International Scholars Journals

African Journal of Estate and Property Management ISSN 9671-8498 Vol. 6 (6), pp. 001-007, June, 2019. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Indeginous knowledge systems in sustainable utilization of wetlands in communal areas of Zimbabwe: case of Hwedza district

Christopher. Tafara Gadzirayi, Edward Mutandwa , Jordan Chihiya, And Chikosha Mary

Department of Agriculture, Bindura University of Science Education, P. Bag 1020, Bindura, Zimbabwe, Africa

Accepted 10 March, 2019

The purpose of this research was to investigate how Indigenous Knowledge Systems (IKS) has helped in the sustainable management of wetlands in Mukondwa ward of Hwedza District in Zimbabwe. The wetlands are found in patches of about 2-3 square km per patch and accommodating an average of 15 households and are managed as a community asset. A descriptive survey was used and a structured questionnaire was administered to 280 farmers in seven villages. The findings show that most farmers viewed IKS to be important in sustainable wetland management. A wide range of IKS techniques were used and these included use organic manure, mixed cropping, use of cultural taboos and flora indicators for sustainable management of wetlands. The study also established that urbanization and conventional technologies have an obliterative effect on IKS. The research recommends that IKS development action be based on a multi-sectoral approach involving all institutions of the society. Planners should take cognizance of existing IKS within communities

Keywords: Indigenous Knowledge Systems, Wetlands, Sustainability.

INTRODUCTION

Wetlands are fragile ecosystems which require sensitive and sustainable management if they are to continue to provide their range of functions and benefits. In most rural areas of Southern Africa, wetlands have dried up while others are shrinking (UNDP, 2004). This does not only mean loss of livelihood options for local people, but also means loss of biological diversity. In Zimbabwe, the management of resources is the concern of the Ministry of Environment and Tourism (MET), through the Department of Natural Resources (DNR), which implements the Environmental Management Act (EMA) 20.27 of 1993 (Government of Zimbabwe, 2005). This legislative framework is not explicit about the role of traditional leadership in the management of resources through sanctions, customary laws and taboo system. This has turned wetlands into “Open- access” natural resources. Titternberg (1996) came up with a model to describe the problem of open access that can occur in this way as the “Tragedy of the commons”

Indigenous knowledge systems (IKS) are perceived to be the knowledge that is unique to a given culture or society. It creates the basis for local level decision-making in agriculture, health care, food preparation and preservation, education and natural resource management. Indigenous knowledge is an important ingredient for development but is grossly under-utilized (Flavier, 1995).

The study determined and assessed how IKS helps in the management of wetlands, particularly on the period of wetness and productivity. The study also looked at how the local wetland farmers understood the concept of IKS and how the community perceived and managed the wetland resource. Management of wetlands in Mukondwa ward of Hwedza District in Zimbabwe is done by the community, under the leadership of the Village- head assisted by agricultural extension workers based in the community. Approach to management is based on local traditional values that emphasize the sustainable utilization of natural resou-rces through application of IKS. The wetlands are mainly found in river basins and catchment areas, (Figure 1) oc-

*Corresponding author’s E-mail: gadzirayichris@yahoo.co.uk
Fax: 263-71-7534 Phone: 263-71-7531/4

