



the  
**abdus salam**  
international centre  
for theoretical physics



## EEE WORKING PAPERS SERIES - N. 2

# The Use of Informal Institutions and Social Networks to Access and manage Water Resources in a Semi Arid Area in Zimbabwe

Witness Kozanayi

*Institute of Environmental Studies, Zimbabwe*

This document was prepared on October, 2002.

# **The use of Informal institutions and social networks to access and manage water resources in a semi arid area in Zimbabwe\*\***

**By**

**Nontokozo Nemarundwe\*<sup>2</sup> and Witness Kozanayi<sup>1</sup>,**

**Institute of Environmental Studies**

**University of Zimbabwe**

**P.O. Box MP 167**

**Mount Pleasant**

**Harare, Zimbabwe**

**E-mail: [kozanayi@yahoo.com](mailto:kozanayi@yahoo.com) and [nonto@africaonline.co.zw](mailto:nonto@africaonline.co.zw)**

*\* Contact person for correspondence*

<sup>1</sup> Research Officer, Institute of Environmental Studies, University of Zimbabwe.

<sup>2</sup> Research Associate, Institute of Environmental Studies, University of Zimbabwe & PhD student Swedish University of Agricultural Sciences.

## **Abstract**

This paper assesses the management and use of water, a scarce resource in a semi arid region. Water use and management in semi arid areas is crucial as is water to local livelihoods. It is shown in this paper that a sound institutional setting can be a panacea to a number of Common Property Resources Management dilemmas. It is also highlighted that social networks or moral economy are important in determining access to, and management of water resources. These social networks are the basic fabric of society. Albeit these social networks are very subtle, it is crucial that outsiders; researchers, the donor community and other related development organisations, unravel and understand these networks before making any far fetched recommendations on resource management and use.

## **Summary**

Water is a key resource in Romwe area, Chivi District, Zimbabwe in that it is the main driver of all agricultural and most livelihood activities. However rainfall is erratic and unreliable while underground water, though abundant, is costly to tap. Romwe community, composed of three villages, Tamwa, Dhobhani and Sihambe, is unique in that it has relatively high amounts of underground water reserves unlike the surrounding villages. To ameliorate the problem of water shortage, farmers in Romwe, either in unison or as individuals, have sunk wells in the area. The donor community has also helped by funding the rehabilitation of a dam and sinking of boreholes, which has increased water availability in Romwe. Management and equitable use of the water resources is an area that needs to be addressed. Elected committees have been entrusted with the management of the communally owned water sources –the dam and boreholes. Essentially the committees' work entails collection of annual user fees from regular water users and maintenance of the dam and boreholes. With privately owned water sources, management lies squarely with the well owner. He/she decides who collects water from the well, how and when. Therefore rules differ across well owners but in general at all wells there is minimum standards of hygiene that should be observed by all water collectors. Though the rules are not written down, almost everyone is aware of them and

anyone who breaks these rules risks being banned from collecting water from a given well. Everyone complies with these “rules of the heart”. Though water collection from both community sources and private wells is free, there are subtle benefits that accrue to the well owner by allowing others to collect water from his or her well. With communally owned water sources, any one who is not from Romwe can not fetch water from here without prior consent of the dam and borehole committees. Permission is granted free of charge. Though water is a scarce resource in the area, the community regards it as a God given resource that should not be denied to others. Denying others access to a water source is greatly resented by the community. Thus if there is water shortage in neighbouring villages, the affected villagers are given conditional permission to collect water from Romwe. Kinship ties are key conduits that are used to access water from different water sources. Such social ties are crucial in that they bind the society together and play a key role in the management of resources in the area.

## **1.0 introduction**

Use and management of common property resources is one of the topical issues that has been debated and researched on for much of the past decades. In Zimbabwe, in particular, over the last two decades there has been a marked drift in government policy from centralised state control regimes to community based paradigms. (Dzingirayi, 1998). Results from many places tend to indicate that local management per se is not panacea to the problems of common property resources (Dzingirayi, 1995 & 1998; Hasler, 1991; Ribot, 1999; Scoones & Matose 1993; Sithole 1999 & 2000; Powell, 1998).

