EFFECTIVE MONITORING OF DECENTRALIZED FOREST RESOURCES IN EAST AFRICA

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Abstract

There is no doubt that state control of forest resources in many countries has proved to be ineffective in solving and halting the rate of deforestation. The financial and human resources available to government forest departments are inadequate to carry out the task of policing forested areas without the participation of local communities.

However, the success of decentralizing resources to local communities depends on solving three puzzles; the problem of supplying new institutions, the problem of credible commitment and the problem of mutual monitoring.

IFRI, studies in Uganda have known that monitoring and rule enforcement is very important for the success of decentralized forest resources (Banana and Gombya-Ssembajjwe 1999). Trying to understand how use-groups and /or communities have monitored their own conformance to their agreements as well as their conformance to the rules in the E. African region is the challenge of this study.

The study revealed that an effective monitoring strategy involves having good incentives for the monitors and a mechanism to supervise or monitor the monitors themselves. Where effective was effective, there are few illegal activities, high basal area and the physical and biological condition of the CPR was expected to improve with time.

Introduction

There is no doubt that state control of forest resources in many countries has proved to be ineffective in solving and halting the rate of deforestation. The financial and human resources available to government forest departments are inadequate to carry out the task of policing forested areas without the participation of local communities. Many forest resources are small and scattered over large areas which make monitoring and rule enforcement by the state very costly, if not impossible (Ostrom 1990, Bromley *et al*. 1992).

The concept of decentralizing forest management by involving local communities and other stakeholders so as to reduce costs and improve the efficiency of monitoring and rule enforcement is not new to the E. African region. As early as the 1970's forest officials put forward the concept of zoning certain areas of Forest parks for community use (e.g. Mt. Elgon Forest Park and Mt. Elgon National park in Uganda and Kenya respectively. Tanzania Ujama policies is encouraged communal of land and forest resources.

However, according to Ostrom (1990) the success of decentralizing resources to local communities depends on solving three puzzles; the problem of supplying new institutions, the problem of credible commitment and the problem of mutual monitoring.

Establishing trust and establishing a sense of community is essential to reduce the incentives to free-ride. Commitment explains why members of a user-group or members of a community can organize themselves to obtain long-term collective benefits. This is because, when individuals organize themselves to solve CPR problems, they establish rules that severely limit the authorized activities. For example, they determine how many resource units an individual can take, when, where and how they can be appropriated; how much labour, money or other materials must be provided to various activities. Without commitment, not very many individuals would follow these rules in addition to putting time and money to safeguard the resource.

In addition to individuals of the community or user group members being committed to the CPR cause, there must be mechanisms for mutual monitoring of conformance to a set of their own rules. Why should an individual patrol the forest boundary? What is in it for him? But some individuals and/or communities have created institutions to manage forest resources and committed themselves to follow rules, and monitor their own conformance to their agreements, as well as their conformance to the rules in a CPR situation.

Before a community can induce its members to join a community-based forest management scheme, it must overcome a free-rider problem. Monitors, who actively audit the condition of the community managed forest resource and the 'members behaviour are accountable to the community. In self-sustaining community based forest management schemes, monitoring and sanctioning are undertaken by the members of the community themselves.

The cost of monitoring and sanctioning activities in East African decentralized forests is very high. This may be attributed to the fact that there is a very low level of voluntary compliance. Most of the now decentralized forests were once government reserves but because of lack of monitoring and rule enforcement, these forest resources were utilized by the communities or as "open-access resources".

If monitoring and sanctioning activities are costly, what strategies has the management committees of these decentralized resources adopted? The factors affecting the cost of monitoring a common pool resource varies significantly and may include this following:

I size of the resource,
ii. the level of dependence of the community on the resource,
iii. the demand for the resource units,
iv. the rules and regulations governing the resource and
v. resource tenure

Depending on the above factors, the incentives given to the monitors of the CPR resource also varies and may include:

i. Wage income paid by the appropriators, as is the case in government and private forests.
ii. Monitors are allowed unlimited access to the forest resource units as is the case with the Batwa (pygmy monitors in Echuya forest reserves).
iii. Monitors are exempted from other communal work in the settlement (e.g. monitors in the Duri-Haitemba forest reserve in Tanzania)
iv. The status of the monitors in the community is enhanced (for example monitors in the sacred forests in Uganda and Kenya).
v. All appropriators (user-groups) volunteer to monitor in turn (for example monitors in collaborative forest management schemes at the initial stages).
vi. Monitors are allowed to sell forest produce confiscated from illegal harvesters

IFRI, studies in Uganda have known that monitoring and rule enforcement is very important for the success of decentralized forest resources (Banana and Gombya-Ssembajjwe 1999). Trying to understand how use-groups and /or communities have monitored their own conformance to their agreements as well as their conformance to the rules in the E. African region is the challenge of this study.