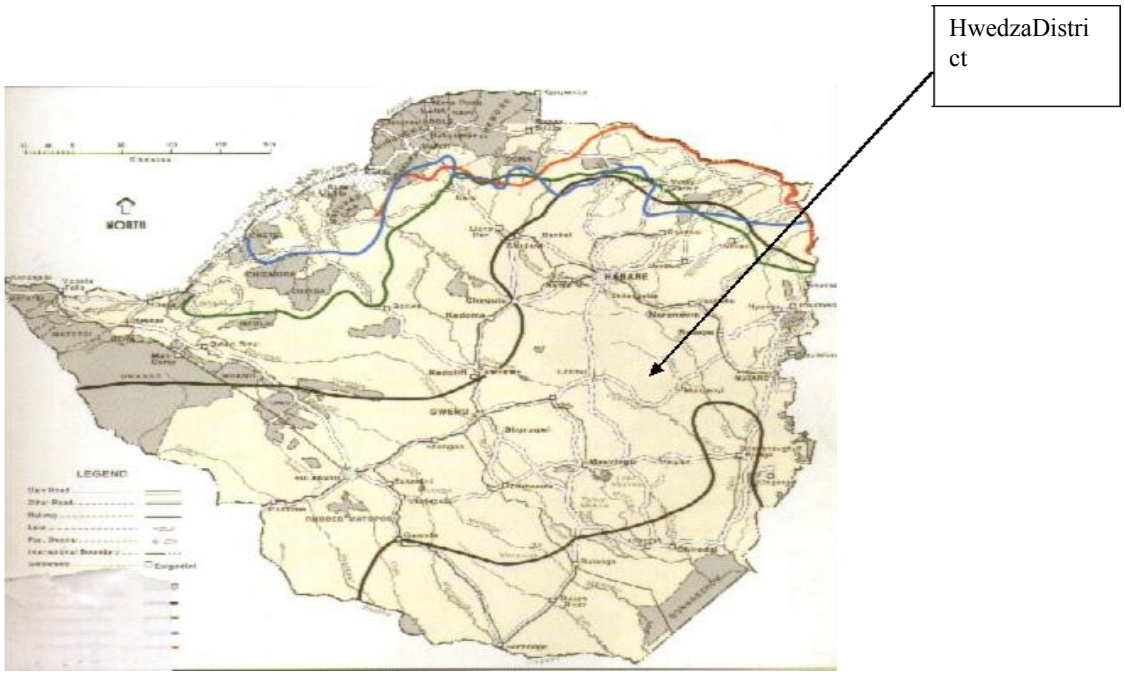

Figure 1. Hwedza District.

curring in patches or clusters of 2-3 square kilometers accommodating about 15 households.

The conceptualization of this research was that the community should see the benefits endowed in their culture, norms and values .It hinged on the need to balance resource utilization for economic benefit and conservation thereby enhancing sustainable utilization of wetlands. The logic was that communities are given an impetus to utilize resources in a sustainable way, if their traditional ethical perspectives are considered. This was in line with the United Nations' Agenda 21 philosophy that communities should participate in Community Based Resource Management (CBRM).

Aim

To investigate the role of indigenous knowledge systems in sustainable management of wetlands

Objectives

1. To characterize IKS used in the management of wetlands in Mawanga.
2. To investigate farmers' perceptions and attitudes on IKS.
3. To assess how IKS has helped in the management of wetlands literature review

Definition of Indigenous Knowledge Systems (IKS)

Lewis (1989) described indigenous knowledge systems as the same as Traditional Ecological Knowledge (TEK). Lewis saw IKS as knowledge, which was shared and passed on to younger people through songs, stories, rituals and other verbal communications.

Kalawole (2001) defined IKS as technical insight of wisdom gained and developed by people in a particular locality through years of careful observation and experimentation with the phenomena around them.

IKS is not just a set of information that is in the minds of the people, which can be simply taped and applied. Mangetane et al., (2001) supports this idea when they said, unlike the cosmopolitan researches, IKS is accessible by recall and practice.

Atteh (1991) postulated that IKS was embodied in culture and was described as an integrated pattern of human knowledge, beliefs and behavior. IKS consists of language, ideas, beliefs, customs, taboos, codes, institutions, tools, techniques, artifacts, rituals, ceremonies, folklores and gender. This culture is passed down from one generation to the next and generally it provides a holistic view of how to use natural resources based on traditional ethical perspectives. Rural communities make use of "curiosity experiments", problem-solving experiments and adaptation experiments to ensure sustainability (Kalawole, 2001).