The shift from centralised and state driven natural resource management is clearly articulated in theories of collective action and common property resource management (CPRM) where the focus is on getting the institutions right. This, however, carries the a priori assumption that institutions are the problem and implicitly justifies piecemeal institutional engineering (Mandondo, 1998). In some of the CPRM literature, institutional arrangements are defined as the rules and regulations governing resource use (Ostrom, 1990). This is the definition adopted by this study. Institutional arrangements often form

the basis for guiding the activities of an organisation, though they may also be informal, and not associated with any specific organisation. They can also be norms based on culture (Mandondo, 1997). The rules and regulations in use by a community determine who has access to the common pool resources (CPR), what resource units authorised participants can use, at what times and who will monitor and enforce the rules (Ostrom 1999). This study covers both formal (explicit) and informal (implicit) institutional arrangements governing water use. The study aims to enhance our understanding of the existing institutional arrangements on access to water resources in a semi arid area.

For its conceptual framework, this study adopts and integrates theories suggesting that identifiable groups of inter-dependent CPR users have a strong stake and desire to manage CPR resources collectively (McCay and Acheson, 1987; Ostrom, 1990). In spite of valorizing the role of community in collective resource management, this viewpoint provides a counter veiling voice to centralised management systems (Mandondo, 1997). Two perspectives exist under this paradigm. One perspective assumes that economic incentives drive self-interested behaviour in CPRM (Ostrom, 1990) while the other suggests that CPRM is motivated and/or facilitated by social capital or moral economy providing social bonds for the attainment of collective outcomes (Mosse, 1997). Dense social networks have been seen to sometimes give weight to informal agreements by ensuring that the agreements are kept ( Dasgupta 1999).

Agricultural households in semi-arid regions are able to increase their food security by cultivating an irrigated vegetable plot. However the success of vegetable production in these semi arid regions largely depends on access to a reliable water source. Sen (1999) in Sullivan et al 2001, notes that in poverty eradication, adequate access to water supplies can be described as an 'intrinsic deprivation' and one which, if relieved, can increase household capacity to raise itself out of poverty.

## **2.0 The study area**

The study was conducted in the Romwe area in Chivi District, Southern Zimbabwe. Romwe catchment is composed of three traditional villages namely Tamwa, Sihambe and Dhobhani with a total population of about 180 households. The inhabitants of Romwe are members of the ethnic Ndebele and Karanga tribes who were displaced from central Zimbabwe in the early 1950s by the then government. However there is the social catchment which is defined by the area from which people who frequently collect a variety of resources from Romwe come. The social catchment (Romwe included), has a total of 789 households (Sullivan *et al* 2001). All of the villagers from the seven villages that form part of the Romwe social catchment complex are the natives of the area. (Nemarundwe *et al* 1999). This area receives erratic and unreliable rainfall which is not enough to support meaningful agricultural activities. Average annual rainfall ranges between 450 and 600 mm. (Campbell *et al*, 2002)

## **3.0 Research methods**

Institutional arrangements for water use, benefits and costs of such arrangements and resilience of the arrangements under different conditions were explored. A number of Participatory Rural Appraisal techniques were used to collect information. Such participatory techniques included resource and institutional mapping, time lines and group discussions. For the purpose of this study, much of the fieldwork was done in the three villages that constitute the Romwe community. However this paper richly benefited from results of a quantitative yearlong socio- economic questionnaire survey that was carried out in the whole social. One key study by Sithole (2000) which focused on water sources found on wetland areas in communal areas also assisted in shaping the fieldwork.

#### 4 Results

Earlier studies on the hydrology of the area indicate that there is a lot of under utilised under ground water reserves in the area. Accessing the underground water is costly. It costs US \$10 per metre to dig a well. Depth of wells range from 4 to twelve metres. It costs US 1 200 to drill a borehole. (1 US\$= 38 Z\$, 1999). ). This figure includes money used to buy equipment, pay staff and the actual drilling of the well (Lovell et al 1999).

