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Indigenous Knowledge in Conservation of Forestry and Land Resources in Musana Communal Areas, Bindura

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Abstract

This paper assesses the role of Indigenous Knowledge (IK) in sustainable utilisation of resources in Musana communal area, Zimbabwe. Observations, questionnaires, interviews and focused group discussions were used for data collection. The research revealed that forests were used for wood fuel, fruit, mushroom, timber, medicine and performing rituals while land was used for crop cultivation, market gardening and pasture. Traditional leaders in the community upheld traditional values and used them in resource exploitation. IK was key in imparting environmental education to the young and newcomers, the newly married and newly recruited teachers at the schools within the community, to enhance sustainable resource exploitation Conservation measures, based on both IK and modern practice, were employed in the area. However, some conflicts ensued between IK based and modern conservation practices. Harmonising traditional and modern ways of resource exploitation would be a way of resolving the conflicts and enhancing sustainable resource utilisation

Keywords: sustainable utilisation, indigenous knowledge, Environmental Education, resource exploitation, land resource, forestry resource

Introduction

The rural populations in Zimbabwe and elsewhere in the region depend primarily on the natural environment for their livelihoods (Mamimine, 1999). The land and forests are critical resources upon which most of them eke a living. The resources need to be conserved for all to benefit now and in the future. Most of the former reserves in Zimbabwe, now communal areas, suffered massive degradation from unchecked exploitation (Rukuni Commission, 1994; Whitlow, 1988) although

government departments - Agricultural, Technical and Extension Services (AGRITEX) now Agricultural Research and Extension (AREX) and Department of Natural Resources (DNR) - were in place. The scenario is suggestive of a missing component in the conservation equation.

The wealth of knowledge possessed by the locals is fundamental in conservation projects Warren (1992:1) thus contends that local level knowledge long ignored and maligned by outsiders who entered an area in a bid to conserve resources "provides the foundation to participatory approaches to development that are both cost effective and sustainable." The success of the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe is attributed to the empowerment and confidence of the local people derived from the use of local knowledge in conservation initiatives (Feder at al, 1985; Chitsike, 2000; Murombedzi 1993).

This paper provides an overview of the use of IK in the utilisation of land and forestry resources in Musana Communal lands of Zimbabwe. It explores the role of IK in the use of the natural environment, resource values of the people of Musana, environmental education in resource exploitation and challenges in resource exploitation among the community.

The Problem

There is great need for the sustainable utilisation of resources in communal areas of Zimbabwe where the natural environment is threatened by deterioration and degradation. The presence of AREX, DNR, Natural Resource Committees in rural areas to provide EE and monitor resource utilisation, has not seen any improvement in natural resource management but deterioration or degradation of the natural resource base – soil erosion, tree cutting and veld fires. The indigenous systems that ensured sustainable utilization of the resources and passed EE from generation to generation tend to be sidelined in communal areas elsewhere (Chitsike, 2000). The study sought to assess the role of IK in sustainable utilisation of resources in one of Zimbabwe's communal areas, Musana in Bindura district.

Objectives of the Study

The aim of the study was to analyse the use of IK in sustainable utilisation of forestry and land resources in Musana communal area.

The specific objectives were to:

- Describe the form of IK employed in the utilisation of land and forestry resources in Musana Communal area.

- Assess the role of IK in sustainable utilisation of land and forestry resources in Musana Communal area.
- Examine the challenges in the use of IK in sustainable utilisation of resources in Musana Communal area.
- Determine the willingness of the Musana community to implement resource utilisation measures based on IK

Background of Musana Communal Area

The area is in agro-ecological region II of Zimbabwe in Bindura district. The average annual rainfall of the area is between 900 to 1050mm. The area is dominated by sandy loamy soils that are well drained. The African loquat, syzygium guineense (Water Pear), parinari curatellifolia (Mobola Plum), terminalia sericea and julbinardia globiflora are some of the main indigenous tree species in the area. Small-scale crop production and market gardening are the predominant economic activities in the area.