Bio-cultural Diversity Management of Resources (BCDMR)

Bio-cultural diversity management is the indigenous and traditional system of managing resources that is based on the values and knowledge of the custodians of the resources. Chiefs and spirit mediums are the traditional practitioners who are believed to have above average knowledge

on the characteristics of woodlands, sacred caves, wetlands and graves. In BCDMR, the spiritual world owns both human societies and nature because this is where the spirits have their habitat. When one is concerned with management of natural resources, one has to include traditional institutions because they work together with the spiritual world. The spiritual world transmits the rules and regulations governing the way sacred places in bio-diversity should be managed through the traditional institutions.

Importance of indigenous knowledge

Mangetane et al. (2001) noted that people in a community value whatever resource they get from the environment through sustainable production systems. These communities are conscious of the need to self-reliant in capital stocks and management skills. In the view of Dewes (1993), the knowledge of local people was an enabling component of development. In this regard; a large percentage of the earth's genetic diversity has been maintained and managed through farmer's IKS. Moreover, IKS often forms the basis for agricultural production that has been sustained for generations.

In Ethiopia, Dixon (2001) noted that the sustainability of wetlands farming appears largely dependent on IKS wetland knowledge, its evolution and dissemination. In many African and Asian communities, people have over time-developed strategies for handling household and communal activities (Mangetane et al., 2001). Members of the community unite to provide essential inputs, including direct labor to operations. For example in Zimbabwe *'Hoka'* or *'Humwe'* is an important uniting force in communal activities. This deployment of manpower is strongly supported by IKS, which is composed of technologies, rules, information, approaches, and relationships that are vital to sustainable development (Kalawole, 2001).

Over the years, IKS authorities made local rules to protect important resources such as water bodies, useful plants, watersheds and rivers. Mangetane et al. (2001) believed this was how sacred grooves which today constitute the rare island of biodiversity in the background of deforested rural areas, were conserved Lack of autonomy by traditional leaders and traditional control over the environment and the application of conventional packages are accountable for today's environmental degradation. Moreover, some accepted scientific practices are off-shots of IKS for example, agro-forestry, stone terracing and fallowing as a soil regeneration practice.

Indigenous pasture management systems have important implications for soil and water conservation as well as for the continuous supply of cattle fodder. This concept involves responsible and moderate use of forests so that they will continue to be sustainable (Gadzirayi, et al., 2005).

Sustainable wetland management

The concept of sustainable wetland management is enshrined in the Ramsar Convention that was adopted on 2 February 1971 in the Iranian city of Ramsar. Sustainable wetland utilization is defined as human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations (Ramsar Convention Bureau, 1988)

In Zimbabwe, the Environmental Management Act attempts to ensure sustainable use of natural resources and curtail destructive practice. The Act provides for sustainable management of natural resources and protection of the environment. This piece of legislation states that "…for sustainable livelihoods, all natural resources need sustainable management particularly air, soil, water and minerals, the springs, vleis, sponges, reed-beds, marshes, swamps and public streams…"(GOZ, 2005).

The battle over resources ownership and control can be traced to colonial era. The pre-colonial era was dominated by traditional leadership (chiefs and elders) that enforced good management through customary laws, taboos and other forms .The colonial powers pushed communities out of resource management and created laws.

In Zimbabwe, the post-colonial era has not made any significant changes to this situation. Instead, it has transferred the ownership and control of resources to government ministries (Matiza and Crafter, 1994). Communities often feel that the state had self-imposed itself to responsebility. Mangetane et al. (2001) said this had turned resources into "Open Access" natural resources.

IKS and Wetland Management

As the basis of wetland management particular attention is paid to the role of Indigenous Knowledge Systems (IKS) and how knowledge of wetland functioning is acquired, disseminated, developed and applied by local people in their wetland management strategies.