Farmers mainly sink private wells so that they lessen the amount of time spent fetching water. Women who collect about 55 % of all domestic water (an average of 72 585 litres per year per household) on average spend about 27 532 hours per household per year collecting water. This gives daily time spent in water collection per capita of about 12 minutes. (Sullivan 2001). So much time is spent fetching water partly because the water sources are far and partly because of the large volumes of water collected-for domestic use and irrigation. This puts a lot of pressure on women who are already overburdened with other household chores-cooking, minding children and working in the fields.

Agricultural households in semi-arid regions have been found to be able to increase their food security by cultivating an irrigated vegetable plot. However the success of vegetable production in these semi arid regions largely depends on access to a reliable water source. This is partly the reason why many households sink their own wells or in instances where this is not possible, to negotiate with neighbours so that they can get water for growing vegetables in the dry season. (Sullivan, 2001) In addition to water provision, wells also have a security function. (See box 1 below)

*Box 1 The farmer who retained a crop field because he had sunk a well in it.*

Mr. Moyo is an immigrant who married a local woman, Maria, in the late 1980s. I thought she got the fields from her relatives and not from the ex-husband. We have to be consistent. This also changes the story line because if she got the fields from her ex-husband, on what grounds would her relatives challenge Mr Moyo?. When Mr. Moyo married her, the two got fields from Maria's relatives as some of its physical assets. Mr. Moyo sunk a well in one of the fields and started to grow vegetables and established a

small orchard in the same field. Like all other farmers in the catchment, he allows other farmers to collect water from his well. He even allocated one of the sons of the village's kraalhead a plot in his garden to grow vegetables.

Mr. and Mrs. Moyo divorced during the mid-1990s and Maria's relatives tried to repossess their daughter's crop field from Moyo. Moyo refused with the fields on the ground that he had acquired the fields when he married Maria. Later on Maria died and her relatives exerted more pressure on Moyo so that he could relinquish the fields to them. They appealed to the local kraalheads and under pressure from the deceased's relatives to annex the crop fields from Moyo the alien, the kraalheads ruled that the deceased's relatives could take back the land of their daughter. However some participants at the tribunal, particularly those who used to collect water from Moyo's well, argued that Moyo was supposed to retain the field he had dug a well in. he had also established an orchard on part of the field. Finally, Mr. Moyo managed to retain his crop field. Were it not for the well, Mr. Moyo would have lost both crop fields, his only means of livelihood.

#### 4.1 Institutional arrangements surrounding communally owned water sources:

##### *Dam, boreholes and wells;*

The main sources of water are dam, boreholes, stream and wells. The first two sources are communally owned while the river is open access in the dry season. Is the river not communally owned? Wells are largely privately owned. Only two are communally owned and these are poorly managed and for hygienic reasons these two wells are rarely used for domestic purposes. Donors funded the sinking of the two boreholes. Anyone from Tamwa, Sihambe and Dhobhani villages can collect water from the boreholes. However any other person from the social catchment should firstly seek and be granted permission by the borehole committee before they collect water from the borehole. Water from the boreholes is largely used for domestic purposes and watering vegetables. In drought situations livestock from the social catchment can be watered at the boreholes.

There are elected committees that are responsible for overseeing the way the boreholes are used. In addition the committees also collect user fees from users of the boreholes. An annual user levy of US\$0.1 per household per year is charged to every household that fetches water from the borehole. The money is used to repair the hand pumps when they break down. The donors who funded sinking of the boreholes and ratified by the Romwe community suggested the figure. In times of water shortage volumes of water collected is regulated so is the use to which water can be put. During that period watering of fruit trees is not allowed so is brick moulding. Rules on water use and management are enforced more vigilantly during these times of water scarcity.

The community has come up a list of rules that guide it in the way the water users collect and manage water. The main rules are: no laundry, brick moulding close to the boreholes.

