

**THE LIKELY EFFECTS OF INEQUALITY AND GLOBALISATION ON SUSTAINABLE MANAGEMENT OF COMMON POOL RESOURCES, THE CASE OF BASARWA (BUSHMEN) OF BOTSWANA**

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**Abstract:**

This paper examines the effects of inequality and globalisation on the welfare of marginal communities, and its implications for sustainable management of common pool resources (CPRs). A case study of Botswana's indigenous people, *Basarwa* (San People), is used to analyse the claims that globalisation is compatible with mechanisms for empowering marginalised communities and providing a basis for sustainable livelihood strategies. Several studies have explored why some communities cooperate to use CPRs in sustainable manner while others fail. However, the hypothesis that inequality, might be an important part of the answer has until recently received little scholarly attention. Is globalisation likely to reinforce this inequality or lead to erosion of local culture, social values and traditions and thus reduce inequality? We use a simple model drawing on contract and club good theory to explore a number of hypotheses on how inequality affects the extent of cooperation in CPR management, and how expanding the user group beyond one tribe may marginalise minorities. This is accomplished by analysing CPR management in Botswana. Since 1966, the Government of Botswana (GOB) adheres to a development strategy that makes no distinction on race, political opinions, colour, creed or sex. However, the status of *Basarwa* disrupts this picture of harmony. They are distinct, and their livelihood strategy is traditionally based on foraging, and social organisation based on bands united in flexible egalitarian structures. In contrast, the rest of Botswana are agro-pastoralists, with highly stratified system of hereditary chiefs and headmen, and they hold the political control and cultural hegemony. This development strategy has left *Basarwa* socially and economically marginalised as labourers and squatters. This exemplifies the likely effects of globalisation on the livelihood of minorities, which promotes social and economic integration without first addressing the existing socio-economic heterogeneity. Similarly, GOB has adopted community based natural resource management (CBNRM) as a rural development and conservation strategy, which does not ensure an egalitarian distribution of benefits. We use data on CPR management among the *Basarwa* of Ghanzi and Kgalagadi of Botswana to assess likely effects of globalisation by analysing CBNRM under an access sharing common property system. Our results show that globalisation may hurt and further marginalise the minorities due to socio-economic heterogeneity, and ultimately undermine their access to CPRs.

## **Introduction**

Globalisation is promoted on the grounds of freeing up markets and reducing inefficiency, but this does not always address the exact political mechanisms for empowerment of the poor, ethnic minorities or unskilled. Although in its most general sense globalisation refers to the cross-national flow of capital, goods and technology, accompanying these flows is the consequent development of power relations and institutions that replace and/or transform existing configurations (Petras, 1993). These transformations, both in the direction and intensity of trans-national flows and in altering power configurations, relate to an underlying tension in much of the debate concerning the promise and perils of globalisation. This involves a critical issue of the role of institutions, particularly the state *vis a vis* the market. Leftwich (1993) argued that development is not simply a managerial question, as the World Bank's literature asserts, but is a political one. All processes of development express crucially the core of *politics*: conflict, negotiation and cooperation over the use, production and distribution of resources. To address this complexity, it is important to refocus on the actual sources of livelihood, detail the historical evolution of structures of resource distribution and question whether current and proposed institutional matrixes are likely to positively or negatively alter these through an increased engagement with globalisation. Like the club good theory, globalisation essentially assumes that all parties have identical positions relative to the resource, making it difficult to apply it in cases where there is an inherent pattern in how the parties relate to the resource (Schlager and Ostrom 1992).

Most of the theory and practice of successful management involves resources that are effectively managed by small to relatively large groups living within a single country, which involve nested institutions at varying scales (Ostrom, 1992). Globalisation in a way is a form of rapidly including users to an existing user group. When any user group grows rapidly, the resource can be stressed. New users may not share a similar understanding of how a resource works and what rules and norms are shared by others. Members of the initial community may feel threatened and may fail to enforce their own self-restraint, or they may even join the race to use up the resource. Having larger numbers of participants in a CPR increases the difficulty of organising, agreeing on rules, and enforcing rules. Although some experiences from smaller

systems transfer directly to global systems, global commons introduce a range of new issues, due largely to extreme size and complexity.

Mancur Olson (1965) demonstrated that when agents are heterogeneous, collective action is bound to benefit those who have a higher input share. He proposed that heterogeneity could facilitate collective action if one or a few players were willing to shoulder the burden of the costs of collective action in return for a larger share of the benefits. Thus globalisation is bound to benefit privileged subgroups whose provision is higher. On the other hand, Elinor Ostrom's original design principles for successful community management emphasises homogeneity. This means that agents should have similar discount rates, levels of social trust, and information about the resource. Many other authors have taken this to mean that overall levels of heterogeneity must be low (Dayton-Johnson and Bardhan, 1996; Heckathorn 1993, and Marwell and Oliver, 1993). This view is reinforced by the fact that in multi-ethnic communities, the distribution of benefits pose a challenging situation . In most cases the livelihood strategies of these tribes differ and, consequently, so does their CPR use. For instance, some groups within a community may still wish to hunt for themselves, as this gives a certain feeling of cultural identity. Others in the same community, perhaps from a different ethnic group, are not part of this culture, and are happy to sell the whole quota. This heterogeneity may pose challenges to the success of a community based organisation (CBO). Furthermore, in the majority of cases one tribe dominates the other in social and economic status. Introducing changes in such a social structure provokes resistance from the dominant grouping. Therefore, globalisation is bound to exacerbate ethnic divisions that relate to rules of resource access. Those with low social status such as the *Basarwa* tend to have a higher reliance on CPRs and a disproportionately high relative share of the burden of rural income poverty. This structural inequality in terms of ethnic status is very significant in western Botswana, where most *Basarwa* are found. This paper uses a case study of Botswana to analyse the effects of inequality and globalisation on the welfare of marginal communities, and its implications for sustainable management of common pool resources (CPRs). We specifically assess to what extent does club composition, size, level of dependence (member needs), and heterogeneity limit sustainable management common pool resources in KD1 under access sharing common property system. We outline the contractual framework for examining CPR management under access

sharing common property ownership. We conclude by discussing the results of our common property model and demonstrate how socio-economic inequality and globalisation may benefit or hurt the minorities in the society.

