic.

Box 1 - Wetlands as part of a wider system.



Those involved in the management of wetlands must understand these dynamics and the complexity of the environmental and socio-economic systems that they face. Key dynamics for policy makers and planners to consider are those related to agriculture and land use as these can have direct and identifiable impacts on wetlands.

Land Use and Wetlands

Land use within both the wetland and its catchment influence the ecological functioning of the wetland and the products it produces (Box 2). Research on wetlands in Illubabor suggests that the key external influences on this system are government policy and climate, especially rainfall, whilst the key internal influences are catchment tree cover, population density, indigenous knowledge and local policies.

Rainfall influences wetland functioning through spring and river flow. Wetland cultivation also affects wetland functioning but is itself influenced by food requirements and other food sources, notably upslope yields. Population density affects wetland functioning by altering land use in the catchment: higher densities increase land clearance for subsistence production, reducing upslope pasture and catchment tree cover. This can lead to reduced infiltration and storage of rainfall in the catchment which affects the wetland and stream flow, while there may be increased soil erosion and sediment loads in the rivers.

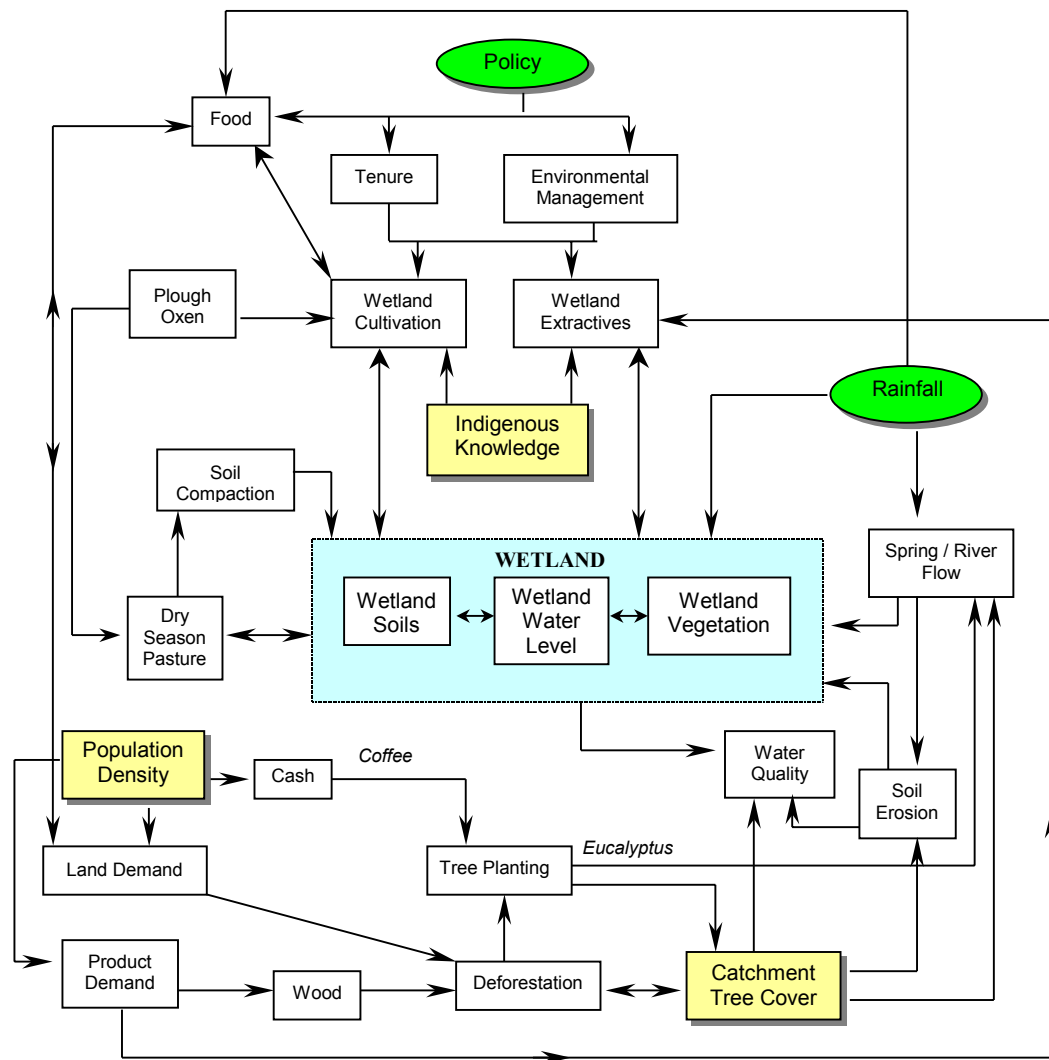
Increased catchment cultivation leads to a shortage of grazing land which often causes increased grazing use

of wetlands. This in turn causes soil compaction and changes in the plant species found in the wetland and the overall bio-diversity.