A traditional chief and a team of village heads are the local leaders of the community. The community developed values that are upheld by most of the members in conservation and other social dimensions. The local leaders are regarded as the custodians of the natural resources. The resources are common property and the members of the community share the rights to use or exclude others from using the resources.

Methodology

Data Collection

The survey was conducted to determine the role of indigenous knowledge (IK) in sustainable utilisation of land and forestry resources in the study area. A structured questionnaire that had yes/no, 5-point lickert scale that showed the level of dependence or agreement ranging from 1 (very large extent) through 5 (very low) and some open questions for clarification was employed to collect data from the farmers. The head of the household, on the day of the survey, responded to the questionnaire. Schedules were prepared for interviews, focus group discussions and observations. Interviews and focused group discussions were done with village heads, members from governmental departments and a non-governmental organization, Danish Aid from People to People.

Sample

Four from twenty villages were randomly selected in the study area. Each village had on average 50 households from which a random sample of 100 respondents was selected for the study. The respondents' age range was between 20 to 65 years, the proportions by sex were 46% male and 54% female and 58% of the respondents had gone through at least O level studies while only 4% of the sample had not been to school.

Data Analysis

A Friedman's test was used to rank level of dependence on the given resources from the environment and the binary regression model was used to determine the IK Index and the willingness of farmers to adopt conservation strategies based on IK.

Results and Discussion

Use of Forestry Resources

The community depended on forestry resources as shown on Table 1.

Table 1: Use of Forestry in Musana Communal Areas

Form of Dependence	**Mean rank**
Wood fuel	1.88
Fruits	2.06
Construction material	2.97
Medicine	3.95
Rituals	5.44

The results reveal that the community largely depended on forestry resources for wood fuel, timber and indigenous fruit. Wood fuel was the primary need for every household; only a few houses were electrified through the Rural Electrification Programme. The trees were thus prone to felling for this use; some measures had to be put in place to check on resource utilisation lest the land suffered degradation. To a minor extent the community derived medicine, mushroom and got places for performing some traditional rituals.

Indigenous Knowledge in Exploitation of Forestry Resources

Values and beliefs held by the community were the basis on which sustainable utilisation of resources in the area was pursued. Table 2 shows the practices that were adopted by the Musana community in exploiting forestry resources.

Table 2: Practices in harvesting forestry resources in Musana Communal Area

Practice	Yes (%)	No (%)
Harvest wood from dead trees only	96	4
Not harvest two trees next to each other	92	8
Not shake trees, pick fruit from the ground	94	6
Do not ring bark medicinal trees	54	46
Harvest fibre from one branch of a tree at a time	74	26

N = 100

The results reveal that the majority of the community members abode by the set regulations on the exploitation of the resources. Above half of the respondents, in the cases cited, confirmed that they followed the rules; it was therefore possible for the forestry resources to be conserved.

Fuel wood, as dictated by tradition, was harvested from dead trees only and/or from offcuts of trees felled for timber. The majority of the members confirmed they bode by the rule. The community leaders revealed that the forests were a legacy from their ancestors hence had to be used with great care. As a gesture of honour to their forefathers, the local leaders had an obligation to ensure that the wood fuel harvesting rules were followed and the land was not stripped of its indigenous forests. It was believed that failure to follow the rules of harvesting timber or fuel wood would upset the spirits; something which the local leaders could not allow to happen. Thus over the years the forests were conserved on the basis of these values.

The felling of trees for timber was governed by the traditional rule that no two trees next to each other were to be harvested and indigenous trees were felled upon consultation with the village head. The rule also forbade the harvesting of immature trees as defined by the headmen. Most of the respondents, table 2, confirmed that they observed the rule. The community derived timber for

thatching their kitchen huts, constructing crop harvesting sheds and fences. They had to consult the headman whenever they wanted to harvest timber from the indigenous forests. The headmen had the responsibility of determining whether the trees had to be cut for the intended purpose. The community was convinced that violating the conservation rules would cause a bad omen on the perpetrator. Consequences included getting 'mad', being bitten by snakes and having the crops unexpectedly devoured by livestock or wild animals such as monkeys and baboons that were common in the area. This way, the forests thrived and healthy indigenous trees could be found in the area at the time of the study while every member of the community had access to forestry resources.