Roggeri (1995) described traditional wetland knowledge as those interventions or techniques, which integrate the objectives of development with the maintenance of wetland functions and values. In Northern Cameroon, a fish canal system has been developed to facilitate water movements between the river and the floodplain. This allows inundation of the floodplain and allows grazing even in dry years when flood levels are low (Roggeri, 1995)

In Burkina Faso, numerous permeable check dams have been built by villagers to increase agricultural production through increased moisture of the soil and increased water supply due to a rise in the water table and wells (Zazen, 1991) In Rwanda, Mexico, Bolivia, India and Indonesia, raised beds for agri-pisci-culture have been implemented and have proved to be sustainable and effective. In Zimba-

bwe, Whitlow (1983) also acknowledged the use of raised plots in vleis (headwater lowlands) as a wetland utilization technique.

One community that is still steeped in TEK is the Barotse in Western Province of Zambia. Their traditional knowledge institution still prohibits cultivation of headwaters of rivers and streams. This ensured all-year round stream flow and the protection of lagoons and fish breeding grounds (Mangetane et al., 2001). Modern day failure to comply with the taboo system has resulted in loss of agricultural lands (Zimbabwe), loss of water bodies (Ghana) (Ashibey, 1995). In India, Naga-land farmers practiced various cropping systems in wetlands, for example, mixed, mono, inter and seque-ntial cropping and also practiced rain- harvesting to harness water for rice fields.

In Ethiopia, Dixon (2001) noted that the Illubador farmers had rich base of wetland hydrological knowledge. Dixon also established that the system of wetland farming is based on farmers' knowledge and experience of wetland hydrology, ecology, soil characteristics and the requirements of wetland crops. The farmers usually have detailed and accurate knowledge of the changes in water-table height during the year. They are also aware of the spatial variability of the wetland water table. Crop performance is used as an indicator of soil fertility. Wetland flora is also associated with various soil conditions. For example, the *cyperus latifolia* is regarded as an indicator of the return of a high water table and improved soil fertility and structure. This will assist the farmer in decision-making in regards to cultivating the wetland or living it fallow for years. The regeneration of a certain plant, for example, *oxalis latifolia* (salt-weed) indicates soil fertility once again.

RESEARCH METHODOLOGY

The study area

Mukondwa ward covers approximately fifteen square kilometers. Altitude varies between 1653.4 m and 1200 m the area is dissected by streams and rivers, which form the Save catchment area. Mean annual precipi-tation ranges between 600-800mm per annum. Most of the rain falls within four months (Nov-Feb) and is characterized by high spatial and temporal variability thereby contributing to wetland expansion and shrin-kage. Temperatures range from 18-27 degrees Celsius. The vegetation of this area is mainly savanna woodland with the *Brachystegia spp* dominating while *Hyperennia spp* are the dominant grass species. Soil types are mainly loamy to sandy with pockets of sandy clays predominantly in the wetland areas.

Research design

A descriptive case study was chosen in this research. It was decided to focus this investigation on district, parti-cularly at ward level because it enables one to explore the potentials of IKS in sustainable management of wetlands. The case study was also chosen because its ability to focus on a phenomena within the environment and tries to understand ‘how’ and ‘why’ it happens (Cohen and Manion, 1989).

Sampling procedures

The research identified the IKS used in wetland mana- gement and farmer perceptions and attitudes on IKS on 280 farmers in the area. The ward has 7 villages and 140 households. Purposive sampling was used to select farmers who had plots in the wetland area. On average each household had at least 2 members engaged in wetland farming.

Primary data collection

Field survey

A field survey was done to determine:
IKS techniques employed in the wetland management
The extent of wetland utilization Farmers’ attitudes and perceptions on IKS as a wetland management strategy.In selecting sample plots, the wetland was defined as the center of each study site. The number of gardens was established from village heads. Sample gardens were selected from within each of the villages in equal proportion to the distribution of total gardens. In conducting the survey, it was generally the father, mother, sons, daughters, and daughters- in- law who were interviewed.

Memory book

In this study area, ten older people of the age group seventy years plus were identified and asked information on utilization and management of wetlands. These people are believed to have been there when the drying of wet-lands was unfolding. These people are also believed to have long standing history in the area, so they have infor-mation recorded in their memories on how they managed wetlands.