Afforestation in catchments can also have an important impact on wetlands: if woodlots of exotic trees such as *Eucalyptus* species are grown, ground water tables may be lowered – affecting springs, riverflow and groundwater flow into wetlands.

Population growth will increase demand for wetland products (such as roofing reeds) which will increase the intensity of natural product harvesting. In time the quality of reed beds can deteriorate making reeds less effective as thatch.

Box 2: Land Use and Wetlands



Key External Influence:  Key Internal Influence: 

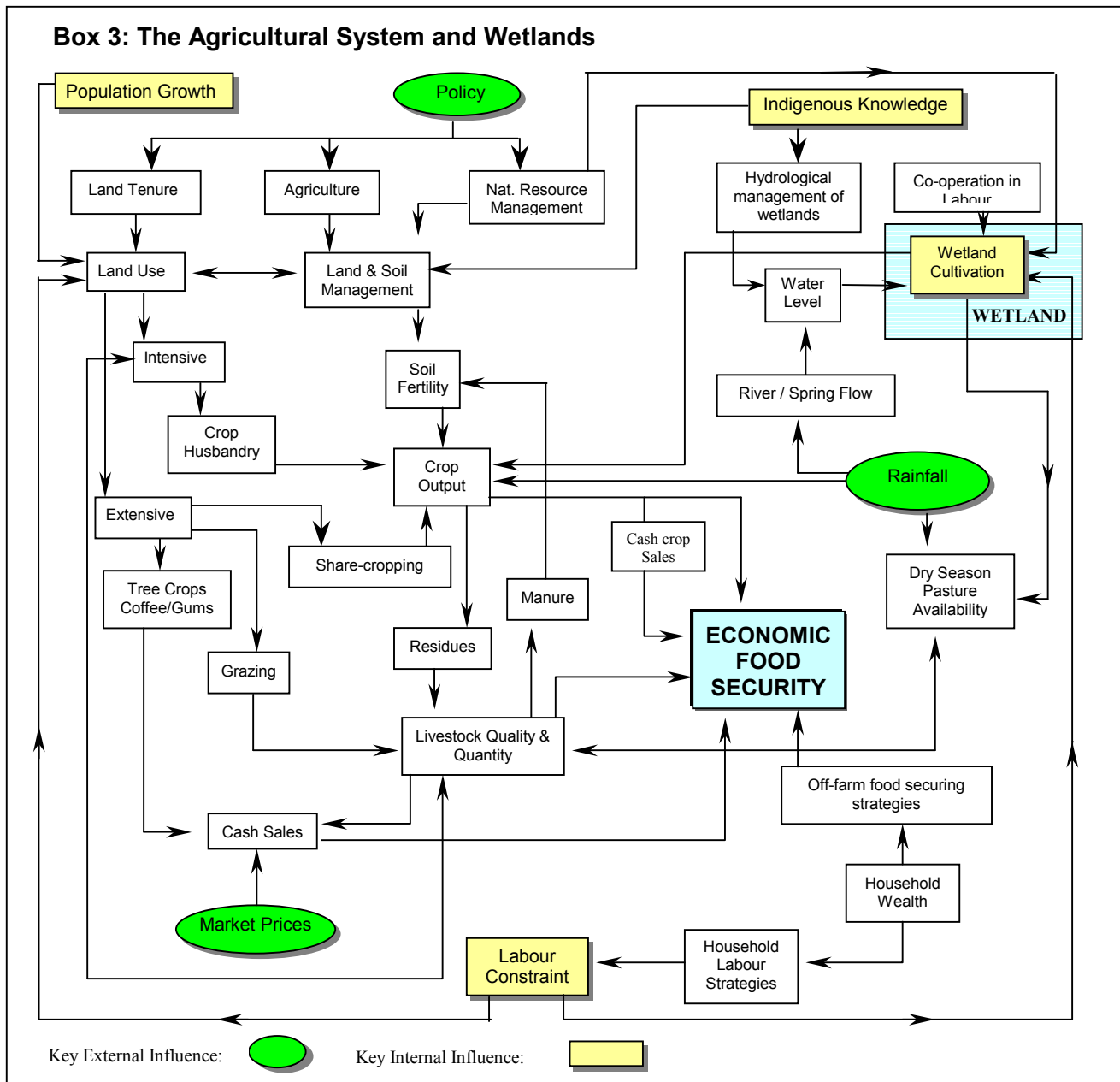
The Agricultural System and Wetlands

The smallholder agricultural system is based on attaining economic and food security through the production of subsistence and cash crops. Wetlands can play a role in this agricultural system (Box 3) (See PBN 4).