The sustainable practice in harvesting forestry resources was buttressed by Forestry Commission, a government department that supplied eucalyptus seedlings to the locals at no cost and encouraged them to set up woodlots using the fast growing tree species. Those who took heed, on average 1 in 10 households, successfully grew the trees and tapped timber from their gardens thereby reducing demand for wood and timber from the indigenous forests. The majority of the households (90%) however still depended on the indigenous forests for timber and wood fuel requirements.

When harvesting fruit especially the African loquat, the traditional rule forbade the shacking or cutting of the trees; only ripe fruit was picked from the ground. Most of the respondents, table 3, confirmed that they observed the rule. In the past, the locals derived fruit from the forests mainly for family consumption hence there was careful exploitation resulting in sustainable use. The trees were thus protected from damage and the fruit was allowed to mature so as to produce seeds that could germinate. A bad omen as outlined earlier was thought to befall anyone who disobeyed and broke the rule. A story was told and confirmed by 50% of the respondents of two young men who cut a branch from a fruit tree in the forests one afternoon, got confused, could not find their way home only to be found the next day loitering among the trees. The beliefs restrained the locals from damaging the forest to a large extent.

Traditional practice forbade ring barking of the trees or uprooting the herbs. Although the use of forestry resources for medicinal purposes was losing significance in the community; slightly above 50% of the respondents, table 3, indicated that they used the local forests for medicine while the rest of them relied on modern medicine from local clinics. However where the trees or herbs were used, it was believed that the medicine derived in contravention of the harvesting rule would not work. The medicinal trees were thus protected and could be used then and in the future.

Traditional practice forbade the cutting of more than two branches on one tree or the whole plant for fibre. The community derived some fibre from the indigenous trees for thatching and tying their vegetables and 74% indicated that they upheld the rule. The trees that produced fibre were thus

conserved and recovered easily after harvesting. The market gardeners were encouraged to use synthetic fibre so as to reduce demand for indigenous fibre thus buttressing the sustainability of resource use. The cost involved deterred some of the members from securing artificial fibre; they had to resort to the cheaper natural fibre but had to abide by the set rules.

The concept of sacred forests and trees in the community also helped in the conservation of forestry resources. The majority of the respondents, 86%, confirmed that there were sacred forests in the area such as Dungwi and Damusi. Except on graveyards, the sacred forests were available for use as indicated by 100% of the respondents. However the users had to abide by the resource exploitation rules. Conservation of forestry resources in these forests was thus upheld. The local traditional leadership enforced strict conservation measures thus the trees were spared from careless exploitation and the sacred areas retained their cover.

Community elders performed ritual ceremonies such as rainmaking in the sacred forests and it was believed that failure to observe the traditional rules meant the area received insufficient rains. The traditional leaders encouraged the community members to use the forests in accordance with spelt out rules to avoid the curse from the spirits. The majority of the community who strongly depended on rainfed agriculture upheld the rule.

The locals, 100% of the respondents, indicated that the African loquat, Mobola Plum and Water Pear were regarded as sacred trees in the area. These trees were not exploited for any purpose, however when they died, some of the community members, in very few cases though, would use them for wood fuel. The locals did their traditional ceremonies such as rainmaking under the shed of mobola plum. The African loquat was believed to be the source of food; it provided the locals with fruit. The Water Pear was believed to be the source of ground water. These tree species abound in the area, as they had not been tempered with in fear of upsetting the spirits of the land.

Use of Land Resources

The community heavily depended on land for their sustenance. Their dependence on the land resources was as shown on Table 3.