Methods

Data were collected as outlined in the IFRI Training Manual (Ostrom *et al.1998*). A team of five researchers held discussions with the residents who use 16 forests under study and the officials involved in governing these forests. Data about the users of the forest, the products that they remove, what rules they follow were obtained during meetings with the residents of the surrounding community. The level of enforcement of the rules and the incentives given to monitors were obtained through meetings with the owners of the forests or with the management committees as well as with discussion with the monitors themselves.

Data collection on the condition of the forests was carried out by randomly selecting 30 plots in each forest. In each plot, the presence or absence of indication of recent forest exploitation (such as firewood, pole cutting, charcoal making, pitsawing or cultivation) was noted. Using two people skilled in identification of plants, trees located with in 10 meters from the center of the plot with at least 10 cm in diameter at breast height (DBH) were enumerated and their heights estimated. At the end of the study the community and the forest managers were requested to appraise the condition of the forest as normal, below normal or above normal.

The data collected was used to determine the condition of the forest and provided an idea of incentives that currently structure the use patterns and management strategies in the 16 forests. Data collected about the trees in the sample plots and the type of exploitation on the plots were compiled to assess the physical and biological condition of the forests.

For each forest type studied, the monitoring system used and the incentives given to the monitors was analyzed. In order to assess the effectiveness of the monitoring system the extent of illegal activities (proportion of plots with evidence of illegal activities was determined in each forest). In addition, both the Foresters appraisal and local communities' appraisal of the condition of the forest were also used as a proxy to assess the effectiveness of the monitoring and incentives system used.

The hypotheses tested in the analysis were that when there is effective monitoring:

i. there are few illegal harvesting activities.
ii. Basal area per hectare is high and that
iii. the condition of the resources improves over-time.

Results

The results showing the monitoring strategy and condition of the 16 forests studied in are shown in table 1. In government and private forests, hired labour was most common. In

sacred forests, monitors are regarded very highly in society and enjoy a lot of trust and respect from the community. In decentralized forests, volunteer monitors were most common. In some communal and some private forests there was no evidence of any monitoring strategy at all.

The highest proportion of plots with evidence of illegal harvesting was observed in Bukaleba, a government forest with hired labour (Table 1). Forests with no evidence of illegal exploitation were those who employed a combination of monitoring strategies. For example, sacred forests with volunteers and respected elders as monitors showed a high level of compliance. Similarly forests with a combination of paid labour and volunteers also showed a high level of compliance. A regression analysis was carried out to determine if there is a relationship between type of monitoring and occurrence of illegal activities. The relationship was found to be negative and significant ($P<0.05$). Thus the null hypothesis that when there is effective monitoring, there are few illegal harvesting activities (Appendix 1) is not rejected

From table 1, it can also be observed that there is a relationship between effective monitoring and basal area per ha. Forest areas with no effective monitoring were characterized by low basal area/ha. The relationship was found to be negative and significant ($P< 0.05$). Similarly, it can be observed that there is a relationship between proportion of plots with illegal harvesting activities and basal area/ha. For example, Mbale and Bukaleba, which had 53 and 57% of plots showing illegal activities, had a very low basal area of 4.79 and 5.90 m^2 per ha. The relationship was also found to be negative and significant at 95% level of significance ($P < 0.05$). Thus the null hypothesis that when there is effective monitoring, basal area /ha is high (Appendix 1) is not rejected.

Table 1 Forest Appraisal of the 16 Forests Studied

Forest Name	Stems Per Ha	Basal Area Per Ha	Monitoring level	Evidence of illegal activities		Condition of Forest (Appraisal)	
				No. of plots	Plot proportion	Forester's	Community
Lwamunda	509	22.93	1	7	23	1	2
Namungo'	478	27.19	1, 2	5	17	2	3
Mbale	283	4.79	1	16	53	1	2
Echuya	755	11.23	1, 2	0	0	2	2
Bukaleba	282	5.90	1	17	57	1	1
Butto-buvuma	467	18.43	1, 6	6	20	1	2
Mpanga	590	31.14	1	0	0	3	3
Mugomba.	336	10.46	1	13	43	1	1
Mugalu Forest	525	26.35	0	2	3	1	2
Mukasa	521	35.62	4, 6	0	0	1	2
Kizzikibi	608	25.36	1	1	3	1	2
Lukambagire	410	13.08	0	9	30	1	2
Najjakulya	434	10.76	0	8	27	2	2
Kyambogo	717	34.27	1	0	0	1	2
Magezigoomu	502	18.49	0	1	3	1	2
Semalizi	776	45.95	6, 4	0	0	2	2

NB:

The illegal Activities include: 1. Pitsawying

2. Charcoal burning
3. Agricultural encroachment
4. Grazing

Condition of the forest reflects: a) Forester's Appraisal

b) Community Appraisal

These are categorical variables given dummy variables of:

i) Below normal - 1

ii) Normal - 2

iii) Above normal - 3

Monitoring levels:	0	No monitoring
	1	Paid labour for monitoring
	2	Monitors allowed unlimited access resources in forest
	4	Monitors status in the community is enhanced
	6.	Volunteers

This may be explained by the fact that where there is no effective monitoring there is over-exploitation of the resource. Often this involves removing all mature big trees that have a high commercial value.

