

Name

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Title

SOCIO ECONOMIC IMPACT ANALYSIS AND STAKEHOLDERS' PREFERENCE TO THE CONSERVATION OF KASANE FOREST RESERVE, NORTHERN BOTSWANA

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Geographic setting

Chobe District is one of the smallest districts in Botswana and has an international setting. It is where Botswana meets, Namibia, Zimbabwe and Zambia. The District lies within the lines of longitude of 24 and 26 E, and between the latitude' of 17, 45' and 19 S. The specific area under study, Kasane Forest Reserve (total area 13,6000 ha) is one of the six gazetted Forest Reserves in Botswana (Forest Act, Chapter 38:04, 1968) all of which are located within Chobe District. The KFR is located at the north-easternmost corner of the country, adjacent to the Zimbabwe international border and very close to Chobe River, which is also an international boundary. The description of the reserve's boundaries are ; to the north surrounded by Kasane and Kazungula villages, Zimbabwe to the east and Chobe National park to the west.

Short summary of the proposed research project

The Kasane Forest Reserve (KFR) in Botswana is of great significance to the local people and environment of the region. Currently a comprehensive KFR management plan is being developed to meet the various needs and aspirations for the present and future. However, essential data on the needs, values, and perceptions of local communities that are critical to the process do not exist. In the proposed study, I will address this problem, by examining the factors that determine forest dependency, attitudes and perceptions of local residents towards KFR management. Furthermore, the stakeholders' preferences in generating management options will be assessed to provide a framework for biodiversity conservation.

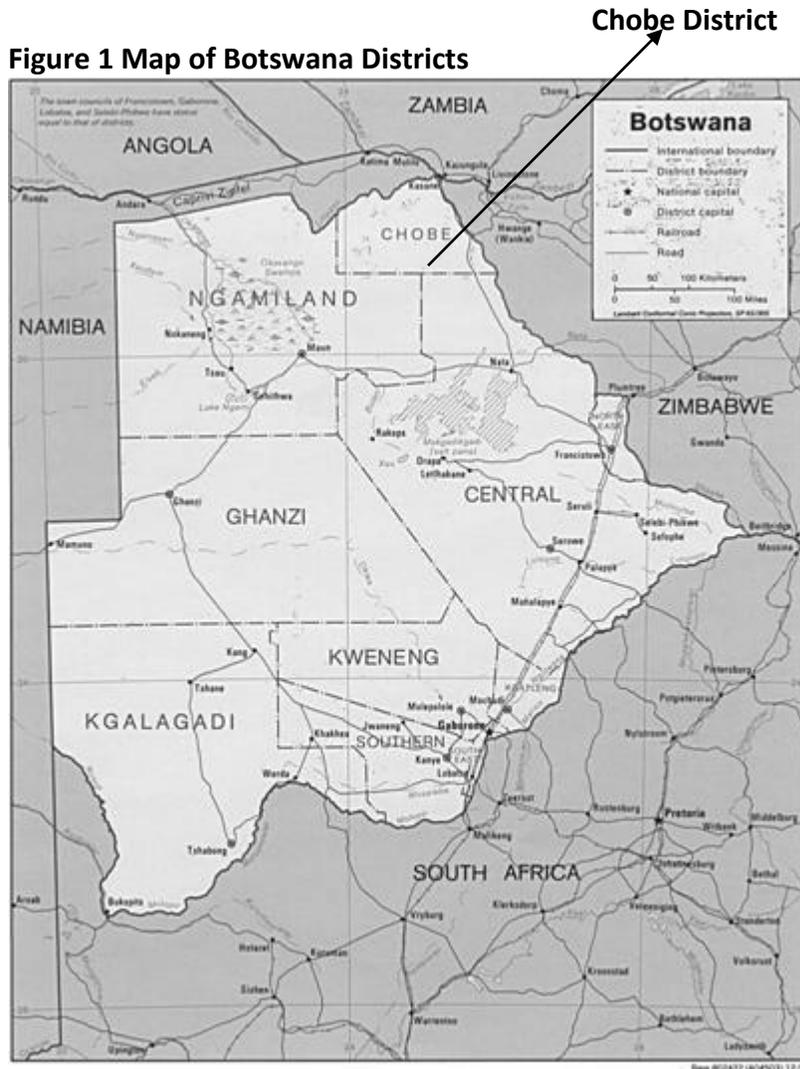
The first objective is to carry out an empirical survey to determine the extent of forest dependency and factors influencing dependency in three communities/villages which surrounds the Kasane Forest Reserve. The second objective is to explore the knowledge and attitudes of local residents towards management of KFR. The final objective is to assess the potential for a multiple use approach/zoning by incorporating stakeholders' preferences in the management. Three hundred survey questionnaires will be administered to households in communities of three villages surrounding the KFR; namely, Kasane, Lesoma and Kazungula to estimate their dependency and their attitudes and knowledge towards conservation of CFR.