### ***Nature of Property Rights Among Basarwa***

In Botswana, as in many other places in Africa, property rights over natural resources are characterised communal rights or common property. Resources such as land are held in common by a group circumscribed by the boundaries of location, ethnicity, clan, or lineage (Berry, 1989; Hitchcock, 1984). Generally property rights are not assigned beyond a simple use right, thereby disabling the alienation of parts of the communal ownership, even in those cases where a plot of land has been farmed continually for several generations by a family (Lawry, 1990; Barnard, 1992; Bennett et.al, 1986). Therefore, the resources are a common good, since actors cannot be excluded yet it is rival in use; a household cannot cultivate a plot already used by another. No social actor can be refused the right to access and use communal land, as long as they respect the principle that ensures social integration. The *Basarwa* traditionally have few personal belongings. These are largely made up of the shelter, hunting and gathering tools, utensils, clothing, ornaments and musical instruments (Hitchcock and Ebert, 1989 Lawry, 1990). They belong to either men or women, as the concept of matrimonial property is unknown to the *Basarwa*. Personal belongings being so few such that *Basarwa* property law really revolves around the use of the common property. Their property system embodies both output sharing and access sharing common property which excludes outsiders (Lueck, 1994). With the community operating within an ill-defined area within which it moves from place to place, it is not the area itself but rather its resources that are thought of as the common property. These resources, namely rain and ground water, the waterholes, the wild plant food and animals, are there for equal use by all of the community or group members. People from neighbouring groups need permission to hunt and gather in the community's area or draw water from it (Barnard, 1992). Permission is sought from the founder-members of the group, their eldest descendants or long-standing group members who act as spokesmen of the group.

Rain and ground water belongs to no one, but permanent and semi-permanent waterholes are community property. Veld products, which constitute between 60% to 80% of the *Basarwa* subsistence base, are also community property but once collected belong to the household that collected them (Lee and Hitchcock, 1998). The game animals belong to no one until they are killed. Small animals become the property of the person who kills them, and are consumed within his own family (Wilsem, 1989; Biesele et. al., 1989) To catch the larger animals requires of course a hunting party, which relies heavily on collective action principles. The composition of the hunting party, which is seldom larger than four or five adult or near-adult men, is not a matter of convention, and no one is formally in command. Once an animal has been hit by a poisoned arrow, the hunters follow it into neighbouring group territory, and if neighbours cross the hunters' track, they will be given a present of meat, but no tribute is obligatory. According to *Basarwa* property law, the animal belongs to the owner of the first arrow to have been effectively lodged into it so that it penetrated enough for its poison to work (Lee and Hitchcock, 1998). However, the meat of large animals is shared with everyone in the community, visitors included, according to definite rules. It is upon the owner of the first arrow to make the initial distribution of the meat, and who receives from him, will give again, and so on.

The *Basarwa* law of property centres around the community. The emphasis is clearly on sharing. This seems sensible as their communities comprise small groups of people. It is also their belief that to look after the health of each and every community member, is to look after the health of the community. However, there is a much deeper, indeed religious meaning of *Basarwa* property law, in terms of which the CPRs are a gift to the community from God (Gilles and Jamtgsard, 1981; Hitckcock, 2001). Personal property being so scarce in *Basarwa* society, and being neither of great nor lasting value, it is only the succession to a deceased person's interests in gift-giving partnerships which is an important matter to be settled. In order to assure the continuation of major partnerships, older men, on becoming less mobile and less productive, will gradually pass their partnerships on to their children or younger siblings. In respect of partnerships which have not been disposed of by the deceased, the deceased's children or siblings may ask the remaining partners to continue to relationship by offering them the deceased's possessions (Berry, 1989; Hitchcock and Campbell, 1982; Andersen et. al., 2000).

To understand the likely effects of globalisation on Basarwa, we use community based natural resource management (CBNRM) under an access sharing common property system as case study. An access sharing common property system limits access to a defined user group and governs resource use by insiders by imposing certain controls. Agreements on inputs and outputs is often assisted by certain institutional characteristics such as numbers of members, homogeneity between members and monitoring and sanctions on members. Assuming that outsiders can be excluded from the resource and insiders can enforce rules amongst themselves to prevent free-riding, the total benefits of co-operation must be greater than the costs (Heckathorn, 1990). While this may be self-evident, it has received much less attention in the economic literature than the concern with free-riding. The main benefits of this system are the avoided externalities of open access and reduced social conflict, while the main costs are the transaction costs (Lueck, 1994). Access sharing reduces the need for explicit monitoring or resource use compared to private ownership, but it also creates competition for the resource among group members. In the case of Botswana, access sharing is managed by internal (group) rules that constrain resource use by group members by specifying entry constraints. Each member of the commons has access to the common resource, but works independently and keeps their own catch or harvest. They also bear an equal share of the costs of excluding outsiders from the CPR as part of the common property contract.

Under the Wildlife Conservation Act of 1992, Wildlife Management Areas (WMA) and subsequent sub-division into Controlled Hunting Areas (CHAs) under specified management authority laid down a solid foundation for CBNRM in Botswana. CBNRM has been accepted as a rural development and conservation strategy in Botswana. Rural communities, irrespective of socio-economic heterogeneous status, are encouraged to form community based organisations (CBOs) called conservation trusts. These trusts can be considered as ‘exclusive clubs’, and the norms of reciprocity or social capital embedded in them as a club good. An exclusive club is a voluntary but restricted group that derives mutual benefits from sharing goods characterized by excludable benefits (Ostrom, 1990; Provan and Milward, 1995). Similarly, once registered as a legal entity, CBO membership is composed of all people who have resided in the concerned village(s) for more than 5 years. The

literature on clubs outlines many similar characteristics that contribute to the success of clubs. The characteristics that are emphasised as being important are leadership (Carlson, 1987) member participation (Stirling, 1993), goal setting (Hass, 1989; Carlson, 1987), size (Hass, 1989), diversity and meeting structure (length, frequency, rules of order). The benefit that one person gets from a good is directly related to the number of other people in the group. Therefore, individual benefits are a function of membership size and provision of goods. This theory applies only when the motivation for joining the club is economic, when the motivation is emotional support the theory does not apply. This paper examines only economic motives to participate in a conservation club. Similarly, the communities in the study area are required as a club or group to have a constitution and to have their conservation trust registered as a legal entity before they qualify for use rights over certain resources such as wildlife. The dominant rule chosen to allocate the wildlife resource is equal sharing, and other resources are still managed under an access sharing system. Guided by their constitution and management plan the trusts become de facto owners of the wildlife and other resources (Government of Botswana, 1992). The board of trustees is a focal point for important decision-making regarding quotas and benefit distribution, business deals with the private sector, and agreements with support agencies such as donors and NGOs. Therefore, communities that form the trust have common ownership of the resources under their control. Unless these benefits address the variety of community needs, just like globalisation, there is no guarantee that CBNRM results in sustainable development for all. The Basarwa *Basarwa* are at least 70% directly dependent on natural resources for their survival. Successful institutional change through CBNRM implies therefore greater improvement of the livelihood of *Basarwa*.