The dam is used by ten villages, chiefly for watering livestock and irrigating vegetables in a community garden that is located just below the dam. In times of drought the dam committee in collaboration with the garden committee decide on how to cut on the amount of activities supported by water from the dam. This year, 2002, because of the drought situation in the area, the two committees, after consulting the ordinary farmers, have banned moulding of bricks, cut down on the area under irrigation, and have changed the method of irrigation from flood to head bucket. All this rationing is meant to ensure that the remaining water lasts till the next rain season. As shown by box 2 below, when there are signs that water shortage is eminent the locals have zero tolerance to anyone who violates set down rules.

Box 2: The dam chairman who spilt the 'precious liquid' in a rage of fury.

Mr. Taka is the chairman of Barura dam and is also the chairperson of the collector well. He is a kraalhead and holds several influential positions in his church and in farmers' groups. Towards the end of the year in 2001, water level in the local dam dropped so low that by end the beginning of October there was imminent threat of water shortage in the community.

Farmers agreed that they were to drastically reduce the area under irrigation in the community garden that is irrigated using water from the dam. The remaining water was reserved for watering livestock. The number of livestock that were getting water from the dam had suddenly swollen up due to the fact that a number of surrounding villages were now watering their livestock at this dam after all water sources in their respective villages had dried up.

Farmers could not however agree on whether or not to reduce the size of plots for some poor farmers who depend more on vegetable production and not livestock for a living. Mr. Taka, a prominent cattle owner himself, proceeded to seal off all outlet valves at the dam so that no water could flow to the garden. This infuriated some poor farmers who threatened to take away the keys to the outlet valve from him. Mr. Taka was very angry to be openly challenged by ordinary villagers. That night, in a feat of rage, he went to the dam and opened the outlet valve so that all the water could flow out so that there would be no water to quarrel about. The water flowed out until it was below the outlet valve. The next day people were surprised to see that all the water had flowed out and they mobilised each other so that they could discipline the dam chairman. They secretly sent a delegation to the District Council offices, (about 70 km away) to enlist the help of the Zimbabwe Farmers' Union (ZFU)- the organisation that represents all communal and small scale commercial farmers. An official from ZFU came and convened a small tribunal with the dam chairman and other farmers in the community. At the tribunal the villagers called for Mr. Taka's immediate resignation as the dam chairman. However Mr. Taka the dam chairman cum kraalhead was quick to apologize to the whole community and promised to co-operate with other farmers in conserving water resources in the area. Only then did the community pardon him!

Nearby villages use water from the dam for brick moulding and laundry. On health grounds, water from the dam is not drunk. Most of the rules at the boreholes apply at the dam too. In addition grazing of livestock, cutting down of trees and settling in the dam catchment is not allowed. This is done to prevent the dam from getting silted. The dam

committee is also responsible for organising the community in constructing soil conservation structures in the dam catchment which will stop soil from running to the dam during the rain season.

Communally dug wells and springs were mainly used before the boreholes were sunk. However since boreholes were sunk in the area people preferred drinking clean water from the boreholes to water from the open community wells and springs. Rules that ensured hygienic standards were maintained around these water sources were put in place. It is also believed that water sprites punish anyone who violates standing tradition on how to use wells and springs. At the moment springs and communally dug wells are used for watering livestock, crops and brick moulding.

The stream is accessible to everyone in the dry season. Water from the stream is largely used for moulding bricks, gardening and at times bathing. During the cropping season only people who have fields long the stream have easy access to the stream.

Streams contribute 11.75 % to the total domestic water consumption. (Sullivan et al 2001)

When there is need to closely monitor the amount of water collected and the people who collect the water everyone in the catchment co-operates with the bore hole and dam committees to punish offenders. Firstly, offenders are tried by the kraalheads who constitute the catchment committee. The catchment committee has the option of referring all complicated cases to the ward councilor or alternatively to the headman (if they decide to pursue the traditional structure). There are two parallel structures of governance in this area: the traditional and modern structure. Only after exhausting local structures do local leaders refer cases to government officials for arbitration. Farmers claim that they do not get satisfactory service from civil servants and find it better to solve most of their conflicts on their own.

Monitoring is made easy by the fact that in times of drought there are long queues of people collecting water at the bore holes or dam all day long. Monitoring is also made easy because the farmers know each other well.

