Research Application Summary

Forest dependency and livelihood around Kasane Forest Reserve, Botswana

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Abstract

Conservation of biodiversity in protected areas will be more challenging if local communities are heavily dependent on them for various products and subsistence needs. This study estimated forest dependency and identified factors influencing dependency for households living around KFR. Data collected from 237 households were analyzed using logistic regression model. Descriptive results demonstrate the very different resource use of population and the diversity of the local people. Logistic regression suggests that forest dependency is positively and significantly associated with family size. However asset rich households were less dependent on forest resources. Thus, policy makers need to consider the needs and economic options with the above components as an alternative strategy for forest protection so as to create a win-win relationship between conservation and local rural development options.

Key words: Biodiversity conservation, Botswana, forest dependency, Kasane Forest Reserve, local communities

Résumé

La conservation de la biodiversité dans les aires protégées sera plus difficile si les communautés locales sont fortement dépendantes d'elles pour les divers produits et les besoins de subsistance. Cette étude a estimé la dépendance forestière et a identifié les facteurs qui influent sur la dépendance pour les ménages vivant autour de la Réserve Forestière de Kasane (KFR). Les données recueillies à partir de 237 ménages ont été analysées en utilisant le modèle de régression logistique. Les résultats descriptifs démontrent l'utilisation des ressources très différente de la population et la diversité de la population locale. La régression logistique indique que la dépendance forestière est positivement et significativement associée à la taille de la famille. Cependant, les ménages riches en biens sont moins dépendantes des ressources forestières. Ainsi, les décideurs politiques doivent prendre en considération les besoins et les options économiques avec les composants ci-dessus comme une stratégie alternative pour la protection des forêts

afin de créer une relation gagnant-gagnant entre la conservation et les options locales de développement rural.

Mots clés: Conservation de la biodiversité, Botswana, dépendance forestière, Reserve Forestière de Kasane, communautés locales

Background

Millions of people are estimated to live in the periphery or in the forests and are making use of these forests for survival as well as for commercial purposes (Coomes *et al*., 2001; Arnold and Perez, 2001). Population growth, market development, and migration, just to mention a few, put the sustainability of these traditional systems under question. In response to the concern over the destruction of tropical forests, governments in developing countries, have often reacted through policy measures that established certain forest areas as protected forests and have passed legislation that restrict use of these forest resources (Heltberg, 2001; Guntalake and Chakravorty, 2000). However, as argued in Maxted *et al.* (1997) the ultimate rationale behind conservation is the potential human utilization. Therefore, user communities must be considered when designing the reserve, whether in terms of permitting sustainable exploitation within the buffer or transition zone by traditional farmers, or building appropriate for revenue generating facilities by attracting ecotourists or scientific visitors. Each user community has a different view of the reserve and a different set of priorities. The requirements of each group of users should be surveyed before the reserve is established and their needs met as part of the management regime. Failure to understand the basic logic of forest people's livelihood practices limits the ability to develop appropriate strategies and institutional arrangements for local forest management, and thereby reduces the likelihood that conservation and development initiatives will achieve their desired goals (Takasaki *et al*., 2000). In southern Africa, this particular "official" approach to natural resource management has generated a range of social conflicts that now endanger the very future of natural resources. In particular , for many local communities in developing countries these areas are the main sources of food, energy, nutritional, medicinal and other subsistence needs (Bahuguna, 2000).

Therefore in designing community-based management programs or any conservation and development approaches, an understanding of relationships among resource use patterns is critical. Particularly of interest, are cases in which resource

users are composed of diverse stakeholders with various interests? Forest dependency also varies across households (Adhikari *et al*., 2004; Gunatilake, 1998; Lise, 2000; Masozera and Alavalapati, 2005). In some instances, dependency is reduced as a result of alternative sources of income and livelihood (Gunatilike, 1998; Shackeleton *et al*., 1998). This suggests that locals' dependency must not be overlooked in protected areas management. In particular the identification of the factors affecting forest dependency is an initial step towards formulating policies that are conducive for an equitable sustainable resource management (Gunatalike, 1998; Hedge and Enters, 2000). This study estimates households' dependency on the Kasane Forest Reserve (KFR) in Botswana, identifies key factors influencing the dependency and draws policy implications for management.

Before addressing these issues, an overview of the historical and current management and policies relating to forests and the KFR is provided.