The study covers communities that are members of a CBO in northern Kgalagadi District, the (Nqwaa Khobee Xeya Trust), that manages the KD1 controlled hunting area. This CBO is formed by inhabitants of four settlements (Ukhwi, Ncaang, Monong, and Ngwatle). Two different ethnic groups form these communities, *Basarwa* (70%) and Bakgalagadi (30%). When *Basarwa* were resettled in these areas in the 1970s, they were forced to live side by side with the more prominent Bakgalagadi, who are wealthier agro-pastoralists (Hitchcock and Ebert, 1984). Traditionally the *Basarwa* have no formal authority figure or chief, but govern

themselves by group consensus. All decisions were made communally within the group. Disputes are resolved through discussions where all involved have a chance to make their thoughts heard until some agreement is reached. Therefore in most cases Bakgalagadi assume leadership. The only advantage *Basarwa* had over the Bakgalagadi in the recent past was direct access to wildlife through Special Game Licenses (SGLs), which have now been phased out. Each license holder was entitled to hunt a limited number of animals throughout the year. Only traditional hunting methods could be employed (dogs and spears). This meant that animals such as gemsbok could be hunted with a relatively good chance of success. In addition, license holders were not allowed to sell any game meat. (Gujadhur, 2001; Biesele et. al., 1989). Over-hunting occurred, particularly with regard to the gemsbok and partly due to the misuse of licences (Hitchcock et.al., 1996). Over time, the hunting success rate for subsistence hunters dropped to a point where the residents of KD 1 became more and more receptive to the notion of giving up their individual hunting licenses and converting to the newly introduced community quota system. It was felt that the opportunities for generating income and employment through the community quota system would off-set the disadvantages anticipated by the SGL holders if they were to loose their individual access to the wildlife resource. For the population of KD 1 as a whole, the community management and utilisation of the available resources was seen as an opportunity to improve living conditions in a way that several decades of government support could not achieve.

### ***The Model***

Access to a communal woodland or forest is shared among groups of  $N$  individuals but not with outsiders. Private resource ownership arises when  $N = 1$ ; setting  $N = \infty$  means open access. Intermediate values of  $N$  correspond to common access with partial internalisation of externalities through imperfect monitoring and enforcement institutions. The community chooses to allow members equal access to the resource. This is similar to the Becker (1981) model with the family as a group that shares access to a common budget. However, Becker does not examine issues of shirking and the attendant costs. In this case, the problem for each member is to:

$$\underset{x_i}{\text{maximise}} \quad V = f^i(x_i) - c(x_i) \quad (1)$$



$$\text{Subject to: } Y_i = f^i = \left( \frac{x_i}{x_i + \sum_{j \neq i+1}^n x_j} \right) f \left( x_i + \sum_{j \neq i+1}^n x_j \right) \quad (2)$$

Where

$x_i$  is effort level of the  $i^{\text{th}}$  individual, which is dependent on individual attributes,  $f^i$  is the  $i^{\text{th}}$  individual's production function, and  $C(.)$  is cost function.

Equation (2) states that the value of production by an individual household ( $Y_i$ ) is determined by input share. This may result in overexploitation of the resource through excessive supply of effort, where  $X^C > X^*$ , i.e. effort supplied is greater than optimal level of effort. A contracting community mitigates this by establishing access rules, and the joint maximisation of problem is:

$$\max_{\mathbf{X}_i S_i} V = f \left( \sum_{i=1}^n \mathbf{X}_i \right) - c(\mathbf{X}_i), \quad (3)$$

$$\text{Subject to: } S_i \alpha_i f' \left( \sum_{i=1}^n x_i \right) = \frac{\partial c}{\partial x_i} \quad i=1,2,n \text{ and} \quad (4)$$

$$\sum_{i=1}^n S_i = 1. \quad (5)$$

Where  $\alpha_i$  is the individual capacity or productivity which is dependent on individual attributes such as age, gender, ethnicity, wealth, level of dependence, etc.  $S_i$  is individual share, which is influenced by rules that govern harvest, community size, resource productivity or carrying capacity, government support to enforce rules, and access to markets.  $S_i=1/n$  if the distribution system is egalitarian.

First order conditions require that individual marginal benefits of harvesting a CPR are equal to marginal costs. The  $i^{\text{th}}$  individual's production function,  $f^i$ , implies that each person can appropriate a share of output equivalent to his or her input share. This means that exploitation of the common resource does not result from shirking, but

rather from excessive effort. Open access dissipation results from the absence of a contract or a club agreement, but a contracting group mitigates this by restrictions. Therefore, value of individual harvest or production is governed by individual and community characteristics which include nature of contract governs harvesting of a CPR, resource productivity, government policy, community size, individual attributes, and access to markets.

### **Model Estimation**

The empirical model attempts to address the following question: under an access sharing contract, to what extent does club composition, size, level of dependence (member needs), and heterogeneity limit sustainable management common pool resources in KD1 controlled hunting area. Communities in the study area have developed institutions to internalise externalities by combining informal co-operation and reciprocal arrangements, and political control over common pool resources. However, these institutions and regulations are unable to eliminate free-riding entirely, due to limited enforcement, resulting in overexploitation of resources. Wildlife Management Areas and communal forests are used to assess the access sharing model to highlight effects of globalisation on the livelihoods of *Basarwa*. The empirical model estimates the output from the common resources as a function of individual and community attributes rules, level of enforcement or government support, resource productivity and the size of the community. Each household seeks to maximise the value of quantity harvested or output from communal woodland that is held under an access common property arrangement. The value of the quantity of the commodity harvested is the dependent variable, and variables relating to household and the community attributes are independent variables:

$$Y_i = \beta_0 + \beta_1LAB + \beta_2HHS + \beta_3AGE + \beta_4PHSN + \beta_5E + \beta_6OWN + \beta_7ETHN + \beta_8GEN + \beta_9REMIT + \beta_{10}GOVS + \beta_{11}GOVT + \beta_{12}INFR + \beta_{13}DOM + \beta_{14}EQUP + \beta_{15}DIST + \varepsilon \quad (4)$$