Survey data will be analysed using the Statistical Package for the Social of Sciences (SPSS) to get descriptive analysis from survey results. Multiple regression analysis will be used to assess the effect of socio economic and location factors on dependency, awareness and attitudes.

The quantification of the management options from stakeholders' perspectives will be analysed with the application of decision making analysis tools, specifically Analytic Hierarchy Process

(AHP) model. Stakeholders' preference analysis using AHP model will be generated by a computer model 'Expert Choice' generated from pairwise comparisons to produce weights, consistency ratios and rankings by chosen respondents using representative democracy forum

It is expected that people of different demographic and socio economic characteristics are likely to have varying needs and preferences, and posses differing attitudes, perceptions and values towards conservation policy. The result of this research will be relevant not only to KFR management planning in Botswana, but will also contribute to the debate on conservation-production conflict in natural resource management.



Study Area

Geographic setting

Chobe District is one of the smallest districts in Botswana and has an international setting. It is where Botswana meets, Namibia, Zimbabwe and Zambia. It is situated in the

north eastern corner of the country, comprising only 22 559 square kilometers of which (17,831 square kilometers) comprises of Chobe national Park and the six Forest Reserves (Chobe District Development Committee (CDDC), 1997). The District lies within the lines of longitude of 24 and 26 E, and between the latitude' of 17, 45' and 19 S (Fig 1.2). Chobe District is well endowed with natural resources to the point that they compete for land use.

The specific area under study, Kasane Forest Reserve (total area 13,6000 ha) is one of the six gazetted Forest Reserves in Botswana (Forest Act, Chapter 38:04, 1968) all of which are located within Chobe District. These were originally created in order to protect areas containing sufficient quantities of valuable timber sized – trees for licensing logging operations under concession agreements (NFS 1993, Anton 1997). However due to the dwindling supply of commercially exploitable sized trees, the logging operations has been prohibited since 1988 (NFS 1993). The KFR is located at the north-easternmost corner of the country, adjacent to the Zimbabwe international border and very close to Chobe River, which is also an international boundary. The description of the reserve's boundaries are ; to the north surrounded by Kasane and Kazungula villages, Zimbabwe to the east and Chobe National park to the west (Forest Protection and Development project, 1996). The annual rainfall is 500–600 mm, the highest in the country.

Although all Forest Reserves are equally important from the ecological point of view, KFR will always be more closely affected by any planned action. This is because of its vicinity to Kasane Town, villages of Lesoma and Kazungula and to its well developed network of roads and therefore experiencing the highest human pressure (in the form of tourism, private investors, expanding of villages and government installations. The number of threats to the future of the existence of the KFR is increasing. Apart from the biological threat to the forest from fire and elephant damage (Department of Forestry and crop Production) (DCP& F), 1996, Nduwayesi 2004), large areas of the forest (about 3060 hectares) have already been de-gazetted for township expansion (residential and Kasane Airport expansion) in 2002.

The Land encroachment poses even a greater threat to the Wildlife Conservation since KFR acts as a bufferzone for Chobe National Park, which is already under great pressure from a large elephant population. Discussions with the Forestry Section and Tourism department officers in Kasane (Losika pers. comm.) revealed that a lot of pressure is exerted on the Regional Forestry Office by different hotels and enterprises who want to conduct tourist safaris and similar activities in the Forest Reserve. The over-crowding of the Chobe National park seems to be the main reason for justifying their interest.

Location of the study villages and their historical and socio- economic context.