Table 3: Use of Land Resources

Form of dependence	**Mean rank**
Crop cultivation	1.91
Gardening	2.45

Pasture	2.48
Brick moulding	3.75
Rituals	4.79
Herbal gardens	6.31
Mould clay pots	6.31

The locals exploited land resources mainly for crop cultivation, gardening and pasture. Other infrequent or minor uses included brick moulding, ritual performances, herbal gardens and obtaining soil for moulding clay pots. Crop cultivation and gardening were the major sources of income for the local community. The former was done seasonally while the latter was an all year round practice. The land was thus prone to degradation unless measures were instituted to ensure that utilisation was safe on the environment.

Indigenous Knowledge in the Exploitation of Land Resources

On the use of traditional manure for improving soil fertility in their maize fields, 100% of the respondents indicated that they used cow dung annually; however 62% of the respondents indicated that chemical fertilizers were also used to raise yields. Cow dung was used to supplement chemical fertilizer which was commonly used in the area but becoming more expensive and less available on the market.

The locals practised mixed cropping; they grew beans and pumpkin together with the main maize crop as reflected by 58% of the respondents. Elwell (1991) recommends this practice as one of the best ways of utilising land for three pronged benefits: improving fertility by nitrogen fixation, increasing yields and protecting the farmers against loses from poor weather conditions. Women enjoyed this practice as they derived some pumpkin vegetables and pumpkins thereby adding some food to their baskets during the wet season.

Minimum tillage and leaving the land fallow were used in the community as ways of conserving the land. Although these methods that were at one abandoned, Operation Joseph revived their use. It is cost effective (Ellis, 1992; Elwell and Stocking, 1988) especially among farmers who do not have sufficient draught power; all they need is minimal animal power for drawing lines then sow their crop. The farmers were able to sow their crop in good time however the contention was that the farmers had to weed earlier. The practice suited local requirements and the problem of late cropping due to shortage of draught power also experienced in other parts of Zimbabwe (Eicher and Rukuni, 1994) was alleviated. The practice needed the support of the local leaders for effective implementation as

echoed by Blume (1999) who argues that grassroots participation is critical in development initiatives of this nature.

Organic manure, treated cow dung and composite, were predominantly used for improving soil fertility in the gardens. The dung was obtained from cattle kraals and each household had one such kraal. Some of the farmers used chicken manure from fowl runs. Most of the locals as indicated by 92% of the respondents, engaged in market gardening all year round growing a host of vegetables – leaf, tomatoes and onion as a source of income. Thus school leavers, women heads of households and even the aged depended on market gardening for their livelihoods. The use of organic manure was safe on the soil, the manure was affordable and the treatment done to the manure made it more readily usable on the soil. The farmers thus used the land all year round and on average each farmer produced 50 boxes of tomatoes from about a quarter of a hectare of land per week during the peak of the vegetable growing season.

The water pear was thought to be the source of water from which springs discharged large volumes of water for use by the market gardeners. The farmers designed canals to tap water from the nearby hills and rivers. The irrigation water, used mainly during the dry season, gravitated from springs and rivers to ponds that were set up in the gardens. The tree was thus conserved, as it was believed that cutting it would mean the springs or rivulets dried up – which the locals could not allow to happen. It was found that farmers as far away from the springs as 1 – 2 kilometres were able to draw water for use in their gardens from the springs. The land was thus on one hand used sustainably while the community enjoyed a steady flow of income all year round.

Wetlands were used in a sustainable way to a limited extent in the community. A yam adaptable to water logged conditions and rice were grown on these fragile soils. In some areas gum trees were introduced. The earlier crops maintained the status of the wetlands while the latter had detrimental effects; the trees took up large volumes of water thus draining the land that ultimately would lose its natural value as a unique ecosystem.