Wetland use for agriculture can be affected by external influences such as policies, market prices and rainfall, as well as by internal influences such as population growth, labour constraints and indigenous knowledge. In particular, poor upslope harvests due to too much or too little rainfall encourages farmers to look to wetland agriculture as a way of supplementing their food supply. This may be reinforced by government policy such as the Wetlands Task Force which encourages wetland cultivation. Population growth encourages the search for new land to cultivate. This may have to be wetlands if upslope areas are fully used. Urban market opportunities may encourage wetland drainage for vegetable growing.

Wetland agriculture is dependent upon farmers having the appropriate resources of labour and oxen, and farmers finding it economically attractive to use these resources in such cultivation. It also requires appropriate, usually indigenous knowledge if it is to be sustained. In particular, knowledge about how to manage the hydrological system is essential as is the ability to co-ordinate farmers in wetland drainage and crop guarding.

Wetlands are also important for pasture (especially in the dry season) and hence their use impacts upon livestock production directly and upon upslope crop cultivation indirectly. Increased cultivation in wetlands causes a reduction in pasture, so where demands for pasture are high, wetland cultivation may be minimal. The need for reeds may constrain wetland agriculture and grazing if the relative returns from this use exceeds that of crops or pasture. This valuation will depend on personal circumstances of households as well as external market conditions.



Influences on Wetland Use from Different Levels

Returning to the discussion at the start concerning the range of influences upon wetland use, Box 4 provides a summary of some of the different levels at which environmental and socio-economic influences occur.

Box 4: Influences upon wetland use.

Level		
HIGH	International	- world commodity prices, e.g. coffee, oil, food and availability
	National	- government policies, e.g. environmental, land tenure, food security, institutional arrangements (e.g. size of kebeles).
	Community	- community coherence / organisation, local land management and institutions, local environmental trends.
	Household	- resources, e.g. oxen, labour, indigenous knowledge,
LOW	Field	- specific environmental characteristics of wetlands

The nature of these influences at different levels can be elaborated as follows:

International Level: this is where international developments, such as prices for coffee or aid agreements can create forces which will work through to the local level and in some ways affect wetland management. For instance higher coffee prices may increase the upslope areas under coffee and so require more wetland drainage for food crops. Lower coffee prices and higher prices for corrugated iron sheets will encourage the use of wetlands for reed production.

National Level: this is where national decisions, usually government policies, are made. These can impact upon wetland use in many ways, including specific emphases upon food security through wetland drainage, but also through measures such as the wildlife protection law which causes increased crop damage in wetlands.

Community Level: this relates to the rural community as a social group and to the rural administrative unit, the kebele. At this level local trends in land use, such as deforestation and grazing shortages impact upon wetlands. There are also local by-laws about wetlands and administrative arrangements, as well as cultural values which are specific to that community, such as food preferences and gender division of labour. Local knowledge is also an influence on wetland use that can be recognised at this level.

Household Level: the resources of the household will affect their views about wetland use. Age, labour, oxen and skills are all important. So too is the access to wetlands which is the result of political processes within a community.

Field Level: influences here include the environmental characteristics of the wetland (how difficult it is to drain or not and its agricultural or other potential).

Lessons and Policy Implications

From the above discussion a number of lessons can be identified for policy makers and planners, both those working in formal institutions at the national, regional and zonal levels, and those working in communities.

- There is a need to think in an holistic manner, i.e. to recognise the range of influences that can affect wetlands and the way in which the activities within a wetland can impact more widely, both in the local area and downstream.
- The hydrological system is the key environmental linkage from wetlands. Wetlands cannot be managed sustainably without recognising the importance of these links. For communities this means considering upslope-wetland interactions in terms of catchment land use, and wetland-upslope interactions through groundwater changes which affect springs and crops on the fringes of wetlands. At the kebele, wereda and zonal levels this means taking a river basin view and seeking to ensure an appropriate flow of water, with no floods and no drying-up of rivers.
- Economic linkages from wetland use impact upon well-being and its distributions in communities. This needs to be considered in any decisions about managing wetland land use. The question needs to be asked concerning who benefits and who loses before any wetland management decisions are made (See PBN 1).
- Overall this information suggests the need for a participatory approach to wetland management. This must be sensitive to community needs and interest groups, recognising different aspects of wetlands and their use. But it also means keeping in mind the need for an overview which looks at upslope and downstream impacts through appropriate institutional mechanisms (See PBN 7).

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