For the purpose of this study, I consider the three communities of Kasane, Lesoma and Kazungula which surrounds the KFR. According to official records, the 2001 census records of Botswana revealed the population of this area as approximately 10247, more than half of the total (18 258) Chobe District population. This area depicts a highest population percentage growth rate of 4.03 percent from 1991-2001 compared to the national average of 2.38 percent (CCSO, 2001).

The village Kazungula was established by the Wenela Agency in 1935 to recruit workers for the mines in South Africa, which also started a forest logging industry from the Chobe forests. With the establishment of the clinic and school around 1945 and 1949 the settlement

rapidly expanded and people started cultivating crops. KFR was established in 1968 on the northern edge of the settlement (Anton, 1997). In 1969 Wenela closed its office in Kazungula and many people originating from Zambia returned home. The start of the war in neighbouring Rhodesia (now Zimbabwe) was an important period to frequent cross border incursions, forcing some people to move to nearby Kasane.

The Lesoma village is completely surrounded by protected areas, which includes the Matetsi Safari Area on Zimbabwean side and the gazetted Forest Reserve in Botswana. The first recorded settlement was in the 1860's around a semi-perennial spring on the valley floor around which cultivation has continued until the present-day. The bulk of the village is located within KFR following a move away from the international border due to cross-border incursions in the mid and late 1970's during the conflict with neighboring Rhodesia. In 2000 the Forestry department negotiated a land swap with villagers and the District Authorities which re-aligned the Reserve boundary out with the village. The population of Lesoma has grown from 234 in 1991 to 454 in 2001 (CSO, 2001).

On the other hand Kasane is not a traditional village, but was established around Government Offices of the District Commissioner, District Officer of Police and Forest Officer in the 1950's (Anton, 1997). Kasane to (a lesser extent Kazungula) is a mixture of ethnic and social groups. Many inhabitants have migrated on a permanent or temporary basis from the other villages in the District. In addition to the number of government officers, a number of expatriates are staying in the district, mostly involved in the tourism sector and farming. There is improved infrastructure and good housing, although there is shortage of land as the area is surrounded by the National Park, the Chobe River and the Forest Reserves. The implication of this migration is that unemployment in Kasane continues to rise (CDDP5, 1997).



Fig 2 Part of land demarcated from Kasane Forest Reserve for housing development.

Photo taken by Researcher Joyce Lepetu (June 2005)

Fig. 3 Part of the Forest Reserve gutted by wildfire in September 2004.

Photo: (researcher Joyce Lepetu showing the part of KFR gutted by fire during her fieldwork in June 2005).



Preliminary Findings

Results on Forest Dependency

Understanding the dependency of households on the KFR is critical for developing management strategies. Reducing the human pressure on biologically rich hot-spots and conserving valuable genetic resources has been and still is a fundamental policy concern in many countries. In the face of rapidly growing human population in and around the bio-diverse regions of the tropical forests, sustainable use of forest products, both timber and non-timber forests products is not easy however. The analysis reveals that forest resources in the protected forest area are an important component of household's activity portfolio. For example, around 54% of the sample households reported collecting fuel wood from this area for home consumption and/or generating cash.

The result from the logistic regression revealed that rich assets households (mainly livestock owners) reduce forest dependency. Put another way, the financial attractiveness of the forest product collection is more important to less diversified households than to more diversified farmers, perhaps as the means of portfolio diversification. This implies that asset-rich households are less likely to exert pressure on KFR.

Furthermore, the study revealed that educated and employed households, albeit not significant, are less depended on forest resources. As it was assumed expanding sources of income would reduce the extent of dependence on KFR, the coefficient of occupation (employment) is negative. If government provides employment opportunities through alternative livelihood options such as tourism, the dependence of on KFR would be reduced.

The present study also indicates that forest dependency is positively and significantly associated with family size. This study is supported by the findings of Energy uses in Botswana by Kabaija 2003 who report that small sized households (1 to 3) persons predominantly used gas for cooking while larger sized households used wood, the "cheaper" energy source. This difference can be attributed to the fact that more energy is used in cooking than lighting, hence larger-sized households cook more food and hence use more energy for cooking, are by necessity forced to use the cheaper energy source.