Environmental Education in the Community

The local leaders were regarded as playing a key role in conservation and transmission of measures of conserving the environment premised on IK as confirmed by 92% of the respondents. The leaders called for meetings when they felt necessary and took up issues with their people on matters of concern. Members of the community confirmed that they met and debated on conservation issues at these meetings. However the community members, 68% of the respondents, indicated that NGOs, government departments and local leaders did not work together to draw up strategies that were suited to the local conditions rather the outsiders imposed their programmes on the locals. The

situation is reflective of what Warren (1992) regards as an approach where the farmers are treated as though they are naturally ignorant. Nonetheless, opportunities abound for meaningful research to be carried out based on local knowledge if the parties sought to work together.

The community had a programme of inducting new members such as teachers at the local schools, the newly married and any others on the local knowledge framework on resource conservation. The village heads had the responsibility to ensure that these members had gone through the induction process. The family unit was also tasked with the responsibility of instilling EE concepts to the young and other family members. Both the young and the aged, 92% of the respondents, confirmed that the family had a critical part to play particularly on the local EE values of the community. The conservation measures were thus easily transmitted and the community members were obliged to abide by them as each household monitored resource utilisation.

There were a number of players that took part in relaying EE in the community. Among them were government departments such as AREX, Forestry Commission and DNR and NGOs such as Operation Joseph and Danish Aid from People to People (DAPP). These institutions focused on the programmes of interest to them and as pointed out by the respondents, they tended to impose on the locals what they had to offer. Operation Joseph worked on implementation of minimum tillage and DAPP on herbal gardens that had been introduced in the area. The institutions offered detached EE packages to the community thus an all-embracing package had to be designed to cater for local needs.

Challenges in Sustainable Utilization of the Resources

The community was faced with challenges that would affect sustainable utilisation of both forestry and land resources.

Challenges in Use of Forestry Resources

The beliefs held by the community were losing influence on some of the community members – conflicting beliefs from Christian groups in the community meant that traditional beliefs were not observed. Warren (1992) also contends that the young generation tended to question the values that were upheld thereby weakening the conservation measures. There was need for the implementation of an all-embracing EE programme that catered for both the traditional, the Christian beliefs and modern scientific explanation to help achieve the desired end – that of ensuring sustainable utilisation of the resources.

Modern institutions introduced by the local council to deal with people who disobeyed set conservation rules affected the sustainable practice. The headmen who were interviewed confirmed that the local council determined fines and put in place agents to arrest the offenders without consultation with the local leaders. This was contrary to the process of empowerment of the local communities as espoused in participatory approaches in sustainable utilisation resources (Chitsike, 2000; Elliot, 1996; Murombedzi, 1983). The modern institution upset the local and effective practice whereby the traditional leaders charged a fine against the perpetrators or referred the case to the chief if it was of a large magnitude. The local leaders were disempowered and distanced from the conservation practice (Feder et al, 2003; Elliot 1996; Blume, 1993). This development had become a source of conflict and created cracks that weakened the enforcement of the sustainable strategies developed over the years. The traditional set up and modern institutions that were supposed to work together and play a critical role in enhancing the effectiveness of project initiatives did not do so.

Some people including the recently appointed chief moved and settled in one of the sacred plateaus, Dungwi, which in a way, reduced the sacredness of the forest. The settlers started clearing the forests for setting up settlement, crop cultivation would clear the forests and for their fuel wood requirements. The forests were thus subjected to degradation. Measures to check on exploitation of resources in this forest rich in indigenous tree species and genetic varieties needed to be drawn up and implemented to shield the forest from wanton exploitation.

The advent of commercialisation of the African loquat, threatened the forests with degradation from fruit harvesters who would be influenced by the desire to make quick money. Truckloads were shipped to Bindura and Harare for sale during summer, October to December, each year. The harvesters would cut the trees and harvest fruit before it is ripe in contravention to the traditional rules. Warren (1992) argues that the young and the poor may not uphold such values as they are faced with competing values/belief and use resource challenges. A mixture of modern measures such legislation and traditional practices need to be called upon to take into account the changing values and enhance sustainable resource utilisation.