Cross sectional data is used which consists of a sample of individuals, households, units, etc. at a given point in time, which may unequal variance of the errors (heteroscedasticity). Often heteroskedasticity problems are eliminated by finding an appropriate transformation of the data. The log-linear function is employed in order to reduce the possibility or severeness of heteroscedasticity. The log form is:

$$\ln Y_i = \beta_0 + \beta_1 \ln LAB + \beta_2 \ln HHS + \beta_3 \ln AGE + \beta_4 \ln PHSN + \beta_5 \ln E + \beta_6 \ln OWN + \beta_7 \ln ETHN + \beta_8 \ln GEN + \beta_9 \ln REMIT + \beta_{10} \ln GOVS + \beta_{11} \ln GOVT + \beta_{12} \ln INRF + \beta_{13} \ln DOM + \beta_{14} \ln EQUIP + \beta_{15} \ln DIST + \varepsilon \quad (5)$$

LAB: Number of persons in a household involved in harvesting (effort)

HHS: Household size

AGE: Age of respondent or household head

PHSN: Number of person per resource area (persons per square kilometre)

E: The level of internalisation

OWN: The value of own produce

ETHN: Respondent's ethnic status (ETHN=1 if non-Basarwa, 0 otherwise)

GEN: Gender of respondent (GEN=1 if female, 0 otherwise)

REMIT: private remittances

GOVT: Government transfers

GOVS: Government extension support (GOV=1 if received support, 0 otherwise)

INFR: Infrastructure or access to market (value of jobs in road construction)

DOM: Membership of a leadership group, that is, membership of a numerically large group. (DOM=1 if member, 0 otherwise)

EQUIP: Value of equipment used for harvesting (technical heterogeneity)

DIST: Distance covered to harvest resource

Institutional arrangements are captured by a parameter  $E$  such  $0 < E < 1$ , and this measures the success with which institutions induce harvesters to internalise externalities:  $E = 1$  defines complete internalisation, while  $E = 0$  characterises no internalisation. For example, if there are ten rules that govern resource access, and a harvester observes only 2 of them,  $E=0.2$ , but he if observes all of them then  $E=1$ . This variable also captures the level of co-operation in a community. Members of a user group always have a range of differing preferences regarding CPR management. Because of this, they may assign different priorities to the various objectives of CPR management. The differences may be in the form of differing personal interests in the CPR or differing degrees of participation in the community. During the fieldwork, it was apparent that people think of themselves both as individuals and as members of a community. However, the inherent spirit of co-operation was generally present even

in the face of large economic differences and social stratification. The varying individual interest with respect to how a CPR is managed reflects both economic heterogeneity (e.g. income level) and social heterogeneity. The extent to which personal interest fully determines an individual's co-operative behaviour with respect to the CPR rules depends on the degree of benefit from participation in the CPR conservation. The higher the level of benefit from co-operation, the more likely that the individual would observe the rules. Values of  $E$  between 0 and 1 represent intermediate levels of institutional failure. Varying parameter  $E$  thus makes it possible to investigate the effect that various degrees of common access and institutional efficiency have on livelihood dynamics and sustainable management of CPRs. Therefore, the higher the value of  $E$ , the more successful are the institutional arrangements, hence the greater harvest or output, and more sustainable utilisation of the resource. The institutional arrangements are hypothesised to have a positive effect on output and subsequently the sustainable management of the CPR.

The variable (ETHN) is used to reflect the status of a tribe that a household belongs to, and this is based on whether tribe is prominent or not. Those from dominant tribes are likely to freely participate in CPR management and access them because they will not be hindered by their ethnic status. In many cases, ethnic or social heterogeneity will be correlated with economic heterogeneity, as certain ethnic groups are also more likely to be richer or poorer than other groups. *Basarwa* are a good example of less prominent tribe, even though they form a numerical majority in the study area, they tend to be the poorest given their ethnic status. Hence households which belong to tribes which are considered to be of lower status such as *Basarwa* face more challenges in terms of access to common land, and consequently realising higher output. Traditionally, *Basarwa* did not consider the land as a commodity and therefore, did not inherit it as the actual owners of the land. Therefore, being a member of a dominant tribe (ETHN) positively affects value of harvest.

Physical returns to harvesting a CPR depends on the total number of persons sharing the resource. Number of persons per square kilometre (group size) is used to capture group size effects. Where producers treat the production level of others as independent of their own, then the number of persons per square kilometre (PHSN) is assumed to be negatively related to output.

The age of household head (AGE) matters because it signifies the household's experience in managing common resources as well as accumulation of social capital and wealth e.g. livestock. Older people have historically experienced relatively stable rules and norms pertaining to collective action over much longer periods than young ones. Therefore, the age of the household head is included to capture possible returns to experience. The higher levels of output are expected to be associated with higher age level of the household head.

Gender (GEN), is used to test the effect of the gender differences on the level of co-operation in CPR management and resource use (Grossman, 1996). Moreover, a higher percentage of females in the household might explain the individual participation of women as members if daughters replace mothers in domestic work. The gender variable allows us to see the difference in the capacity to participate and use CPRs between men and women. This helps to account for inter-household differences in co-operation due to gender differences. This is of particular importance in rural Botswana, which is characterised by a large number of female-headed households. Generally women participate more in resource harvesting from a CPR than men. Therefore, being female is associated with high output level from a CPR.

Effort (LAB) is of number of people from the household that are involved in harvesting the resource. This variable is hypothesised to be directly related to output. An increase in the amount of labour used by small households will result in an increase in quantity harvested.

Technology (EQUIP) is an important factor of utilisation of CPRs. As long as all the owners have the same technology, access and use of the property is equitable. In practice, different households use different equipment to extract or harvest veld products. The value of equipment used indicates the capacity of a household to exploit the resource. The more efficient the equipment used for harvesting or the higher the value of the equipment, the higher the quantity of the resource that would be harvested.

Household size (HHS) has more direct bearing on the capacity of a household to harvest the CPR and participate in its management. A larger household has a greater number of persons to spread across its income generating activities, and thus reduce dependence on a CPR. However, a large household has a higher capacity to harvest a large quantity of veld products, which increases dependence on a CPR. Therefore, the effect of household size on quantity harvested is ambiguous.

I use access to markets to address globalisation. Access to markets (INFR) may undermine the ability to attain collective action, since community members may have more exit options. On the other hand, greater access to markets may increase the demand for some kinds of organisational development related to economic opportunities, unless entry of private firms or state intervention displace the need for such development (Bebbington et al., 1996; Uphoff, 1986). Market access may also influence participation in CPR management by affecting village members' access to information and knowledge of alternative organisational forms, as well as by affecting economic opportunities. However, Ostrom and Schlager, (1992) suggest that isolated communities are more likely to be successful in CPR management. Thus the expected impacts of measures of market access are ambiguous. In 1982, the government of Botswana introduced a rural roads development programme (LG 117). The main objective of the programme was improvement, construction and maintenance of district roads using labour-based methods. People in rural areas are employed for about 180 days in a year and can earn up P1500 per annum. The cost per job was used to estimate the programme expenditure per household (INFR).