If there is a critical shortage of water in some villages, especially during the dry season, rules regarding who can have access to water are usually loosened to accommodate the unfortunate neighbours. Similarly if a neighbouring village's borehole breaks down, access is given to them to collect water from a borehole in the catchment. On the other hand, farmers from Romwe sometimes collect resources such as construction poles, firewood and sand for construction from some of the neighbouring villages.

#### Institutional arrangements surrounding privately owned wells.

Farmers dig private wells around their homesteads or in crop fields. The wells are usually dug by individual households through mobilising their own labour, hired labour or assistance from neighbours. In some cases the wells are inherited, together with fields, from parents and grandparents. On average local men charge (US\$9.1) per metre dug. The figure is much higher if the wall of the well is lined using stones to stop it from collapsing in. The depth of wells range from 4 to 15 metres, depending on the depth of the water table. There is no limit to the number of wells a household can dig or the depth to which a well can be dug. Hydrological studies that were done in the area have indicated that there is a huge rain fed aquifer under ground at Romwe. Use of wells usually depends to a large extent on informal agreements between water seeker and the well owner. The well owners institute their own rules on who can collect water from their wells. They also determine the volume of water to be collected, frequency of collection, standards of hygiene to be observed.

Although a well may be privately owned, many households other than the well owner have access to the well. Wells are shared with relatives, neighbours, church colleagues and friends, such that eventually everyone in and outside the village has access to almost a well within reach. When considering a well from which to seek permission to collect water, one usually considers nearness of the well, how close they are to the well owner, and whether or not they had assisted with the digging of the well.

Kinship ties are also used to access water. In the community, kinship ties form the basic fabric that binds together people and such ties are conveniently used as conduits through

which the local people can share resources; water, land, labour, (for weeding, herding arrangements and food). Relationships do not necessarily have to be close ones; even distant relations are highly valued. By sharing the same totem, households regard each other as relatives. Eventually everyone in the community is related to the other in one way or the other. In times of drought or when water level in wells is low, farmers share the little water remaining. "It is unAfrican to deny a relative water, a God given resource". If the water situation is really bad, at times the well owners may consider cutting back on the number of people who collect water from their wells. If the well owner so decides, at times they do not only consider how closely related they are (in terms of kinship ties) with the farmer who is going to be affected by their decision. In order to come up with a decision on whom to ban, the well owner also considers the benefits they get from all the people who collect water from his or her well. Slightly put, the well owners consider the cost of terminating the social contract with the other person. Some social contracts are costly if they are broken in terms of benefits that can be lost if the social contracts are terminated. Thus if there is water stress in the area, some well owners may decide to stop their close relatives from collecting water from their wells if the close relative has no potential whatsoever to help the well owner one day if the well owner gets into a predicament. In fact some well owners, even in good years, prefer to allow distant relatives to collect water from their wells because these are not difficult to ban when there is water shortage or when they become chronic offenders. With close relatives, a well owner can not be very firm. The locals greatly resent a situation whereby access to water is denied for no apparent reason. Once one well owner fenced off his well so that no one could fetch water from his well and the next day he found a dead dog in the well! It is also believed that local spirits will punish anyone who unnecessarily deny others access to their well by causing the walls of the well to collapse inside or the wells to dry up.

A number of subtle benefits accrue to the well owners. A well owner may allow a farmer e.g. from another village to fetch water from his well to enhance his chance of leasing land for cropping. In Romwe there is a shortage of arable land but in neighbouring villages e.g. Matenhese land is abundant. However in Matenhese they do not have