Field observation

It is when a researcher collects information by interact-ting with the environment in a more naturalistic setting without using predetermined ideas, measurement or responses. This technique was found suitable because of its flexibility, and strong validity of findings. Field observations were coupled with guided interviews so that observed inform-ation could be recorded while conducting interviews at the same time. However, this technique is not replicable and cannot be used to study attitudes of respondents

Research instruments

A structured questionnaire was used as data collection instrument. The open-ended format helped the respon-dents to display their views of the concept and allowed them chance to express their views as they wished. This method was seen suitable since it has immediate feedback; clarification of statements and it permits grea-ter depth than other techniques. Data collected included respondents socio-economic characteristics, cropping patterns, wetland utilization, attitudes and perceptions towards wetlands management premised on IKS (Table 1).

Table 1. Form of IKS used.

Fertility	Moisture	Water conservation
• Use of organic matter, livestock manure, farmyard manure and fallowing. • Use of certain plants e.g. cats-tail grass, to predict return of soil fertility after fallowing. • Mixed cropping • Intercropping	• Use of leaf-litter • Raised beds to drain access water • Intercropping, to reduce runoff and to increase soil fertility. • Use of certain plants e.g. Sedges *(cyperus ssp)* • Position of the moon to predict rains • Natural fires on hilltops e.g. Mawanga and Ngomakurira hills, predicts coming of rains. • Use of fauna and flora to predict the rain season and crops to grow • Mixed cropping	Taboo system on use of springs, sponges and sacred days • Cultural beliefs of spirit mediums: give sanctions to resource use and predict crop season. Rituals and ceremonies e.g. Chipwa/mukwerera bring rains • Use of indigenous trees e.g. *ficus sur* (mukuyu/umkiwa) and *cordatum syzygium* (mukute/umdoni-) if not removed, help to preserve springs and sponges • Use of banana plants and sugar cane for increased infiltration.

Data presentation and analysis procedures

Describe and analyze the collected data. Data was entered into a computer and analyzed using Excel statistical software package. Potential differences between old and young, males and females were analyzed. The findings were presented by use of tables, graphs and pie charts. Each illustration is accompanied by a text to explain its significance Data was presented using statistical analysis and extraction of selected comments of respondents. This was done because it is difficult to observe "emotional values "from the summarized statistical data. Therefore, this extraction of comments is meant to provide a somewhat subjective manner so as to give a realistic account of the emotional content of recorded statement.

RESULTS AND DISCUSSIONS

The listed IKS in (Table 1) was synonymous among the age group 51+. However, this knowledge was almost absent in the age group 30 years and below. This trend agreed with Matiza and Crafter (1994) who suggested that there should be formal training in IKS since this knowledge is diminishing. The use of sedges to signal return of a high water table was also noted by Dixon (2001) in Ethiopia. Most farmers believe that rain-making ceremonies are important in bringing rainfall. Also a reasonable number believed that incest is mainly responsible for drought and the dry spells sometimes experienced in the area. The use of flora, for example the use of "muzhanje" and "muhacha" are used as indicators of the amount of rainfall expected and hence the crops to grow. A lot of "mazhanje" means maize should be grown and a lot of "hacha" means small grain crops should be grown, for example, rapoko.

Rituals and ceremonies were said to be important for the following;

To affirm villagers' respect for nature and the spirits that will punish them if they damage nature or misbehave.

To make offerings to the spirits

To provide opportunities to amend conflicts and disputes that occurred in the previous year.

Distribution and perception analysis of farmers towards IKS

Farmers were asked to give their perception on the following traditional practices: taboo concepts on use of springs and sponges Value of spirit mediums in regards to wetland management Cultural rituals and ceremonies (e.g. chipwa) Sacred days (chisi).

