

**Reducing Stresses on Wetland Resources in Dryland Ecosystems of Mpwapwa District, Central Tanzania: Where Do We Start?**

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**Abstract**

This paper addresses the way forward on how to reduce stresses posed to the wetland resources in dryland areas of Mpwapwa District, Central Tanzania. The paper starts by analyzing wetlands themselves and their livelihood contribution to local people in the area and how those wetlands are threatened with regard to their sustainability. In the second part community-based proposed strategies are presented as a starting point towards reducing stress to these wetland resources. Focus group discussions with local communities, key informant interviews, in-depth interviews with individual household, stakeholders' analysis and literature reviews were the methods used. Several strategies have been proposed by local communities as a way forward to arrive to sustainable utilization of the wetland resources. Dialogues with different stakeholders interested on wetland resources in these dryland areas should be facilitated in order to settle the differences and conflicts of interests. Furthermore, some of the proposed strategies which can easily be implemented may be facilitated by the government and any other interested development partner in order to ensure sustainability of the wetland resources and hence ensured improved welfare of local people depending on wetland resources in these areas.

**Keywords:** Degradation stress, wetlands, dryland ecosystems, Mpwapwa district, Tanzania

**Introduction**

Dryland areas have been regarded as “*dead*”, empty, isolated, and unproductive places where people are unable to survive (RPSUD, 2005). In reality, dryland areas have supported people's livelihood through myriad of goods and services they provide over years, and they are home to approximately 2 billion people worldwide (WRI 2002). Uniquely in these dryland areas are the wetland points, which due to their ecological nature coupled by socio-economic gradients are facing significant challenges for their sustainability. Since the interaction of these factors directly and indirectly affects the ecological resilience

of the dryland areas, understanding of values and potentials of these fragile areas in relation to peoples' livelihoods is important for the development of sustainable dryland management strategies.

In Tanzania, dry land areas, both arid and semi-arid cover about 65% of the country with 30% of the human population and 59% of the livestock population (URT, 2001). Generally, wetland areas of semi-arid regions support its community through three major activities: flood plain agriculture, dry season grazing and extraction of some tree products (Zoungrana and Temu, 1996). Dodoma region is among the semi-arid regions of the country receiving a mono-modal rain with an average of 570mm per year and one of the main livestock-keeping regions in Tanzania (Hella, 2004). The water points are very crucial for biodiversity and livelihood strategies in the semi-arid areas. These areas have been used in the high value crop production, sources of fodder for livestock, water for domestic purposes and many other uses. With this broad understanding of the existence of wetlands in the dryland areas, and that they are the main source of community's livelihoods in the area, reducing stress to these wetlands is an important aspect to be addressed. In this paper we present strategies that communities in the area have proposed as an entry point on how the stress subjected to the wetland resources in the dryland areas can be reduced which will then result into improved health of the wetland resources and improved livelihood of the communities in the area.

## **Methodology**

### **Study area description**

Dodoma Region lies between 4° to 7° S and 35° to 37° E. It is a region centrally positioned in Tanzania and is bordered by four regions namely Manyara in the North, Morogoro in the East, Iringa in the South and Singida in the West. There are five administrative districts namely Dodoma urban, Dodoma rural, Kondoa, Kongwa and Mpwapwa.

Topographically, much of the region is a plateau rising gradually from some 830 metres in Bahi Swamps to 2,000 meters above sea level in the highlands north of Kondoa. The study was carried out in five villages namely Kwamshangoo, Inzomvu, Mbori, Mlembule and Godegode, in Mpwapwa district which lies between 6°0' to 6°20'S and 26°22' to 36°30'E . The area is dominated by long dry spells with cool nights and warm and sunny day times. Maximum and minimum temperatures are 27.5°C and 15.5°C respectively and the rainfall ranges from 350 to 800mm per annum (WB, 1994).

### **Data Collection Methods**

A multi-stage sampling design was used where both purposive and random samples were drawn from the population surrounding the existing wetlands in the dryland areas. The methods and techniques for data collection included focus groups discussions with local communities, key informants interviews with agricultural and natural resources technical/professional staff in the district and village official. In-depth

Individual household interviews using a structured questionnaire, stakeholders analysis and literature reviews. A total of 180 people were interviewed from the five selected villages in the district.