reliable water even for domestic purpose. They do not have a reliable aquifer and the only borehole they have is overworked and breaks down frequently. Farmers from Romwe sometimes lease land from Matenhese. Whether one gets land or not in Matenhese depends very much on the amount of social capital between the farmers. Prices for leasing a piece of land in Matenhese varies from one person to another depending also on the level of social capital between the two parties. If farmers are friends the farmer in Matenhese can lease his or her land to a farmer from Romwe for free or for a very nominal fee. Thus some well owners allow farmers from Matenhese access to their wells even in drought years when water is a key resource that drives most local livelihoods. At the moment the cost of leasing land in Matenhese ranges from (US\$9) to (US\$ 14.5) per acre per cropping season. Some well owners give access to fellow farmers who have draft power speculating that when the rain season begins, they can also be assisted with draft power at a reasonable price. The local livestock head was decimated by a devastating drought in 1992 and is still in the process of recovering.(Campbell *et al* 2002) . Another kick back which well owners can get is cheap labour to help in the fields or to herd livestock. Though the well owners do not openly ask for these favours from the people who collect water from their wells, the water collectors intuitively know that they are supposed to reciprocate the favours they get in one way or the other. People who share the same water points have a high chance of doing other projects together because usually these are people who understand each other and can easily mobilise each other. Flow of information is also fast among people who share the same water resource. This is more common with communally owned water sources like dams. Cattle herders for example, come to know each other in detail as they constantly interact at the dam when they meet to water their livestock. They can share information about cattle diseases, key dates on the cattle calendar e.g. when they will dip their cattle next. Vegetable farmers at community gardens e.g. at the dam and collector well also work together as a family (though each farmer has their own plot) and relate to each other as such and they share technical and other information pertaining to their projects and other things. These networks that are formed and nurtured over long periods through constant interaction are crucial in the observation of local institutional arrangements about resource use.

Access to a well is usually denied if the person who is seeking permission is known to be unhygienic, and was once asked to assist in the digging of the well and he/she refused. Wells that are located in vegetable garden are not easily accessible for security reasons. There is fear that if people are allowed to collect water from such wells they may end up stealing vegetables or leave the gate to the garden open which will result in animals getting into the garden and eat vegetables.

## **5.0 Discussion**

There are a lot of unwritten but effective informal rules and sound conflict resolution mechanisms. These informal rules are not costly to enforce. These unwritten rules are part of the social fabric and play a key role in determining access to water. Resilience of these rules lies essentially in their flexibility and capacity to accommodate change. This sensitivity to change is important in semi arid areas where water availability is highly uncertain. This is quite contrary to the notion that rules should be codified. (Mandondo, 2000, in prep). Codification should however be done when the community there is absolute need to do so rather than be prescriptive.

Privatisation does not always lead to exclusion of other stakeholders. Reciprocity arrangements ensure through social networks ensure that even privatised resources are accessible to many people. However it is highly likely that the poor may not benefit from privatisation seeing that they have very little to reciprocate with the privatised resources. Water, when privatised, has a security function whereby communities retain access to core water resources which they control in times of water scarcity. Households that own private wells increases their chances of getting land leases from other farmers who have land in access- in exchange for water.

## 6.0 Acknowledgements

We would like to thank Professors: J.P. Plattaue, K. G. Mäler, P. Dasgupta and Peter Frost for their valuable comments. Last but not least, we would like to thank IES for funding us to attend a scientific writing workshop, funded by the Agroforestry Southern Africa project, which enabled us to improve our writing skills. This publication is an output from a project funded by the UK Department for International Development (DFID) for the benefit of developing countries. (Micro-catchment Management and Common Property Resources Project R7304). However, the views expressed are not necessarily those of DFID.

\*\* Some of the results of the study on water use in Romwe have been produced in a paper that has been submitted to the Journal of Southern African Studies

exchange rate: 1US\$=Z\$55 (2002) unless stated.

## References

Berry, S. 1993. *No Condition is Permanent: The Social Dynamics of Agrarian Change in Sub-Saharan Africa*. The University of Wisconsin Press. Madison.

Berry, S. 1994. 'Resource Access and Management as Historical Processes: Access, Control and Management of Natural Resources in Sub-Saharan Africa: Methodological Considerations.' Occasional paper 13. IDS. London.

Campbell, B.M., Luckert, M., Zindi, C., Mutamba, M. and Kozanayi, W. 2002. Household Livelihoods in Semi-arid regions: Options and Constraints (in prep)

Cleaver, F. 1999. "Moral ecological rationality, institutions and the management of common property resources" Forthcoming in *Development and Change* and presented at the African Environments Conference in Oxford 5-8 July 1999. Oxford.