Use of fauna and flora to predict rains and crops to grow Only 12 respondents in the young age group perceived IKS to be very important while 18 strongly disagree and 12 were not sure. In the middle-aged group, 91 respondents perceived IKS to be very important while only 12 disagree and 18 were not sure. In the old age group, 93 respondents perceived IKS to be very important while 18 did not agree and only 6 people were not sure (Figure 2). Overall, more respondents (69.6 %) perceive IK to be very important, while 17.4% perceive IKS not to be important and 13.0% are not sure. These results show differences in perception on IKS between the young and the old. This may be because of the influence of urbanization and the conventional curriculum.

Attitude of farmers towards IKS and conventional knowledge

The farmers were asked to give their opinion about the following statement: "Growing dominance of western systems of scientific thought, governance structures and technologies is displacing our old ways of managing our wetlands" 196 out of 280 farmers' preferred IKS to conventional systems (Figure 3).

Most of the farmers said they value IKS because it is sustainable, for example, the use of organic manure in place of inorganic fertilizers. Traditional leadership, especially village heads, think that the governance system is prohibiting them from enforcing resource management through traditional institutions. The notion of village heads seem to be valid as it was supported by some sections of

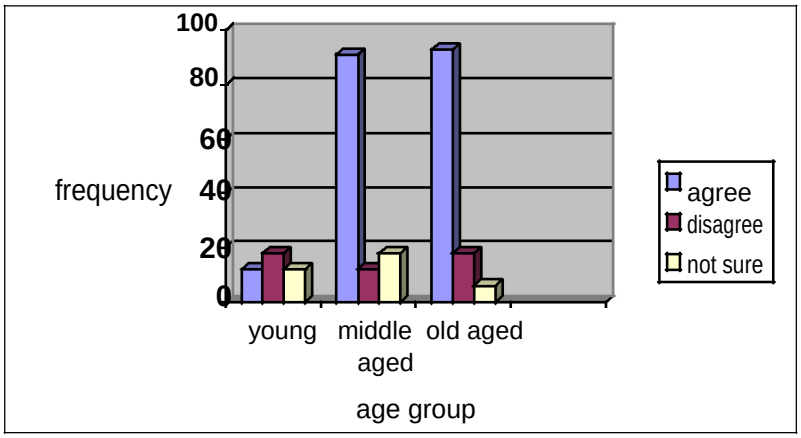

Figure 2 : Perceptions of various age groups on importance of IKS

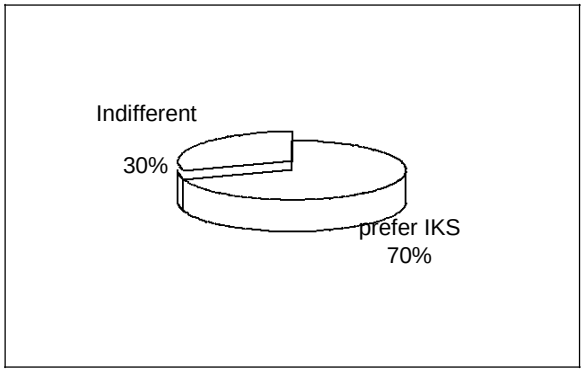

Figure 3. Preference of farmers towards IKS.

the EMA (C.A.P 20:27) which explain that local leadership had the mandate to apprehend offen-ders, but the conviction rests with the judiciary. This is different from traditional systems, where instant judg-ment is done through customary law and spiritual func-tions, for example, spirit mediums.

The area is dominated by farmers who belong to the Catholic denomination (59.4%). 86.4% of these Catho-lics strongly agree that IKS is important .The Johane Masowe WeChishanu and Mugodhi sects do not beli-eve in the importance of spirit mediums and rituals and ceremonies associated with them. Instead, they believe in the almighty God and they communicate with God through prophets, dreams and visions. These three in-form them about the season ahead of them, predict rains and any other concerns of the environment. How-ever, though they do not believe in spirit mediums, they still believe in the powers of the spirits and they also believe in, and respect most of the traditional ethos, for example the taboo concept on springs.