Whereas content analysis was employed in analysing qualitative data generated through key informants interviews and in focus group discussions, Quantitative data were subjected to Microsoft excel for descriptive analysis.

## **Results and Discussion**

### **Existing Wetlands and Their Utilization Status in Mpwapwa District, Tanzania**

Worldwide, wetlands are very important for their ecological functions which they perform, as well as for their rich flora and fauna (Ramsar, 1997). They also constitute a resource of great economic, cultural, scientific and recreational value to human life (ibid). Wetlands and people are ultimately interdependent and the former has assisted people living around those areas to improve their well being. Shemdoe et al., (2006) reports Mpwapwa district as one of the dryland areas of Tanzania, to have several wetlands existing which have been the main livelihood sources to the people residing in the villages surrounding them. Table 1 presents the list of identified wetlands and their level of utilization in the surveyed wetlands in Mpwapwa district. The percentage utilization indicates about 73% of all the identified wetlands to be completely used in various ways by the surrounding communities for livelihood purposes. It is clearly shown that there is a potential danger for the wetlands in Mpwapwa to become extinct in the near future as a result of high use pressure. As reported in FAO (2000), about 25 percent of the world's wetlands have already been lost, largely due to conversion to agriculture or diversion of water for agriculture and aquaculture. Extra efforts are therefore needed to conserve these wetland resources including those in Mpwapwa district as their existence are highly threatened by the growing demand of land for agriculture and livestock.

**Table 1.** Existing wetlands and their level of utilization in Mpwapwa district, Tanzania.

S/N	Name of the wetland	Location by ward /village	Total Area (ha)	Utilized area (ha)	Percentage (%) utilization
1	Malolo	Wazaganza	800	500	62.5
2	Lumuma	Mafene	300	300	100
3	Kitati	Kitati	120	120	100
4	Mbori	Mbori	160	160	100
5	Lufusi	Lufusi	60	60	100
6	Idodoma	Idodoma	60	35	58.3
7	Inzomvu	Inzomvu	16	16	100
8	Godegode	Godegode	150	50	33.3
9	Kwamshangoo	Ising'hu	32	32	100
10	Tambi	Tambi	90	75	83.3
11	Mlembule	Mlembule	107	107	100
12	Lugula	Mwenzele	32	32	100
13	Ipera	Kinusi	61	61	100
14	Mbuga	Mbuga	18	18	100
15	Nzugilo	Nzugilo	10	10	100
16	Matonya	Matonya	15	15	100
17	Lufu	Lufu	15	15	100
18	Mang'haliza	Mang'haliza	10	10	100
19	Wotta	Wotta	15	15	100
20	Wangi	Wangi	25	15	60
21	Galali	Galali	60	25	41.7
22	Vikundi	Vikundi	5	5	100
<b>Total Area</b>			<b>2,241</b>	<b>1,672</b>	<b>74.6</b>

Source: Mpwapwa District Agricultural Report (2005)

Conflicts of interest between farming and livestock keeping communities are inevitable given the population densities in the wetlands. Table 2 shows the population of both human and livestock depending on the respective wetland area in the district.

**Table 2:** Human and livestock populations in selected wetlands in Mpwapwa district, Tanzania.

Wetland/village	Area (ha)	Estimated population/village						
		Human	Cattle	Goats	Sheep	Donkey	Poultry	Pigs
Kwamshangoo	32	3,800	2,000	1,700	-	-	-	-
Mbori	160	6,973	315	228	94	50	2,492	-
Inzonvu	16	2,600	4,500	3,600	700	60	-	200
Godegode	150	3,736	350	2,000	2,000	50	-	-
Mlembule	107	3,104	244	424	47	-	-	24
<b>Total</b>	<b>465</b>	<b>20,213</b>	<b>7,409</b>	<b>7,952</b>	<b>2,841</b>	<b>160</b>	<b>2,492</b>	<b>224</b>

Source: Village office report.

**Note:** the dashed cells indicate that no data was available

The population statistics indicate that Mbori and Inzomvu wetlands have the highest number of human and livestock populations beyond the carrying capacity compared to other surveyed wetlands. This has been due to the influx of people from other dry areas within the district who anticipate getting some farming plots in the areas surrounding the wetlands. Animal population density reflected here is high to guarantee sustainability in agriculture and livestock keeping. In Kwamshangoo, for example, there are about 119 persons and 116 animals per ha of wetland in the area, the number which is regarded to be high compared to the carrying capacity of the wetlands in the area.