----- . 1995. "Water as a Weapon: The History of Water Supply Development in

Nkayi District, Zimbabwe.” *Environment and History*, Vol. 1 pp 313-333.

Dzingirayi, V. 1998. The Politics of Migration and the Communal Areas Management Programme in Zimbabwe. Unpublished DPhil Dissertation. Centre for Applied Social Sciences. University of Zimbabwe.

------. 1995. “Take back your CAMPFIRE”. A study of local level perceptions of electric fencing in the framework of Binga’s CAMPFIRE programme. CASS Occasional paper. Harare.

Fruhling, P. 1996. A liquid more valuable than gold. CIDA, Stockholm, Sweden.

Hasler, R. 1991. The Political and Socio-economic Dynamics of Natural Resource Management: The Communal Areas Management Programme For Indigenous Resources (CAMPFIRE) in Chapoto ward. CASS Occasional paper, University of Zimbabwe. Harare.

Lovell, C. , Batchelor, C.H. and Chilton, P.J 1999. Community gardens using limited groundwater resources.

Mandondo A. 1997. “Trees and Spaces as Emotion and Norm Laden Components of Local Ecosystems in Nyamaropa Communal Land, Nyanga District, Zimbabwe”. *Journal of Agriculture and Human Values*, 14:353-372.

------. 2000. “The Concept of Territoriality in Local Natural resource Management and its Implications on Livelihood in Nyamaropa Communal Land”. *Journal of Agriculture and Human Values* (In press). & WWF Programme Office. Harare.

------. 2000. *Management and Ecology of indigenous woodlands in Nyamaropa communal lands, Nyanga District in Zimbabwe*. Unpublished PhD Thesis. Department of Biological Sciences, University of Zimbabwe. Harare.

McCay, B. J. and J. M. Acheson. 1987. *The Question of the Commons: The Culture and Ecology of Communal Resources*. University of Arizona Press. Tucson, AZ.

Moyo, S. 1995. *The Land Question in Zimbabwe*. Sapes Books. Harare.

Nemarundwe, N., Mutamba, M. Kozanayi, W. 1998. An overview of woodland utilization and management in three communal areas in Zimbabwe. Results of PRA Research in Chivi, Mangwende and Gokwe South districts. IES Special Report, 1998

Ostrom, E. 1999. *Self-governance and Forest Resources*. Center for International Forestry Research. Occasional Paper No. 20. Bogor.

-----, 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press. New York.

Platteau, J-P. 1995. *Reforming lands rights in sub-Saharan Africa: Issues of Efficiency and Equity*. United Nations Research Institute for Social Development (UNRISD). Discussion Paper No. 60. Geneva.

Powell, N. 1998. *Co-Management in Non-Equilibrium Systems: Cases from Namibian Rangelands*. Swedish University of Agricultural Sciences (Department of Rural Development Studies). Uppsala.

Ribot, J. 1999. "Decentralization, participation and accountability in Sahelian Forestry: Legal instruments of political administrative control". *Africa* 69 (1): 23-65.

Scoones, I. 1997. "Landscapes, Fields and Soils: Understanding the History of Soil Fertility Management in Southern Zimbabwe". *Journal of Southern African Studies*. Vol. 23, No. 4:615-634.

Scoones, I and F. Matose. 1993. "Local woodland management constraints and opportunities for sustainable resource use". In P.N. Bradley and K. McNamara (eds). *Living with trees: Policies for Forestry Management in Zimbabwe*. World Bank Technical Paper 210: 157-193.

Sithole, B. 2000. "Devolution and Stakeholder participation in the water reform process in Zimbabwe". CASS Occasional Paper.

-----, 1999. *Use and Access to Dambos: Institutional Considerations*. Unpublished PhD Thesis. Centre for Applied Social Sciences. University of Zimbabwe. Harare.

Sullivan, C., Mutamba, M. and Kozanayi, W. 2001. Water use and livelihood security: A study of rural households in Southern Zimbabwe. Institute of Environmental Studies, University of Zimbabwe. Harare.

Winpenny, J. 1994. Managing water as an economic Resource. Routledge, London