Conclusion

It has been established that local people have sound practical knowledge of wetland cultivation and manage-ment, which has been developed over years of experience, and which appear to be based on well founded premises. The technologies designed over hundreds of years to meet sight specific conditions have proved to be both productive and sustainable.Yet; they have received minimal attention in development and planning while untested modern tech-nologies have been subsidized and supported through conventional policies and programs.

Recommendation

IKS development action should be based on a multi-sectorial approach involving all the institutions of the society.

It is also important to constantly engage local commu-nities in IKS action research.

Planners and implementers of conventional models should recognize the importance of IKS in any given community.

REFERENCES

Ashibey EDA (1995). Indigenous Knowledge systems and prudent natural resource management. In: Indigenous Knowledge systems and Natural Resource Management in Southern Africa. Matowanyika JZZ, Garibaldi

V, Musimwa E (eds) Report of the Southern Africa Regional Workshop. Harare, Zimbabwe. 20-21 April 1994. IUCN-ROSA. Zim. Vol(1- 104) : 3-6.

Atteh OD (1991). Indigenous local knowledge as key to local–level development: possibilities, constrains and planning issues in the context of Africa. Seminar on Reviving local Self-reliance: Challenges for rural/regional development in Eastern and Southern Africa, Arusha. Tanzania, 21-24 February.

Cohen L, Manion L (1989). Research methods in Education. Becknhem; Croom Helm. Routledge, London pp 5-38.

Dewes W (1993). Traditional Knowledge and sustainable development in Southern Africa. Proceedings of a Conference held at the World Bank, Washingotn D.C, Sept 27-28, Envrionmentally Sustainable Proceedings, Series No 4

Dixon AB (2001). Indigenous hydrological Knowledge in Southwest Ethiopia: In: Indigenous Knowledge Development Monitor Vol. 9(3): 3-4.

Flavier JM (1995).The regional program for the promotion of indigenous knowledge in Asia", in Warren, D.M., L.J. Slikkerveer and D. Brokensha (eds.) The cultural dimension of development: Indigenous knowledge systems. London: Intermediate Technology Publications. pp. 479-487.

Gadzirayi CT, Mutandwa E, Mupangwa JF (2005). Veld Condition Trend Of Grazing Areas: Why poor livestock production in the tropics ?, Rangelands Journal. In-press, USA.

Government of Zimbabwe (2005). Natural Resources Board, E.M.A (CAP 20:27) in Environmental Management Act and the farmer.

Lewis HT (1989). “A parable of five hunter- gatherers in Canada and Australia.” In Johannes, R.E (eds), Traditional Ecological Knowledge: A collection of essays, IUCN, Gland, Switzerland. pp 11-19.

Mangetane GK, Asibey EAO (2001). An Overview of African Indigenous Knowledge for sustainable Development. Scandinavian Seminar College: African Perspectives of Policies Supporting Sustainable Development.

Matiza T, Crafter SA (1994). Wetlands Ecology and Priorities for conservation in Zimbabwe: Proceedings of a seminar on Wetlands Ecology and Priorities for conservation in Zimbabwe, Harare Kentucky Hotel. 13-15 January, 1992. pp 55-63.s

Ramsar Convention (1988). Ramsar Convention Bureau, Switzerland. Wildlife and Country Side pp1-7.

Roggeri H (1995). Tropical Freshwater Wetlands: A Guide to Current Knowledge and Sustainable Management. Kluwer Academic Publishers, Dordrecht, Netherlands.

Titternberg H (1996). Natural Resource Economics, 4th Edition, McGraw Hill, NY, USA. pp1-3

UNDP (2004). Economic Development focus in Africa, UN Publications, Washington DC, USA. pp14-60

Whitlow R (1983). Vlei Cultivation in Zimbabwe Reflections on the Past, or A play with a difference. Zim. Agric. J. 80(3): 123-135.

Zazen SM (1991). Enhancing Participation of local People: Some basic Principles and an Example of Burkina Faso. Landscape and Urban-Plann20:151-158.