### **Socio-economic characteristics of the wetland surrounding communities**

#### *Demography*

Socio-economic status of the communities surrounding the respective wetlands in the area was also studied. Table 3 indicates the demographic structure in the surveyed villages. It is simply observed that, the number of households per village ranged between 500 to 772 and the average population to range between 5 and 6 people per household. Majority of the people (97.3%) in the study area depend on agriculture as their main economic activity. Therefore, the reported population size (Tab.3) has serious implication on the existing natural resources and especially the wetlands. Unless the prevailing situation in Mpwapwa is reversed the wetlands will disappear in the near future.

**Table 3:** Demographic characteristics in the villages in Mpwapwa district, Tanzania.

Village name	Number of households	Average household size	%Respondent	
			Male	Female
Mlembule	562	4.7	62.9	37.1
Godegode	772	5.0	83.9	16.1
Inzomvu	508	5.4	57.5	42.5
Kwamshangoo	500	5.7	65.0	35.0
Mbori	685	5.1	65.0	35.0

*Education, land size, crop productivity and marketing constraints*

Being an important tool for liberating people from poverty, education has been mentioned to be necessary for any developing country to alleviate its people from the extreme poverty (URT, 2003). In the surveyed villages, most of the respondents attained primary education level. Very few attended up to secondary level. This indicates that the level of poverty is still high in the areas and the only means of earning livelihoods by the village dwellers is the existing natural resource base surrounding them, which are mostly the wetland resources. This has serious implication in the general use and management of wetland biodiversity in the area, as most of the respondent reported to depend on the wetland resources entirely for their livelihoods.

Regarding the land ownership in the area, an inventory of the land size was also carried out in order to determine the plot size that an average household owns in both wetland and dryland areas. It was estimated that in the wetland areas an average household owns a plot of 0.57 ha and in the dry land and average of 3.44 ha. This implies that if dry land agriculture could be productive enough, the level of poverty in the area could have been reduced. Similarly, stresses posed to the wetlands and their associated biodiversity could be reduced. Unlike what is contemplated herewith, people depends much on the 0.57 ha of wetland plots compared to 3.44 ha as the produce from dryland is very little compared to what they harvest in the wetland which therefore increases the stress to these wetland resources existing in the area.

The pressure that exert stress to the wetland resources in the area include shortage of rains, the factor that forces people to practice agriculture on the wetlands where they are assured of getting good returns. Vermin is another problem that farmers in the area have mentioned to affect their crop production systems. About 62% of the respondents mentioned vermin as a main constraint in crop productivity. Regarding farm implements, 61% of the respondents mentioned high prices and poor availability of these implements including fertilizer, pesticides to be one of their drawbacks in their crop production systems. Unlike other factors, few respondents mentioned market of the produce to be a problem as 68.3% of the respondents mentioned market of the crops which they produce not to be a problem in the area. The only thing that they associated with market is poor transport facilities between farm places and markets.

### *Threats facing the wetlands*

High population of both human and livestock increases use pressure to wetland resources in the area. This has also led to the existing conflicts between peasants and livestock keepers in the area. Over cultivation and encroachment of the wetland resources due to high population and the suitability of the areas for production of high value crops has increased stress to the wetland resources as about 75% of the areas that were regarded to be the wetlands have been converted to agricultural purposes.

Siltation and improper handling of solid wastes has been mentioned as one of the pressures causing stress to the wetland resources. Over cultivation and farming that does not take care of soil conservation in the respective mountainous areas has resulted into flooding during the rainfall. The floods bring silts from the head streams which cause siltation to the wetland down stream which threatens the existence of the wetland resources in the area. Solid waste has also been regarded as one of the factor causing stress to the wetland resources in the area. This has been associated with the blockage of the water source in the springs known as spring eye to some wetlands in the area. The blockage of the spring eyes has reduces the capacity of the wetlands to hold more water.

### *Stakeholders analysis*

Identification of the key stakeholders and assessment of their interests and the way in which these interests affect the wetland management in the area was also done. Different stakeholders were identified. Their interests and roles are documented in table 4. The stakeholders identified are peasants, livestock keepers, District agricultural office, district council, District Natural Resources Office and NGOs including Participatory Irrigation Development Programme (PIDP) and World Vision.