Controlling household/family size through the provision of favorable policy incentives could help reduce residents' dependence and extraction pressure on the trees being conserved in the protected areas. Special attention here needs to be given to households with large number of adult family members who are unemployed and needs alternative means for income generation options. This means that welfare of elderly people and resource conservation may be promoted through diversifying income sources such as government transfers like increasing monthly pension which is in fact very low, about USD18 per month.

However, one positive aspect in relation to use of energy sources in Botswana is that is that the use of fuel wood as an energy source has been on a consistent decline since the 1981 census. The general pattern therefore appears to be one of an increase in the uptake of conventional energy sources and a decrease in the uptake of traditional energy sources, particularly fuel wood (Kabaija, 2003). These are welcome developments particularly in view of the fears of unsustainable use of wood resources for energy uses. Botswana can leverage on the following alternatives/opportunities in order to reduce pressure on the already dwindling forest resources.

Therefore efforts to conserve KFR such as restricted access , might lead to reduced welfare of the poor who are reliant on collecting forests products especially fuel wood. However, forest protection could in fact benefit the poor if it leads to a rise in prices of harvesting permits for those that collect firewood for commercial purposes e.g. in vehicles who are usually rich households. More importantly, policies that focus on securing forest access by the poor and maintaining them in KFR may actually perpetuate poverty and overexploitation of the resource, if other development options are overlooked (Anglesen & Wunder, 2003). A more effective pro-poor and pro-forest strategy may be one that assists the poor in moving out of KFR and into more gainful employment. Towards this end, public investment creating employment opportunists and promoting self-employment are highly warranted, e.g., educational spending, food-for work interventions (drought relief) and micro-lending programs.

Forest- based approaches, such as market development for under-exploited products like wood crafts and palm crafts (from *Hyphaene pertasiana*) for making baskets may be more cost effective. A very high potential exists in this area which is a hub of tourism sector in Botswana. Such programs can increase local incentives to sustainably manage forest resources. But careful implementation is necessary, because the rise in NTFPs may spur over-harvesting of resources and decrease the incentives for local residents to participate in forest management (Jumbe & Angelesen, 2004). This needs special precaution in an area like Kasane and Kazungula areas which are highly populated urban centers with a strong market economy from the tourism industry coupled with the scarcity of some of these NTFPs in the Forest Reserve.

Other approaches in reducing dependency on forest resources and attaining forest conservation may be fostered by programs that encourage tree planting outside natural forests. One possibility is community-company partnerships; these have proven useful for conserving natural forests and improving rural welfare in many areas (Scherr et al., 2002). Companies typically provide necessary materials, low interest loans, and technical assistance for establishing small woodlots on farm or customary land. In return, companies have the rights to buy mature tress. Botswana government under the Department of Forestry and Range has initiated such projects in other parts of the country; however the feasibility of such programs in land-scarce and problem animals Chobe District requires further investigation. Perhaps the most feasible intervention is the promotion of tree planting around homes, which has been quite successful due to the tree protection afforded by the family members.

Results on Conservation Attitudes

Attitudes were examined using statements that respondents were asked to rate on the 1 to 5 Likert Scale. The mean attitude index was 3.98 and Cronbach's alpha was 0.69 suggesting that it was truly additive and reflective of overall attitude. This results indicate that local people were generally move positive to the Forest Reserve, similar to other findings of Fiallo and Jacobson (1995) in Ecuador; De Boer and Baquete (1998) in Mozambique; Weladji et al., (2003) in Cameroon. Logistic regression analysis suggested that the respondent's level of education significantly influenced conservation attitudes; tertiary education and secondary education are statistically significant at $p < 0.05$, while primary education is statistically significant at $p < 0.10$. All other variables are not significant

In general on a scale of 1 to 4 (least important to most important) 48.5 % of the respondents ranked the Limited land issue as the Most Important problem facing the

community living around KFR, followed by livestock predation (41.85%) and wildlife damage to crops (36.3%) as Important. However lack of access to forest products is perceived as the Least Important problem by respondents (72.2%) faced by the community. However although respondents recognized these factors as problems, none of them influenced conservation attitudes. Despite economic hardships experienced by local people through wildlife depredation, as reported by local people (Lepetu, 2004), the extend of crop damage (**damage**) *albeit* negative, did not influence people's attitudes towards KFR here, although this has been identified as a factor elsewhere (Parry and Campbell, 1992 in Chobe Enclave in the same District; Weladji and Tchamba, 2003 in Cameroon and Newmark et al. 1993 in Tanzania)