Veld products are usually harvested to meet household food demands, construction material and for commercial purposes. Therefore, if the government wishes to reduce overexploitation of veld products, the policy should promote alternative sources of income and co-operative behaviour. Own produce and public transfers provide an alternative source of income for those who rely on harvesting veld products. The higher the level of these, the less demand for veld products. The sign of coefficients for these variables is expected to be negative.

Remittances (REMIT) by migrant workers back to rural areas provide a substantial source of income to relatives and families. Just like under any common property

regime, migration decisions are often made jointly by the migrant and by a group of non-migrants. Generally costs and returns are shared, and the distribution rule is spelled out in an implicit contractual arrangement. The chosen contractual arrangement reflects the relative bargaining powers of the family and the migrant worker. Stark (1991) observes that the approach demonstrates the efficiency, flexibility, and what he calls the dynamic comparative advantage of the family. In this way, the family as an entity does not split apart as its independence-seeking members move away in search for better income generating opportunities.

Portfolio investment theory may also shed light on CPR management and the factors such migration. Under this theory, migration decisions are ordered by family needs for stable income levels, provided by a diversified portfolio of workers, and the need to jointly ensure the family's well being. Collective decision-making and objectives of individual migrants determine migration patterns and remittance flows. This co-insurance covers risks of losing income in individual markets and allows the family to smooth its consumption. The main hypothesis is that remittances are best explained in the context of risk-spreading, and co-insurance contractual arrangements made by the family as a whole. Therefore, the flow of remittances has a serious bearing on a households's CPR conservation strategy. Consequently, remittances are hypothesised to play the role of reducing pressure on CPRs. However, they may also play the role of increasing pressure on CPRs through aspirations of wealth accumulation by establishing or increasing the family harvest. Therefore, remittances are likely to have an ambiguous effect on demand for veld resources.

GOVT measures the impact of public transfers on amounts of veld products harvested from a CPR. Government transfers play an important role on the welfare of rural households. These are government provided funds that comprise old age pension (P110.00 monthly), which is paid to all Batswana older than 65 years of age, and the annual value in Pula of destitute help paid monthly to the very poor, in cash and in-kind. Increase in government transfers is likely to reduce the quantity of veld products harvested from the CPR. Therefore, there is an indirect relationship between quantity harvested, and the government transfers.

Distance (DIST) between a homestead and the CPR raises travel time and the cost of

harvesting and carrying commodities to homestead. Distance is thus expected to reduce quantity harvested. If community members try to maximise their return to effort, then CPRs closer to homesteads are likely to be more overexploited than CPRs located farther away. Thus, as distance from homestead increases, it is expected that quantity harvested would be reduced.

### ***Model Evaluation and Diagnostics***

The Ordinary Least Squares (OLS) approach makes the assumption that  $V(\varepsilon_i) = \sigma^2$  for all  $i$ . That is, the variance of the error term is constant (homoscedasticity). If the error terms do not have constant variance, they are said to be heteroscedastic due to unequal variance of the errors. This is a problem associated with cross sectional data. The cross sectional data set used for this thesis consists of a sample of individuals, households, units, etc. at a given point in time. It was obtained by stratified sampling to ensure sufficient or desired spread of variability in sample. However, measurement error can cause heteroscedasticity. Some respondents might provide more accurate responses than others might. Heteroscedasticity can also occur if there are subpopulation differences or other interaction effects (e.g. the effect of income on expenditures differs for *Basarwa* and other tribes). The problem arises from violation of the assumption that no such differences exist or have already been incorporated into the model.

Sometimes heteroscedasticity results from improper model specification, for example, there may be subgroup differences or effects of variables may not be linear. Perhaps some important variables may have been eliminated from the model. It means that OLS is not the best (most efficient, minimum variance) estimator. Also, heteroscedasticity can make the OLS forecast error variance inaccurate since the predicted forecast variance is based on the average variance instead of the variability at the end of the series. Often heteroskedasticity problems are eliminated by finding an appropriate transformation of the data. The log-linear function is employed in order to reduce the possibility or severeness of heteroscedasticity. This method is preferred because it compresses the scales in which variables are measured, hence it reduces heterogeneity. Formal tests such as Breusch-Pagan or White's test of



heteroscedasticity and Ramsey's regression specification error test are also carried out to avoid biased or misleading results (Greene, 2000). In a cross-sectional data set each observation contains information on one of the units. Order of observations in a cross-sectional data set does not matter, hence serial correlation is not be a problem in this research.

## Findings and Discussion

Estimation of the model outlined in the previous section was undertaken using LIMDEP. Table 1 displays the regression results of harvesting veld products under access sharing common property system. The dependent variable is the log of the value of benefits from harvest. The regressors include a set of individual characteristics, community characteristics and the resource controls.

Table 1: Regression Results for Access Sharing Common Property

Variable		Coeff.	Std Error.	P-value
$\beta_0$	Constant	6.8172***	2.0724	0.0011
LnLAB	Labour	0.1685**	0.08471	0.0477
LnDIST	Distance	-0.0227	0.2127	0.9169
LnEQUIP	Equipment	0.2836**	0.1228	0.0218
LnINFRA	Market Infrastructure	0.8062	0.5690	0.1578
LnE	Internalisation/Cooperation	0.0315	0.03360	0.3495
LnOWN	Own Produce	-0.2033	0.2376	0.3929
ETHN	Ethnicity	-0.0843**	0.3831	0.0288
GEN	Gender	0.1882	0.1357	0.1665
LnPHSN	Persons per square kilometre	-0.0733	0.7334	0.9205
LnEDU	Years of schooling	-0.0169	0.3004	0.9551
LnGOVT	Government transfers	-0.0375	0.3615	0.9175
DOM	Numerically large group	0.3355	0.6382	0.5996
LnREMIT	Remittances	-0.1026***	0.0347	0.0034
LnGOVS	Government support/policy	0.2027	0.3066	0.5092
LnAGE	Age	0.0661	0.1081	0.5419