Materials and Methods

Kasane, Kazungula and Lesoma, the three villages surrounding KFR where the study was conducted, have a total of 2657 households (CSO, 2001). From this, a sample size of 237 households was selected which was approximately about 10% of population size. Within the selected villages, a list of the households was acquired from the District Council Offices from which a simple random sample was applied to select households. Sampling was done by writing down names of residents' households on pieces of paper and these were put in a box from which names of the household owners were drawn at random based on the location of the wards. The choices of respondents based on the location of the wards were done in order to ensure equal chances of selecting different land uses around the PA (arable farmers, livestock farmers, tourist operators) and location-specific factors (e.g., distance to the Protected Areas). Where the household owners were unavailable, it was not possible to go back to visit the household in the evening for fear of wild animals; therefore in such cases, where the head of the chosen household was not available at home, the adjacent or a nearby household was selected.

Survey design. The survey instrument contained both close and open ended questions. The questions asked were related to resource use, perceptions, the demographic characteristics and socio economic data. The data on household characteristics

included (gender, age, household size, residency and education [ability to read and write, non-formal, primary, secondary and tertiary level] and occupational data).

Model specification. Household's dependence on KFR was calculated as the ratio of annual income earned from forests to the total annual income earned from wealth and other sources (agriculture, off-farm employment, and the KFR). The procedures that were followed to derive income from each source are explained below.

For this analysis, the forest dependents are defined as the households having a positive income from forest related activities (see explanation below for calculating percentage of forest income below). Forest dependency is classified based on the relative forest income rather than the absolute forest income. Relative income is used because it is difficult to say what level of absolute income determines the forest dependency. Relative dependency is classified as the percentage of full income contributed by forest products while absolute dependency is classified as quantities of forest products collected (Pattanayak *et al.*, 2003). The model used to estimate forest dependency is as follows:

$$\ln (P_i /1- P_i)= \beta_0 + \beta_1 X_1 +\ldots+ \beta_k X_{ki}. \quad (1)$$

Where:
i denotes the i-th observation in the sample
p is the probability of dependency on forest resources
β_0 is the intercept term
$\beta_1 \ldots \beta_k$ are the coefficients associated with each explanatory variable $X_1 \ldots X_k$.

The impact of age, gender, education, household size (HHsize), total wealth assets (Weassets), and number of years living in the area (Resident) on forest dependency is estimated. Household income was computed for each household based on the information provided by them. The computation of household income was carried out as follows:

Household Annual Income = Σ (Forest Income + Agriculture Income +Return to Wealth + Wage Income)
Forest Income = Σ (Fuel wood annual income + wild fruits income+ poles income + Thatching grass income)

Agriculture Income = Σ (maize income + sorghum income + millet income + Beans income)

Wealth (Assets) = Σ (Livestock Assets + Household Assets)

Livestock Assets = Σ (Cattle income + Goats income + Sheep income + Donkeys income + Pigs income + Chicken income)

Household Asset = Σ (Radio price + TV price + Bicycle price + Tractor price + Donkey cart price + Car price + Cell phone price + Fridge price + Bed price)

Forest income. Information about collection and sale of forest products was obtained from households. In addition, a list of all non-timer forest products (NTFP) was prepared with key informants and the Forestry Staff and Document reviews as a checklist to remind respondents about product they might forget. Products such as thatching grass, fuelwood can be traded commercially to generate cash while subsistence products such as medicinal plants, wild fruits and fuel wood are used for household consumption. Income from commercial products was calculated by multiplying the quantities with market prices. Income on subsistence products was computed based on surrogate prices.

Agriculture income. Agriculture includes cultivation of crops for purposes of both household consumption and selling. Information on crop yields was gathered from individual households through the questionnaire survey. Prices of crops were obtained from the local market or through the Botswana Agricultural Marketing Board (BAMB) which sets prices for the sale of crops in the country.

Wage income. Information on salaried jobs and business was collected from individual members. This also includes other sources of income such as remittances, and pensions for age old people. This information was provided by the respondent.

Other household assets. The annual rate of return on capital (livestock, tractor, and car) was computed as a product of the price and the interest rate. The interest rate used for this study was 10% which was determined after discussion with relevant departments in Botswana. In certain cases such as prices for cattle, goats and other livestock, the surrogate market price was used depending on the age of the animal. Other assets

such as small items such as radios, bicycle, and television, the respondent was asked how much he will be willing to sell that item at the current market.