Conclusions and future challenges

Since positive attitudes tended to increase with education level, and education level in KFR area is also related to social status (wealth) and hence reduces forest dependency, incentives should be provided for young people to go for further education. This study shows a vast difference between households with (none and elementary educations) and those with (some high school and tertiary education) within the sampled population. Generally education tends to increase one's awareness of the importance of the environment and natural resources.

Last, but not least the government should consider and act upon creating alternative employment and income sources such as ecotourism projects. Therefore the use of the Forest Reserves in Chobe including KFR is fitting more so that Safari companies have expressed interest in using the Forest Reserve to conduct game drives and other tourist activities (Ross, 2001). The communities could benefit by sharing a percentage of leasing revenues, or take a more proactive role in tourism ventures and forest management. The demand for daytime activities from the numerous tourists staying in Kasane Township gives KFR potential as an activity center. Activities may include night drives, walking safaris, naturalistic or scientific groups, bush dinners, bird watching and community based utilization of NTFPs and coppiced products in tourist markets. The activities also seem particularly appropriate for the Forest Reserve due to lower wildlife concentrations (compared to Chobe National Park), permitting safer walking, bird watching and botanical activities (Ross, 2001). The lower wildlife densities of the Reserve, which could be thought to be a disadvantage, can now be used as an advantage by diversifying the kinds of activities available for tourist in Chobe. This diversifying of activities also allows for potential generation of jobs and an increase and maintenance of local skills and cultures.

In summary, to enhance greater cooperation from local people and achieve a sustainable conservation and utilization of the forest reserve, greater stakeholder participation is recommended in designing any management plan. A sustainable action plan should use the forest to pay its own management costs and allow surrounding communities to benefit, so they can see the forest reserve worthy of their protection. Caution should be taken to avoid marginalizing other members who use the reserve for their basic needs.



Fig 4. Subsistence firewood collection from KFR
(Photo taken by J Lepetu)

Fig 5 commercial firewood collection for sale from KFR

(Photo taken by Joyce Lepetu)



PHASE II

The results of stakeholders' preference analysis

This study further sought to assess stakeholders' perception of a preferred management strategy/practice. Based on literature and discussions with the Forestry department, three hypothetical management options were tested: Community Forest Management (CFM), Participatory Forest Management (PFM) and State Forest Management (SFM). In this study, CFM is defined as a type of management where decision-making is solely by the community, and any participation of the state is at the discretion of the community. It should also be noted that stakeholder experience of CFM was limited to a system where use of resources from forests is controlled by a traditional authority such as the local chief or tribal council. Traditional chiefs protected species that were threatened by extinction and regulated the harvesting of forest resources. Local beliefs also prevented the exploitation of some species. In discussions held with stakeholders of the KFR, it was impressed upon interviewees that while the definition was substantially similar to their own (i.e. mediated through traditional leaders), it could also involve a policing and monitoring function of the use of resources by the community members. State Forest Management (SFM) is defined as a forestry practice that is characterized by a centralized, authoritarian structure; a top-down approach to management and decision-making that excludes local communities. The PFM is defined as a joint or collaborative forest management decision-making and planning by both the state and the local communities.

In order to incorporate stakeholders' values in choosing preferred management options, the decision tool called Analytic Hierarchy Process (AHP) developed by (Saaty 1980) was used to elicit stakeholders' preferred forest management options for the KFR. The AHP model has been

extensively used in complex decision-making with divergent interests. Because natural resource planning often entails making choices among alternative management regimes, decision support tools are proposed as instruments for making rational, carefully reasoned, and justifiable decisions (Schmoldt et al. 2001).