### Model Summary

Number of Observations=264

R-squared=0.52

Model test:  $F[13, 251]=9.31$ , Prob value =  $<0.00005$

Results Corrected for heteroskedasticity

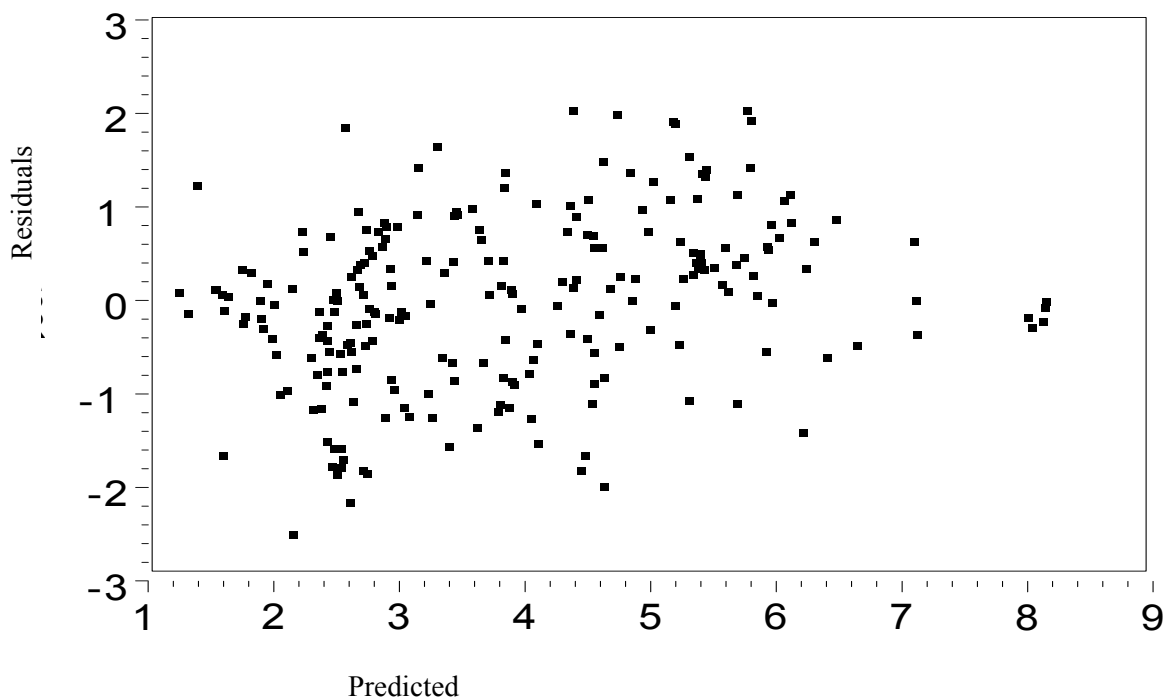
Breusch – Pagan Chi-squared = 15.68, with 13 degrees of freedom

Significant: \* $p<0.10$ ; \*\* $P<0.05$ ; \*\*\* $p<0.01$

Source: survey

Table 1 presents the summary of OLS regression results and various statistics for the evaluation of the estimated regressions and hence the statistical reliability of the regression coefficients. The regression equation has a reasonable explanatory power ( $R^2$ ). The regressors account for 52% of the variance in output across the households. Ramsey's Reset F-test also supports the chosen specification, the P-value  $<0.0005$  is much smaller than the critical level of 0.05. The predictor variable has a significant linear relationship with the response variable. A scatterplot of residual against and predicted values is presented below. The residual plot suggests that heteroskedasticity is not significant. No fan, wedge, or diamond shape pattern is found in the plot between the residuals and the predicted values. This suggests that the residuals have an equal variance.

Figure 1 Residual Analysis to Detect Heteroskedasticity



Breusch-Pagan test for heteroskedasticity Chi-squared value  $\chi^2(13) = 15.68$ , which is less than the critical value of 22.36. Generally, the results conform largely to the main hypotheses included in the conceptual framework. Most of the explanatory variables carry the expected signs. The significant determinants of CPR output in all the estimations are extent of homogeneity, ethnic heterogeneity, value of equipment used, and distance covered to harvest a CPR.

Ethnicity is shown to significantly have a negative association with a household's level of harvest. Ethnicity is indeed an important issue, but it is a complex one. All things equal, being a member of a prominent tribe or non-*Basarwa* group, negatively affects the quantity harvested. This supports the hypothesis that ethnic heterogeneity is to some extent associated with economic heterogeneity. This implies that among the communities in the study area, households belonging to prominent tribes tend to be less poor and thus depend less on CPRs. Ethnic minority or low social status groups tend to be poor and hence depend more on CPRs than those belonging to prominent groups, as the latter tend to have diversified income sources. Policies that are geared towards reducing dependence on CPRs and improving their conservation should be targeted towards households who are from less prominent tribes such as the *Basarwa*.

The coefficient of remittances variable is negative and significant. When families receive remittances, they reduce the intensity of usage of a CPR, and thus allow for improvement of environmental conditions on the CPRs. Remittances is crucial source of income for the poor in rural Botswana. Private cash transfers sent to the lowest income group in the survey are twice as much as public transfers received by the same group of households. This implies that augmenting CPR harvest from remittances sources will act to improve the biophysical sustainability of the CPRs. Remittances may therefore be an important issue from a sustainability point of view. However, increase in remittances may imply access to more efficient harvesting technology which may lead degradation of resources.

The coefficient of ethnicity variable is negative and significant, suggesting that prominent ethnic status is an obstacle to increasing livestock output, completely negating the hypothesis that a higher social status is likely to be associated with higher livestock output. The results are not surprising because although people who have higher level of social status or are from tribes that are not considered social minorities are more likely to own larger herds of livestock, they usually hire those with lower social status to manage their livestock. Those with low social status tend to have higher expertise in livestock rearing, especially in situations where it is their full time occupation. Does this mean that people with lower ethnic status are likely to

realise higher level of livestock production than those with high status? Do the results imply that livestock productivity of people with higher a status is much lower than that of lower status? A plausible explanation may be that people with lower ethnic status have fewer income portfolios, hence they are adequate time to adopt output increasing practises for harvesting a CPR than those with several income portfolios.

A measure of social heterogeneity in the study area is whether or not harvesters are a member of a numerically large group. The coefficient of this variable (DOM) is positive but not significant, and these results are consistent with the hypothesis that heterogeneity weakens the effect of social norms and sanctions to enforce co-operative behaviour and collective agreements. The implication of the results is that when harvesters belong to a numerically large group, they are more likely to have positive participation in crafting of rules and their compliance by others. Joint rule-crafting of this kind is associated with the highest level of benefits from harvesting the commons. Being a member of a numerically large group (homogeneous group) is in general positively associated with co-operative outcomes. To a large extent, the problems of successful commons management are not necessarily based on the characteristics of the natural resource itself as Hardin (1968) perceived it, but rather the more challenging problem of getting people to co-operate. Thus the problem is particularly closely related to those of producer and worker co-operatives. Mobilising co-operative effort is especially problematic at the level of institutional supply, but also in the running of the institution. The extent of homogeneity within the institution determines its success and failure.