Since there was no basis for assigning the forest dependency index from Botswana Government sources, the dependency index in this particular study was divided at the median (Sah and Heinen, 2001). Although there are a few cases in the 40% range and beyond, the majority of cases are clustered at the lower end of the scale, with most of them falling below 8%. These high values for only a few cases have a significant effect on the mean but little or no effect on the median, making the median a better indication of central tendency in this example (Mertler and Vannata, 2005).

It is assumed that households whose forest income represents greater or equal to a value greater than 8% of the total income are dependent on the forest, while households whose forest income represents less than 8% of the total income are less dependent. Thus, the variable is assigned a value of zero (0) if the household forest dependency is < 0.08 and a value of 1 if the household dependency index is e" 0.08. The binary nature of the dependent variables suggests that a logit model is appropriate (Gujarati, 1995). The categorical explanatory variables, education are recoded as 0 representing "those with above primary education level as educated (1) and those below primary education level as (0). Gender was also recoded as 1 and 0 respectively, male (1) and female (0). Before presenting the results of estimation, a brief description of each explanatory variable and expected theoretical relationship to forest dependency is provided below.

Age. People of all ages can be forest dependent, however young people may be more dependent on forest products than elderly people may. The reason for this is that the young people may have multiple uses of the forests and more so forest products collection is labor intensive. On the other hand, the elderly people may not take a risk of going into the forest to undertake forest activities particularly that the elderly people may not have the strength to carry out forest related activities (Kohlin and Parks, 2001). It is therefore hypothesized that forest dependency is inversely related to age.

Education. In general, education opens up better employment opportunities for people, thus diverting them from agricultural

and other subsistence activities (Hedges and Enters, 2000). The higher social status of the educated, government or private sector employees may also restrict their involvement in forest dependent activities since they can afford the modern type of lifestyle e.g. using gas stoves or electricity for cooking. Therefore, it is hypothesized that forest dependency is inversely related to the education level of members of the family.

Gender. Both the males and females can be dependent on the forest. However, women and men collect and use different forest products, for different uses (Campbell, 1991). The collection of firewood and medicinal plants are joint activities, while the collection of thatching grass and wild fruits are exclusive chores for women. Cutting building poles is exclusively a man's activity. Because collection of forest products is prohibited and in some cases there is a danger of wild animals in these areas, men are more likely to take the risk of going into the forest when compared with women. It is therefore hypothesized that male-headed households are more likely to be more dependent on forest resources than female-headed households are.

Household size. Families with more labor tend to extract more forest resources (Gunatilake, 1998; Hedges and Enters 2000; Masozera and Alavalapati, 2005) because they are able to mobilize part of their families to undertake forest dependent activities while maintaining a labor supply for other village–based activities. Furthermore, larger families have higher subsistence needs, and that may be another reason to depend more on forest resources. Therefore, it is assumed that larger households are directly related to forest dependency.

Wealth assets. Wealth assets are calculated in this study as the sum of physical and livestock assets. In rural Africa, livestock acquisition remains a key form of wealth accumulation (Dercon, 1998 quoted by Fisher, 2004). In the Chobe District, scarcity of land and the Tsetse fly disease limit cattle rearing. Livestock is relatively liquid asset that can be sold in response to price fluctuations, or for consumption or to provide financial capital to start a business or to pay for the acquisition of household assets. It is hypothesized that people who have more livestock and other household assets are inversely related to forest dependency, because livestock rearing is one of the stable sources of income for the households (Fisher, 2004). Therefore,

it is expected that asset-rich households are less likely to exert pressure on forest resources.

Duration of residence. Long-term residents are likely to be more knowledgeable about the ecological structure, composition and seasonal patterns of the forests and hence collect more forest products (Pattanayak *et al.*, 2003). It is therefore expected that length of residency is directly related to forest dependency.

Results and Discussion

Forest resource utilization. As in most other parts of the country and in this region in particular, firewood is still one of the most important source of household energy (Table 2). However, only 138 (58.2%) of the households reported ever going into the forest reserve. Most households are virtually asset-poor and the distributions of key assets are unequal. The use of building poles and thatching grass has declined significantly in the study area as compared to a decade ago (Anton, 1997). This is shown by a shift towards corrugated iron roofing by households in the study area (personal observation).