Challenges in Use of Land Resources

The Communal farmers heavily depended on chemical fertilizers that affected land productivity, raised crop production costs and affected the sustainability of the agricultural practice. Elwell (1991) contends that the use of chemical fertilizers increases yields in the short term but impoverishes the soil as the chemical make-up of the soil is affected in the long run. The unavailability of chemical fertilizers on the Zimbabwean market in the 2005-2006 agricultural season forced the farmers to depend on organic manure for improving soil fertility. The farmers reported that they got very low yields, on average five to six 50-kilogram bags per hectare, despite the favourable rains that were

received. The situation was reflective of a degraded soil from continual and predominant use of chemicals.

Institutions such as AREX and an NGO, 'Operation Joseph', that interacted with the community, discouraged mixed cropping in favour of monocropping. This became a source of conflict – the locals felt the obvious loss of crop yields and the indirect loss of soil fertility derived from the practice. Harmonisation of the traditional viewpoint and that of the external experts was thus necessary to enhance sustainable use of the land resource.

The use of chemicals to contain pests was a major challenge the market gardeners had to contend with – the chemicals that were used had serious negative impacts on the ecosystem and sustainability of the practice. Indiscriminately, pests, locusts, pollinators and bacteria were prone to destruction. There was a yawning gap in the area for intervention research and environmental education (EE) on environment friendly ways of combating the pests that attacked tomatoes and leaf vegetables. Elwell (1991) and Altieri (1987) proposed integrated pest management (IPM) as the panacea to pest control and sustainable utilisation of land where pests posed problems. However strategies that were developed in the area, took into consideration local knowledge and suited local conditions had to be designed.

Farmer's Willingness to take part in Conservation

The probability that a household was willing to take part in learning and implementing conservation was hypothesized to be the function of the farmer's attributes – age, level of education and sex - and institutional factors. The Binary Logistic regression model revealed that the IK index had a significant impact on the decision by households ($P<0.05$). Most of the respondents engaged in both crop cultivation and market gardening were willing to engage into some research with experts or outsiders. They appreciated the reduction in production costs they realised when they engaged on minimum tillage. The initiatives need to be spread in harmony with local level knowledge (Leeuwis, 2004).

Recommendations

- The local leaders need to work together with government departments and NGOs in designing strategies that are commensurate with modern day challenges such as the commercialisation of resources and changing values among the community members.
- The farmers, NGOs and government departments have to engage in joint research for substituting chemical pesticides with environment friendly strategies such as IPM that incorporates the IK.

- The local council needs to give the responsibility of punishing those who violate conservation rules to the local leaders; thus in a way, grassroots community would have been empowered to conserve the resources with confidence.
- An EE programme needs to be designed to cater for all; local leaders, farmers, NGOs and government departments for integration of local knowledge and modern conservation measures for sustainable utilisation of the resources.

Conclusion

The study reveals that sustainable utilization of land and forestry resources in Zimbabwe's communal areas is complex. The Musana community depended heavily on forestry and land resources for their livelihoods. Indigenous Knowledge has been influential in instilling a sense of responsibility in resource conservation. The local leaders, the family unit, government departments and NGOs were involved in imparting conservation knowledge to the community members. The sustainable conservation practices were threatened by declining values among community members, introduction of modern measures by government departments and NGOs, the heavy dependence on chemicals for improving soil fertility and pest control and the declining control of resource use by the community leaders. These challenges make sustainable use of resources rather elusive. However the community indicated some willingness to employ IK in utilisation of natural resources which raises some hope for designing an all embracing approach to resource management. The integration of the local knowledge with modern practice would enhance sustainable use of resources. Thus the community leaders, NGOs, the farmers and government departments need to come together and draw up the requisite programmes of saving these critical resources from wanton destruction. All in all, the grassroots community forms the seedbed upon which sustainable practices should be nurtured and developed for the seemingly elusive goal – sustainable resource utilization - to be achieved.

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