The coefficient of the variable for distance covered to reach a CPR is negative but significant. Distance involves walking and carrying the harvest, which gets harder with increasing resource scarcity around settlements. Abundant commodities of CPRs are found closer to settlements than those that are overexploited or scarce. In order to increase quantity harvested, one has to cover long distance to reach less exploited parts of CPRs.

The net effect on conservation depends on the extraction technology involved. Economic inequality might influence commons outcomes via differences in costs of resource harvesting. The results in Table 1 show that the coefficient of the variable for

technology or equipment used for harvesting the resource is positive and significant, which is consistent with the hypothesis. Traditional tools to access and harvest CPRs are likely to have no adverse impact on the existing users' access to the resource. However, the use of advanced technology by well off community members may lead to over exploitation of the CPR, and drive the resource stocks to the point that owners lacking the new technology may lose access to the CPR. The results show that increase in technology leads to an increase in quantity harvested hence unequal access to the resource.

The coefficient for extent of internalisation variable is positive but insignificant. The results show that the level of co-operation or institutional success level is directly associated with output. The coefficient of the variable for level of internalisation (E) is positive and significant. This implies that communities with lower levels of cooperation or with higher levels of heterogeneity derive lower levels of output, and those with higher levels of co-operation are likely to have higher levels of output. This shows that limiting overexploitation of CPRs through regulations on resource users' behaviour may allow the rate of exploitation to be increased when stock is in greater abundance. For instance, thatch grass cannot be harvested until after July. The entry date was set to make sure that the grass grows to full maturity and the seeds are fully developed. When the grass is cut at its mature stage, the seeds fall to ground and ensure regeneration for the next season. Therefore, internalising activities by cooperating with the rules and regulations positively affects the quantity of harvest of veld products. Variation in internalisation among households within a community is likely to occur not only because of individualisation of a resource but also due to consumptive dependency on a resource and the degree of social ties between and within households.

Results in Table 1 show a direct relationship between age and quantity harvested, which is consistent with a priori expectation. The coefficient of age variable is positive and insignificant. The explanation of this is that as one gets older, the demand for velds product is increased especially for those ages getting married and establishing a family. They would need to construct new dwellings such as huts, kraals, etc., which requires increase in harvest level. The other explanation is that younger people tend to migrate to urban areas to seek employment. Older people who

have no job opportunities in the cities or who have retired tend to remain in rural areas, and consequently are more involved in resource harvesting and conservation.

The dummy coefficient for gender is positive and highly significant, indicating that female harvesters do better than males. This conforms largely to the hypothesis that women are more involved in harvesting wild products and ensuring household food security of their households.

The coefficient of markets access variable (lnFRA) is positive but not significant. Having better access to markets increases the value of resources and this may induce collective action in managing CPRs. On the other hand, better market access may tend to undermine individuals' incentives to co-operate by increasing the opportunity cost of labour or by inducing excessive supply of effort, and thus overexploiting resources.

Having government support to enforce property rights positively affects output, and consequently cooperation. The coefficient of the dummy variable for government support (interaction with government extension staff and awareness of enforcement legislation) is positive. This is consistent with the hypothesis that communities cannot manage CPRs sustainably unless they are backed by government policy to enforce such rights. The results suggest that a potential exist for government to achieve greater participation of communities in management of biodiversity by means of designing greater incentives to community association.

It is obvious from results in Table 1 that government transfers significantly affects quantities harvested from the commons. The coefficient for government transfers is negative and not significant. Although public transfers negatively affect harvest level, they mitigate the consequences of environmental shocks (e.g. drought), and can also be used to reduce dependence on CPRs.

The variable for number of households per square kilometre (lnPHSN) is negative and not significant. This conforms to the hypothesis that group size negatively affects commons outcomes. Therefore, in the case of study area, high density of communities

that harvest CPRs weakens social interactions as the basis of organising community-wide collective action and the CPR productivity insignificantly.

The coefficient of the own produce variable is positive but insignificant. The results are contrary to the hypothesis of indirect relationship with the value of harvest. If own produce were increased by 1%, the quantity harvested would increase by 0.18% (Table1). The positive relationship between the value of own produce and harvest level indicates that as incomes rise, the relative budget share of veld products increases, and that total demand for wild goods increases, albeit at a small magnitude. However, this increase may vary widely between individual species. For instance, increasing incomes result in substantially larger consumption of game meat, which was made possible by using the increase in income to buy hunting equipment. Hence, veld products are complements and some substitutes to purchased goods. This direct relationship between harvest and own produce poses sustainability issues. Increase in own produce may imply access to more efficient harvesting technology, which may lead degradation of resources.

Results show a negative relationship and between of years of schooling (InEDU) and output. The coefficient of InEDU is negative and insignificant. Education provides one dimension of economic heterogeneity through differential earning opportunities not fundamentally tied to the commons. Less educated people harvest more CPR commodities than those with high levels of education do. Education provides exit options to derive income from non-CPR sources. The presence of exit options has serious implications to and minority groups and resource conservation. If resource-users have relatively lucrative earnings opportunities outside the commons, this can affect their individual incentives, as well as the power of social cohesion to promote cooperative behaviour. As the results show, those who a higher number of years of schooling derive less output from CPRs, which implies they have relatively high opportunities of earnings opportunities outside the commons. Acquiring education may diversify the income earning opportunities the Basarwa, who are highly dependent on CPRs, and enable them to access to CPRs under a global setting.

The results show a direct relationship between quantity harvested (value of harvest) and effort or amount of labour used. Th effort level (inLAB) coefficient is positive



and significant. Unless there is enforcement of rules that limit harvesting, these results demonstrate a specific case whereby access sharing common property system can induce excessive effort supply and shirking. Generally harvesting veld products is labour-intensive, hence increase in supply of labour or effort is bound to increase output or quantity harvested.. However, if actions are not internalised, excessive exploitation of the CPR occurs because an individual harvester cannot appropriate the scarcity rent; therefore, he ignores it. One of the losses from further exploitation, which could be avoided by limiting effort, is the opportunity cost of overexploitation; it is not part of the decision-making process of open access harvesters. Unlimited access destroys the incentive to conserve. An individual exploiting an open-access resource would not have any incentive to conserve it because the benefits derived from restraint would, to some extent, be captured by other hunters. Thus unrestricted access to resources promotes an inefficient allocation. The implication of this is that compliance with harvest controls such as limiting effort results in higher resource stock. Sethi and Somanathan (1996) suggest that an increasing negative relationship exist between the effort levels chosen by harvesters and the stock size. Thus, the smaller the level of stock available, the larger the level of effort necessary to extract enough to cover minimum resource requirements.