Although there is widespread selling of handicrafts to tourists by both men and women at the market place (personal observation), all of these products were bought from traders from the neighboring countries of Zimbabwe and Zambia and others from the neighboring remote areas of the Chobe Enclave.

Table 2. Frequency distribution of forest resources collected in KFR.

Category	Frequency	Percent
Forest resources		
Fuelwood	128	54
Building Poles	2	0.8
Wild Fruits	15	6.3
Thatching Grass	2	0.8
Handicrafts	4	1.7

Table 3. Forest income as a percentage of total household income in three villages.

Villages	N	Mean	Std.Dev	Minimum	Maximum
Kazungula	57	10.87	14.99	.00	72.75
Kasane	154	4.89	9.77	.00	67.83
Lesoma	26	15.99	21.76	.00	77.73
Total	237	7.55	13.44	.00	77.73

Residents attribute this to the scarcity of local material for making handicrafts in the Kasane Forest Reserve (KFR). Residents also felt that the availability of fruits was declining due to an increased population in recent years of elephants and baboons which either damage the trees or pick the fruits before they are ripe for human consumption. Thatching grass is becoming more difficult to find due to the lack of annual early burning to promote fresh vigorous growth in the next growth season. According to villagers in the survey, this was due to disagreement between the Forestry Department and the local people on certain management decisions such as the timing of early burning.

Comparison of villages. As discussed in the above Section, the main source of forest products collection (either for sale or subsistence use) is in the form of fuel wood collection, followed by wild fruits and very small amount for other products. Kasane has the highest average total households' income, while in Lesoma, the proportion of the forest income to the total income is higher than in the other two villages. One-way ANOVA was used to compare the percentage of forest income over the total household income from the three villages. A significant difference was found among the villages (2, 234) = 10.696, p<000). Hence, a hypothesis of equal means can be rejected (Table 4).

Table 4. ANOVA -Forest income as a percentage of total household income.

	Sum of squares	df	Mean square	F	Sig.
Between groups	3569.69	2	1784.85	10.696	0
Within groups	39047.2	234	166.868		
Total	42616.8	236			

Tukey's HSD(Table 6) was used to determine the nature of the differences between the villages. The analysis revealed that percentage of forest income was significantly high for the village of Lesoma (m = 15.99, sd = 21.76) followed by Kazungula (m = 10.87, sd = 14.99), but the two villages are not significantly different from each other. The percentage of forest income is lower for the village of Kasane (m = 4.89, sd = 9.77) and is significantly differently from the other two villages. There are severable explanations for the observed inter-village differences. The notably important reason is that Kasane is

Table 5. Dependent variable: percentage of forest income/total household income Tukey HSD multiple comparisons.

(I) Place of interview	(J) Place of interview	Mean difference (I-J)	Std. Error	Sig.
Kazungula	Kasane	5.98253(*)	2.00277	.009
	Lesoma	-5.11460	3.05704	.218
Kasane	Kazungula	-5.98253(*)	2.00277	.009
	Lesoma	-11.09713(*)	2.73890	.000
Lesoma	Kazungula	5.11460	3.05704	.218
	Kasane	11.09713(*)	2.73890	.000

* The mean difference is significant at the 0.05 level.

Table 6. Nonparametric correlation of forest income with continuous variables.

Variables	Spearman's Rho	P - value
Age	0.161	0.013*
Education	-0.290	0.000**
Household size	0.363	0.000**
Residency	0.339	0.000**
Annual wage income	-0.249	0.000**

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

the most urbanized of the two villages followed by Kazungula, and therefore there are more opportunities for employment in both the government and private (tourism sector) and for self employment in Kasane. This factor makes collection of forest products in Kasane a less lucrative option.

Correlation of selected households' variables with forest income. A Spearman rho correlation coefficient was calculated for the relationship between dependent variable forest income and selected households' explanatory variables. This is a non parametric procedure that determines the strength of the relationship between two variables. A significant correlation indicates a reliable relationship, but not necessarily a strong relationship. With enough subjects, a very small correlation can be significant. Generally, correlations greater than 0.7 are considered strong. Correlations less that 0.3 are considered weak. Correlations between 0.3 and 0.7 are considered moderate. The nonparametric correlation of continuous variables with forest income (Table 6) showed that there was a significant

negative correlation between forest income and annual wage income (p = 0.000), education (p = 0.000), occupation (p = 0.003). On the other hand, significant positive correlations were observed between forest income and explanatory variables such as age (p = 0.13), household size (p = 0.000) and residency (p = 0.000).