**Table 4:** List of stakeholders interests and their roles in wetland management

<b>Name of stakeholder</b>	<b>Role/Interest</b>	<b>Position in negotiating proper management of the wetlands</b>
Peasants	Water for crop production, household consumption, building purposes	Key, primary
Livestock keeper	Water for livestock Pasture	Key, primary
DALDO/ DNRO	Improved crop and livestock production, biodiversity conservation (both fauna and flora), harvesting of natural resource products,	Key, primary
District Council	Revenue collection from crops, natural resource products, livestock etc	Key, primary
Participatory Irrigation Development Programme	Water for irrigation in the irrigation schemes Improved well being of the local people	Primary
World Vision	Improved agricultural production Improved well being of the rural poor	Primary

### **Community Proposed Strategies to Reduce Stress to Wetlands in Dryland Areas of Mpwapwa District, Tanzania**

Representatives of the communities interviewed proposed different strategies that if well integrated in the modern scientific wetland management practices could reduce stress subjected to these wetland resources. As an entry point in reducing stress to the wetland resources in the area, capitalizing on the community based proposed strategies could result in the proper management and improvement of wetland resources in these areas as well as improved communities livelihood. As explained in Colding et al., (2003) learning from local communities with long-term experience in environmental variability and uncertainty in many parts of the world may yield rules of thumb for managing complex ecosystems such that the resilience and options for human welfare are not reduced. This study has therefore involved the local communities living in the villages surrounding the wetland resources in identifying different strategies as an entry point to reduce stress to these wetland resources existing in this area.

### **Strategies for Wetland Stress Reduction in Dryland areas of Mpwapwa, Tanzania**

Several strategies were proposed by the community representatives interviewed in this study. The main ones that need more attention in order to reduce stress to the wetland resources in the area include:

- Reducing size of livestock herds.
- Livestock keepers who are not residents to the village should be prohibited to bring their cattle and other livestock to the wetland.
- There should be a joint effort between upstream people and the villagers residing close to the wetland to ensure their farms are conserved in order to reduce the level of siltation that is being brought to the wetland.
- People upstream should be encouraged to plant trees as one of the strategies to reduce siltation
- Demarcation of specific areas for grazing, stock route and watering points for the livestock in the area, which will reduce the level of stress to the wetlands caused by livestock
- Implementation of the Bylaws formulated on watershed and wetland management in the area
- A research on water quality and quantity in other water sources that livestock keepers claim not to be suitable for their livestock should be carried out in order to come up with diversified areas for watering livestock that could reduce the stress to the existing water source.
- Establishment of the Village Environment Committee that will deal with the conservation of the conservation of water sources in the villages that these committees are not established
- Re establishment of tree planting campaign as it has been done by HADO in the past years.
- Establishment of man made wetlands that will assist in diversifying water sources for livestock
- Forbidding farm clearance using fire on the farms close to water sources
- Extension education on soil conservation and utilization of manure to enhance crop production

## **Conclusion and recommendations**

Generally, what comes out clearly from this study is that, people exert too much use pressure on the wetlands due to the entire dependence as one way of livelihood adaptive strategies. Furthermore, conflicts of interests between farmers and livestock keepers, indigenous and immigrants people highly threaten the existence of the wetlands. With an increase in population for both human and livestock, associated with the climate change, quick and effective efforts are needed to rescue the situation; other wise the existing wetlands will perish in near future. In favour of that, capitalizing on the community based proposed strategies that has been listed in this paper, will yield in the reduced stress to the wetland resources. Such kind of research findings should be communicated to the policy makers to aid them to understand on what communities have in mind regarding the strategies that if facilitated could improve the health of the wetlands as a result will help improving the well being of the communities in the dryland areas. Furthermore, negotiating proper wetland utilization and management with different stakeholders having a stake to the wetland resources through dialogues is one of the issues to be prioritised. With all the community based proposed strategies on managing the wetland resources, detailed ecological studies are needed so that a concrete recommendation regarding the specific conservation needs of the resources in the area is given in order to relieve the wetlands from the stress they are faced with hence favouring their sustainable utilization.

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