In this study, stakeholders were defined in accordance with Borrini-Feyerabend (1996) as social actors who (i) have a direct, and significant interest in an area's natural resources; (ii) are aware of their own interest in the management of the resources; (iii) possess specific capacity (knowledge) and comparative advantages (proximity, mandate) for such management; and (iv) are usually willing to invest specific resources (i.e. money, time, authority) towards some form of management. Therefore, this study included not only local people and Forestry authorities, as it is often the case, but all stakeholders who have an interest in the KFR. Thus, the main groups of stakeholders were involved (i.e. those who affect or are affected by policies, decisions and actions) in the area namely: (i) local people, whose survival may depend on natural resources provided by the PA; (ii) Forestry staff and other administrative authorities representing the government at the KFR; (iii) private tourism businesses in the hunting concession areas surrounding the forest reserve under state regulations and control; and (iv) Non Governmental Organizations (NGOs), research and education institutions which are interested in the conservation of the forest reserve.

Analytic Hierarchy Process Modeling for Stakeholders' Preference Analysis

Stakeholders' preference analysis using AHP model was generated by computer software 'Expert Choice' generated from Pair-wise comparisons to produce weights, consistency ratios and rankings by chosen respondents using representative democracy forum (Keeney and Raifa 1992). A total of 29 usable questionnaires were analyzed. Some of the questionnaires were removed from the analysis because they were not complete. The community stakeholder group from the three villages was the largest comprising 15 representatives; the wildlife group had 6 representatives, the forestry group had 5 representatives, and the Tourism sector had only 3 respondents that represented that group.

The majority of stakeholders overwhelmingly preferred Participatory Forest Management (PFM) weighted at 0.504 for the management of the KFR. The second ranking was State Forest Management (SFM) at 0.348 weighting and the least preferred being Community Forest Management (CFM) at 0.258.

The stakeholders' results tend to correspond with those of the households' survey in which the majority (82.3%) of respondents indicated their desire for PFM. However, the reasons given for greater community participation reveal the main concerns of users: namely the consolidation of user-rights on access and control over resource use, rather than the conservation of the resources. Some issues stated by communities for involvement in decision-making are that local people have the indigenous knowledge (i.e., tree species management), which the administrative experts such as the forestry department do not possess. It is also encouraging that the other stakeholders such as Wildlife and Forestry officers now acknowledge the importance of bringing community members to participate in the management of the forest resources. This they iterate will reduce the conflict and enhance their effort towards sustainable management of the resources.

The question that arises is why community forest management (CFM) is so poorly supported? Obiri and Lawes (2002) suggest that an important reason for this is the diminished capacity of previously recognized community forest management institutions, particularly traditional authorities such as local chiefs. Therefore, local communities are unwilling to accept managerial responsibility for a forest on their own. Another major reason in this area could be that the efficacy and involvement of previously recognized community based natural resource management institutions for wildlife utilization (e.g. KALEPA Trust and the neighboring Chobe Enclave Conservation Trust) have left some mistrust on the communities and government agencies for such institutions, with lack of accountability by members cited as an overriding factor.

Users adjacent to Kasane Forest Reserve recognized that traditional authority had declined in the last 10 years, but nevertheless identified a role for both the state and the community in PFM. It is also noteworthy to consider that grounded knowledge of how communities used to contribute to the protection of natural resources is not always present at the level of traditional authorities. The people who still have first-hand knowledge are old; younger persons have come into traditional offices that have not been sufficiently exposed to traditional education. This is clearly seen in Lesoma village, whose traditional village headman is less than 30 years old. Empowering participatory initiatives in a way that accommodates both traditional authorities and local government structures is a major challenge and should not be underestimated (Grundy and Michell 2004; Robertson and Lawes 2005). Although the traditional methods of controlling resources collapsed after independence, community members still identified a role for both the state and the community in PFM.

These results have important policy implications. Policy makers can strike a better balance between competing stakeholder interests thereby minimizing conflicts. It is interesting to note that all stakeholders recognized the importance of the conservation of biodiversity although the collection of forests products is considered an overriding factor. Policy makers should consider the conservation effort by further evaluating the extent of the conservation values that must be preserved. This is particularly so because of the small sized nature of the Forest Reserve and its associated negative pressure such as fire and elephant damage. It is not surprising that the grazing attribute is considered less important to influence the choice of management options. This is maybe because an alternative avenue, Ranch 256 in the adjacent forest reserve, has been allocated for this attribute. The research clearly indicates that the preferences of the stakeholders should be incorporated in the in the decision-making process.