Results of the model explaining forest dependency are presented in Table 7. The likelihood ratio test shows that the regression model is significant with Chi-Square statistics of 37.58. This result indicates that the explanatory variables in the model are significantly related to forest dependency. The results show that the model predictions are correct 72.60% of the time indicating that the explanatory variables can be used to specify the dependent variable, in discrete terms (1,0), with a moderate degree of accuracy. Coefficients of Household size (HHsize**)** and Wealth assets (Weassets**)** are statistically significant at 5% significance level. Other explanatory variables, Gender, Age, education and Residency, the coefficients are generally small and insignificant too.

Table 7. Logistic results of forest dependence.

Variables	B	S.E.	Wald	Exp (B)
Gender	.064	.330	.037	.938
Age	.016	.014	1.360	1.016
Education	-.268	.478	.315	.765
Resident	.016	.013	1.542	1.016
Household size	.144*	.051	7.946	1.155
Wealth assets	-.00044*	.000	7.613	1.000
Constant	-1.851	.965	3.679	.157
Correct Prediction	72.6%			
LR Test	37.58			

* Coefficients significant at p<0.05.

The positive association between household size and forest income indicated that larger households tended to derive more income from forests. The variable Household size (HHsize) shows a positive relationship with forest dependency. This suggests that large families tend to depend more on forest resources. The effect on the probability of forest products utilization (collection) of increased family size is further pronounced when the household lacks other income generation options such as formal employment. This result concurs with the findings on fuel wood collection reported by Köhlin and Parks (2001). Kgathi *et al*., (2004) also found a positive significant

relationship between household size and fuelwood consumption in Mmankgodi, Botswana. Though regression model revealed that fuelwood consumption increased as household size increased, each subsequent increase in household size was associated with a lower increase in fuelwood consumption in proportional terms because large households tend to use fuelwood more efficiently than small households (Kgathi *et al*., 2004).

The variable Weassets shows a negative relationship with forest dependency which is consistent with the prior expectation. This implies that households with larger wealth assets are less dependent on forest resources. Asset-endowment of the household was included in this analysis in terms of value of household assets and value of livestock held. The only plausible explanation for this result could be that people who have large herds of livestock are unlikely to have time for harvesting forest products as they have to spend most of their time herding their animals. This finding is corroborated by other studies in Africa (Barrettt *et al*., 2001) and elsewhere (Sills *et al*., 2003; Takasaki *et al*., 2000). However, the use of basic and advanced technology e.g. donkey cart and trucks by well off community members may lead to overexploitation of the forest resources, hence denying those who do not have the new technology access to the forest resources. This could even be more detrimental where regulations and rules governing the resource use in a forest reserve are not enforced.

Conclusions and Recommendations

The understanding of the dependency of households on the KFR is critical in the development of 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 populations 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. This research analysis reveals that forest resources in the protected forest area are an important component of the households' activities. About 54% of the sampled households reported collecting fuel wood from this area for home consumption and/or income generation.

The result from the logistic regression reveals that rich in assets households (mainly livestock owners) are less forest dependent. This suggests that the financial attractiveness of the collection

of forest product is more pronounced on less diversified farmers than on more diversified farmers, perhaps as the means of portfolio diversification. This implies that asset-rich households are less likely to exert pressure on the KFR. Furthermore, the study reveals that educated and employed households, although not statistically significantly different, are less dependent on forest resources. If the government provides employment opportunities through alternative livelihood options such as tourism, the dependence on the KFR might 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 on energy uses in Botswana by Kabaija (2003) who reported that small-sized households (1 to 3) persons predominantly used gas for cooking while larger-sized households used wood, which is the "cheaper" energy source. This difference may be attributed to the fact that more energy is used in cooking than lighting. Hence larger-sized households cook more food leading to more energy for cooking, and hence are forced to use the cheaper energy source.

Controlling household/family size through the provision of favorable policy incentives could help reduce the residents' dependency and extraction pressure on the trees being conserved in the protected areas. Particular attention here needs to be given to households with large numbers of adult family members who are unemployed and need alternative means for income generation. This means that the welfare of elderly people and resource conservation may be promoted through diversifying income sources such as increasing monthly pension, which is currently very low, about US$18 per month.