Table 1 also shows this condition of the forests as appraised by both the forester and the community. The condition of forests with a less effective monitoring system and therefore with high proportion of sample plots with evidence of illegal harvesting were appraised by both the foresters and the communities as being below normal. However, the relationship between both the forester's and community appraisal of the forest and level of monitoring was not found to be significant ($P > 0.05$). In most of the cases, the community appraised the foresters as normal or above normal while the Foresters appraised the forests as being below normal. The communities appraised the forest as normal if they were able to obtain enough products to meet their subsistence needs. Most important products for the communities are firewood, medicines and poles. On the other hand the Foresters appraised the forest as normal if there were merchantable trees in large quantities.

Conclusions

According to Gibson (1999), the monitor faces two choices, to Enforce or Not to enforce forest regulations. The resident of the villages has three choices, to harvest forest products for subsistence (e.g. firewood), harvest forest products to earn an income or not to harvest forest products at all. Both the monitor and the local resident can calculate the pay off of every outcome. According to Gibson (1999), the outcome, not to harvest /not

enforce is the worst outcome for the local resident but is the most preferred outcome for the monitor.

The benefits local residents receive from harvesting forest produce are high. Forest products such as firewood, poles, timber, foods, and medicines can be used for both subsistence and generation of income. Because cutting large timber species yields more income than harvesting firewood and poles, local residents prefer to harvest such species. The low probability of being caught by monitors who are insufficiently motivated does not reduce the high pay offs illegal harvesters get. Given the high returns, the forest user (user-groups) has a dominant strategy to harvest high value forest products (timber, charcoal and agricultural encroachment).

The monitor, on the other hand, confronts significant costs by enforcing forest regulations. Enforcement involves going on patrols, confrontation with well-armed illegal harvesters and hostility from local communities. Consequently, the cost of any monitoring (enforcement) is greater than the cost of not enforcing. Thus, not enforce is the monitors dominant strategy. As a result, illegal harvesting becomes rampant. This is especially true if the monitors are poorly supervised or is there is no mechanism to monitor the monitors themselves. This is the case in government forest reserves where monitors are paid low salaries and at the same time are not properly supervised.

In forest areas where there were two monitoring strategies (e.g. Namungo, Mukasa and Semalizi) the dominant strategy for the monitors appeared to be, Enforce the rules and as a result, there are less illegal activities. In this case the monitors themselves are monitored by either the volunteers in the community or by the owners. This reduces the pay-offs for those monitors whose dominant strategy is, Not Enforce rulers. In conclusion, it can be stated that when there is effective monitoring, there are few illegal activities, high basal area and the physical and biological condition of the CPR improves with time.

Appendix 1

The effect of the combined illegal activities and monitoring levels on the forest condition as appraised by the Forester and the Community (regression relationship)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.79902157
R Square	0.638435469
Adjusted R Square	0.548044336
Standard Error	8.213682871
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	4	1906.018143	476.5045357	7.063032057	0.001783811
Residual	16	1079.433381	67.4645863		
Total	20	2985.451524			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	15.83742057	10.36709766	1.527661945	0.146122629
Illegal activities	-1.108845339	0.404282672	-2.742747625	**0.014447817**
Monitoring level	2.39897671	0.978300065	2.452189053	**0.026058329**
Forester's Appraisal	2.086013387	3.974466474	0.524853688	0.606881489
Community Appraisal	2.273950328	5.126765692	0.443544812	0.663311006

Level of testing: 95% (i.e.) 0.05 significance

Simple linear relationship (regression) between forest basal area and the effect of levels of monitoring

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.566222
R Square	0.320607
Adjusted R Square	0.28485
Standard Error	10.3321
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	957.157	957.157	8.966145774	0.00745434
Residual	19	2028.294	106.7523		
Total	20	2985.452			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	16.35952	3.133327	5.221135	4.86304E-05
Monitoring level	3.420501	1.142317	2.994352	**0.00745434**

Simple linear relationship (regression) between forest basal area and the effect of illegal activities

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.694194
R Square	0.481905
Adjusted R Square	0.454637
Standard Error	9.022624
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1438.704545	1438.704545	17.67282	0.000481011
Residual	19	1546.746978	81.40773571		
Total	20	2985.451524			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	29.86118	2.576515411	11.58975556	4.65E-10
Illegal activities	-0.46576	0.110792555	-4.203905744	**0.000481**

The effect of the combined illegal activities and monitoring levels on the forest basal area (regression relationship)

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.785250363
R Square	0.616618133
Adjusted R Square	0.574020147
Standard Error	7.974152619
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	1840.883544	920.441772	14.47528866	0.00017893
Residual	18	1144.56798	63.58710999		
Total	20	2985.451524			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	
Intercept	24.19357927	3.203731607	7.551687294	5.51644E-07	
Illegal activities	-0.384430425	0.103120108	-3.727987044	**0.001539626**	
Monitoring level	2.335010482	0.928461038	2.514925653	**0.021625944**	

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