### ***Conclusions and Policy Implications***

The paper addresses the key issue of what strategies, in the context of globalisation and inequality, will be effective in improving the welfare of minorities who are highly dependent on CPRs. Inequality when it reflects deep and persistent differences across individuals or groups in access to the assets that generate income, including not only CPRs but, most important in today's global information age, the asset of education, can further marginalise minorities under globalisation processes. Access sharing common property management systems which govern the use of CPRs are similar to globalisation as they tend to accommodate heterogeneous users (e.g. women, men, pastoralists, fishers, hunters, etc.), who exercise a variety of resource uses (e.g. animal grazing, irrigation, firewood, collecting tree products, etc.). Access and use rights may be simultaneous among different types of uses and users, or in cases where they conflict or the uses fail to coincide, they might be structured to overlap. This is

possible even with private property that provides for secondary use rights. Although common property and overlapping private property arrangements do not guarantee equity and have been known to exclude those with less power, the outcome of these systems is often greater equality that would not be achieved under traditional private property regimes. Globalisation efforts would therefore do well to consider the equity and social security values of these arrangements, particularly in environments where viable market alternatives are limited or non-existent. Care should also be taken to examine the inequities in these arrangements and search for means to empower the less marginalised communities and foster their inclusion.

Growing integration of rural communities with markets through globalisation seems to have a positive effects. The results show that output directly associated with access to markets. This falls in line with the claim that globalisation open up markets and allows the free flow of resource. Access to markets may result in greater incentives to protect CPRs to assure a continued stream of benefits from them. However, harvesting for commercial purposes may create incentives to degrade the resources faster. Much will depend on the degree of tenure security offered by the prevailing property rights system. Access to markets can also provide people with alternative livelihood options (e.g.employment opportunities outside CPRs) and thus reduce dependence on CPRs.

Veld Product harvesting is strongly influenced by technology or equipment used for harvesting veld products. This implies that technology is an important feature of access sharing common property. As long as all the owners have the same technology, access and use of the property is equitable. However, if individual CPR users apply varied technology to access and harvest the resource, the regime will deteriorate unless the rules change. *Basarwa* generally use traditional tools to harvest veld products. The use of traditional tools to access and harvest CPRs is likely to have no adverse impact on the existing users' access to the resource. However, if the use of advanced technology by well off community members may lead to over exploitation of the CPR, and drive the resource stocks the point that owners lacking the new technology may loss access to the CPR. This is likely to happen under globalisation given the heterogeneity among nations. The results show that increase in value of capital (technology) leads in increase in quantity harvested, hence unequal access to

the resource. This means that technological improvements (use of vehicles, carts and mechanised tools) may induce less internalisation of harvesting practices. Those who own advanced technology may place different economic values on CPRs, and technically exclude poorer members of the community such is the case with *Basarwa*. When group members adopt different economic values, the common property regime must either adapt or privatisation will likely occur. This finding falls in line with studies of medieval commons around the world (Quiggin, 1988). Whether a CPRs will survive globalisation in technology, economics, and ecology is largely a feature of the strength of the values of the community that manages it. The rules of access and use of communally managed resources must be clear and based on local knowledge, and reinforced by limiting equipment used or by imposing quotas.

The regression results indicate that observing rules of use differs according to the depending upon degree of economic dependence on a resource and the degree of relationship among individuals. Thus, variation in internalisation of one's harvesting activities among households within a community is likely to occur not only because of individualisation of a resource but also due to consumptive dependence on a resource, and the degrees of social ties between and within households.

Being a member of a prominent tribe is negatively associated with harvesting of veld products, especially for subsistence level. However, once the use of a resource becomes commercialised, there is often a switch, where a large increase in the scale of harvesting is associated with those from prominent tribes. Households from these tribes usually have access to transport and can hire more labour, hence are able to maximise their participation in. For instance, households with donkey carts and pick-up trucks collect veld products for themselves as well as get paid to transport harvest for other. Those from less prominent tribes are less likely to have any means of transport. This exemplifies the likely effects of globalisation on ethnic minorities.

Labour is positively associated with output significantly. This means that those households with the means to increase their labour supply through hiring are most likely to be those from prominent tribes. This implies that resource distribution is mainly dependent on an individual input share, and whether commodities harvested are used for subsistence or for commercial purposes. If it is used for subsistence, the

poor and ethnic minorities capture it, and when it becomes commercial it is captured by the elite and those from the socially prominent tribes.

As it was assumed that expanding sources of income would reduce the extent of dependence on a CPR, the coefficients of remittances and government transfers variables have negative coefficients, and the coefficient of remittances variable statistically significant. If sources of income were diversified, the dependence on CPRs would be reduced. This means that the welfare of minorities and resource conservation may be promoted through diversifying income sources.

Socio-economic heterogeneity and power relationships cut across gender. Generally researchers and policymakers frequently identify female-headed households as the target for providing benefits or promoting equity. Differentiation among female-headed households can be on the basis of *de jure* versus *de facto* status; on whether or not remittances are forthcoming from absent household members; their status as widows or divorcees; whether they are in a matrilineal. Homogeneity of groups' members in terms of the activity or its goal may be more important than gender *per se* (Baland and Platteau, 1996). This requires empirical determination, and the lessons from successful and unsuccessful cases to be shared more widely.

In conclusion, although globalisation improves access to markets, it does not ensure improvement of welfare of minorities because it does not address the existing socio-economic heterogeneity. In particular it seems to promote increasing inability of poor households to meet basic needs under output sharing CPR management. For households that used to derive livelihood from wildlife on subsistence basis face loss of access and control over the resources. Where they are unable to cope with difficulties under output sharing common property, poor households can be reduced to starvation levels and beyond. The merits of access sharing common property systems are in terms of governing effort supply and overexploitation. However, it may result in worsening the economic situation of those who have a high level of dependence on CPRs. Therefore, the communities concerned should devise sharing rules that address the special needs of the marginalised groups in the community. At the level of the government, vulnerability-reducing interventions among the poor and socially less prominent tribes need to increase the strength of such household and its

members. These would aim to place minorities in a better position so that they might be able, both as individuals and as a unit, to improve their ability to benefit globalisation. Such interventions might involve increasing skills and general level of education of the poor and socially ethnic minorities. The findings of this research shows that education offers exit options to non-CPR income sources. Being educated expands one's income sources, thereby improving their welfare and reducing dependence on CPRs.

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