However, one positive aspect in relation to the use of energy sources in Botswana is that the use of fuel wood as an energy source has been on a consistent decline since the 1981 population 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 rely on the following alternatives/opportunities in order to reduce pressure on the already dwindling forest resources:

Firstly, Botswana has an abundance of one source of energy whose use is environmentally friendly, and that is solar energy.

Therefore, the potential for solar energy can be exploited, particularly in rural communities that are not catered for by the national electricity power grid. In addition, the National Development Plan 9 (NDP 9) Energy sector policies and strategies that could have a positive impact on the improvement of this sector include:

(i) Continuation of the collective rural electrification scheme (which allows for only 5% down payment in rural areas and a repayment period of 15 years). This payment method makes it easier for poor households to connect electricity to their households.
(ii) Improvement in safety aspects and distribution of illumination paraffin and gas- especially in rural areas where there are no service stations.
(iii) Support of the introduction and use of other fuels (e.g. cow dung, coal) and other appliances such as coal stoves.
(iv) Ensurance of the sustainable use of fuel wood by promoting fuel efficient stoves.

Efforts to conserve the KFR through restricted access, might lead to the impoverishment of the already poor households which 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. More importantly, policies that focus on securing forest access by the poor and maintaining them in the KFR may actually perpetuate poverty and overexploitation of the resource, if other development options are overlooked (Anglesen and Wunder, 2003). A more effective pro-poor and pro-forest conservation strategy may be one that assists the poor in moving out of the KFR and into more gainful employment. Towards this end, public investment creating employment opportunities and promoting self-employment (e.g. educational spending, food-for work interventions and micro-lending programs),are highly recommended, 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 effective. A very high potential exists in this area, which is the hub of the tourism sector in Botswana. Such programs can increase local incentives to sustainably manage forest resources. Nevertheless, careful implementation is necessary, because the rise in non-timer forest products (NTFP) may encourage over-harvesting of resources and decrease

incentive for local residents to participate in forest management (Jumbe and Angelesen, 2004). This needs special attention in areas such as Kasane and Kazungula that 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.

Programs that encourage tree planting outside natural forests may foster other approaches in reducing dependency on forest resources and attaining forest conservation. 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 provide necessary materials, low interest loans, and technical assistance for establishing small woodlots on farm or customary land. In return, companies have the sole rights of buying the mature trees. Botswana government through the Department of Forestry and Range Resources has initiated such projects in other parts of the country. However, the feasibility of such programs in the land-scarce and problem-animal Chobe District requires further investigation. Perhaps the most feasible intervention is the promotion of tree planting around homes, which has been quite successful elsewhere in Botswana due to the tree protection afforded by the family members.

Lastly, the government should consider and act upon the creation of alternative employment and income sources. The use of the forest reserves in Chobe including the KFR is more appropriate because Safari companies have already 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 lease revenues, or take a more proactive role in tourism ventures and forest management. The demand for daytime tourism activities from the numerous tourists staying in Kasane Township gives the KFR potential as a tourist center. Activities may include day game-drives, walking safaris, naturalistic or scientific groups, bush dinners, bird watching and community based utilization of NTFPs such as crafts in tourist markets. The activities also seem to be particularly appropriate for the KFR due to its lower wildlife concentration when compared to the Chobe National Park. This would permit safer walking, bird watching and other botanical activities (Ross, 2001). The lower wildlife densities of the KFR which could be a disadvantage could also be an advantage by diversifying the activities available for tourists in the Chobe district. The

diversification of activities also allows for the potential generation of jobs, an increase of local skills and maintenance of traditional cultures.

In summary, to enhance greater cooperation from local people and achieve sustainable conservation and utilization of the forest reserve, greater stakeholder participation is recommended in the design of any management plan. A sustainable management plan should use the forest to pay its own management costs and allow surrounding communities to benefit; hence, they can see the forest reserve as worthy of the protection. Caution should be taken to avoid marginalizing other members who use the reserve for their basic needs. This will require critical consideration and integration of conservation of the resource with peasant household development in the area. Lastly institutions must be identified to facilitate the implementation of the management plan and ensure equitable distribution of the benefits to local communities.

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