While there is no blueprint for the implementation of the management that suits every situation, it is felt that participatory management of the Kasane Forest Reserve is the preferred management institution. However, its success will depend on an improvement of relationship between stakeholders, particularly between users and the forest owners (State). The State does not have the resources to control forest use or other illicit behaviors (e.g. setting up fires in the forest and poaching) without the help of the communities. Thus, PFM is a useful means of managing the resources. Baland and Platteau (1996) note that trust building between partners is necessary for effective co-management. A crucial step suggested by Ostrom et al. (1993) is to involve the targeted community beneficiaries at the design stage of the project.

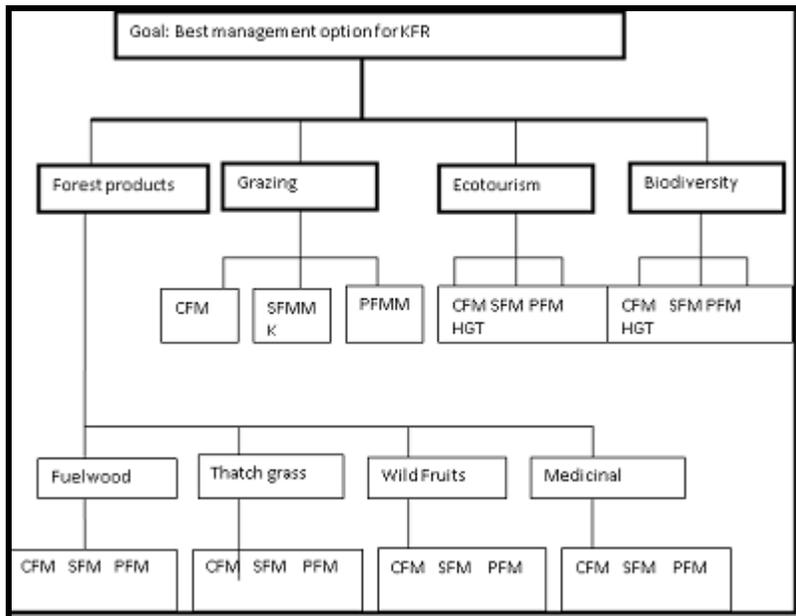
To help close the trust gap and mitigate the condition of skepticism and apathy, frequent monitoring and interactive meetings needs to be held with local communities. In an ideal

situation, dedicated, on-site PFM practitioners should be deployed within communities to foster understanding and build relationships.

Working with communities in a truly participatory way is a relatively new function for Foresters the world over (Bass 2001), and Botswana is no exception. It is recommended that detailed feasibility studies be undertaken prior to the implementation of PFM. This will place the government in a better position to plan a pragmatic approach to offset any challenges that may be later encountered. Such studies could highlight the various types of heterogeneity that exists among stakeholders and how they can be harnessed and managed to ensure that they work for the program. Thakadu (2005) reported that lack of feasibility studies deprived the success of CBNRM implementation in Botswana. Therefore, caution should be taken not to dismiss state forest management (SFM) quickly because it is too 'protectionist' without any bases on feasibility studies that can inform the DFRR on how best to manage the differences among stakeholders.

Benefits that accrue from SFM are more widely spread through the society, unlike CFM and PFM, which largely addresses only the interests of stakeholders immediately adjacent to forests. Neither SFM nor CFM can solve the problems of forest conservation on their own, but a comprehensive system that includes community participation and considers some protection of the resource base by the state has a better chance of achieving this goal.

Figure 6. A hypothetical management for choosing the best management option for KFR



Financial Report

Item	Amount(US \$)
Hired transport and petrol charges in Chobe District	3,000
Translating the instrument to Setswana language and photocopying the questionnaires	1,000
Air- Ticket Gainesville- Gaborone(return)	2,500
Hired research assistants for 5 months for data collection at Botswana' daily rate @ 6.7 *4 *30(days)* 5 months	4,020
Stakeholder workshop for AHP model, elicitation exercise,(costs approximately) for venue, feeding the participants.	500
Purchase of Expert Choice software for AHP modeling stakeholders' preferences	450
TOTAL	11,470