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Equity, Institutions, and the Environment:

Socioeconomic Aspects of Local Forest Governance

Krister Andersson

University of Colorado at Boulder

and

Arun Agrawal

University of Michigan at Ann Arbor

ABSTRACT

Local institutions matter for the relationships between socioeconomic inequalities and forest conditions. Analyzing these relationships in 319 observations from local forest user groups in six countries, we detect no systematic associations between socioeconomic attributes and changing forest conditions. Only when controlling for the presence and performance of local institutions is it possible to discern statistically significant regularities. The fact that we observe systematic differences in these associations depending on the local institutions supports the notion that local institutions have a moderating effect on the relationship between socioeconomic inequalities and ecological sustainability. Socioeconomic inequalities seem to influence ecological sustainability, not directly, but via local institutions that may mitigate, enhance, or even completely cancel out the effect that these end up having on the natural environment.

INTRODUCTION

Since 1985, the volume of writings on governing natural resource commons and the diversity of questions addressed through this work has grown rapidly (NAS 2004). However, the greater proportion of this literature continues to focus on whether and how local governance institutions contribute to sustainable management of resources. Examining this general question under diverse ecological and political-economic conditions, and with reference to many different types of resources and groups of peoples, writings on the commons have been signally important in showing the capacity of users to self organize, work with central government officials, and take advantage of opportunities to govern their resources in a sustainable fashion.

One of the major theoretical and policy issues that current writings explore only to a lesser extent is the relationship between equity and sustainability.[1] To be sure, many scholars interested in local level sustainable outcomes either assert or imply a positive relationship between greater socio-economic equity and more sustainable resource use and governance (Budhathoki 2004, Trawick 2001). At the same time, many others point to the adverse equity effects of a focus on efficiency in resource use and governance (Chatterton and Chatterton 2001, Smith 2004, cf. Banerjee et al. 1997). But research focusing directly on the relationship between social or economic equity and its relationship with institutional or ecological sustainability remains rare despite some recent important contributions (Adhikari and Lovett 2006, Varughese and Ostrom 2001), and despite attention to the inequitable outcomes that may result even when resources are

[1] This is not to say that the interest in this relationship is limited within the field of common property analysis, or has not received some attention outside the field. See, for example, the important contributions by Gadgil and Guha 1992, Dailey and Ehrlich 1996. However, these general studies are less attentive to empirical evidence on the relationship between sustainability and equity on the commons.

managed by communities or locally organized community institutions (Adhikari 2005, Agarwal 1998). At least part of the reason for the limited consensus on how equity affects environmental outcomes lies in the diverse dimensions along which equity exists (Rae 1981, Sen 1995, Velded 2000), the potentially different impacts of social vs. political vs. economic inequities on ecological outcomes (Dayton-Johnson 2000), and the significant difficulties in generating measures of equity that capture its many different dimensions and their potentially divergent effects on resource governance outcomes (Prasad et al. 2006).

An additionally feature of the research on commons is that what is known about the relationship between equity and sustainability is based primarily on studies of specific cases, resource types, and countries, some notable exceptions not withstanding. Aailable work has greatly improved existing knowledge about specific cases, but has been less successful in generating empirically based conclusions based on evidence from multiple settings. The ensuing study seeks to make a contribution to the understanding of how equity and ecological sustainability are related by drawing upon data from multiple cases from several different countries. The study is based on data collected jointly by researchers involved in the International Forestry Resources and Institutions research program based at Indiana University.[2] The primary methodological justification for the use of data at the local level is that given the local nature of most renewable resource governance, the proximate factors that influence the relationship between equity and sustainability are also likely to be most visible at the local level.

The generalizability of our findings, based on local-level evidence from multiple countries and contexts is also open to multiple interpretations and questioning because of

[2] For more information about the IFRI research program, visit http://www.indiana.edu/~ifri/.

questions about the representativeness of any set of cases that address local resource governance. But comparative work based on data from multiple locations, visited at multiple occasions over time, has the potential to produce generalizations that overcome at least some basic issues of methods concerning the number of variables that affect outcomes associated with local collective institutions of resource governance. The arguments offered in our study are especially relevant given the critical nature of the relationship between equity, institutions, and ecological sustainability: important for both normative reasons and practical concerns. Based on our findings, we identify some new areas for future research to explicate further the conditions under which equity and ecological sustainability may be jointly achievable.

The arguments in our paper concern the factors that shape equity in the allocation of benefits from community-managed resources, and are based on evidence from 319 cases in which different user groups depend on local forests. The cases are drawn from six countries: India and Nepal in south Asia, Kenya and Uganda in east Africa, and Bolivia and Mexico in Latin America. The comparative analysis focuses on local-level social and political dynamics, how they are shaped by national policies, their effects on institutional rules, and outcomes related to distribution of natural resources benefits. The next section reviews the existing literature on the relationship between equity and ecological sustainability and examines the role of local governance in influencing this relationship. Based on this analysis, we develop a series of hypotheses to be tested in subsequent sections. Section 3 describes the field work methods and the data. Section 4 presents the results of our hypotheses testing. We end with a discussion of the results and their implications for future research on local governance and the importance of equity

for achieving sustainable ecological outcomes. Our conclusions highlight the role of local institutions as they mediate the effects of socio-political and economic inequalities on resource-related outcomes.

INEQUALITY AND ITS EFFECTS: THEORY AND EMPIRICAL EVIDENCE

A spate of recent work on collective action and the commons has tried to pinpoint the relationship between inequality or heterogeneity, governance, and ecological sustainability (Adhikari and Lovett 2006, Poteete and Ostrom 2004, Varughese and Ostrom 2001). This work has highlighted two potential ways in which social and economic heterogeneities affect resource governance, and thereby, ecological outcomes: positively and negatively (Agrawal 1994). A smaller set of authors postulates a U-shaped relationship between inequality and successful collective action.

The first set of authors builds on Mancur Olson's (1965) insights regarding privileged groups to suggest that high levels of heterogeneity are likely to be associated with a greater likelihood of successful collective action (Hardin 1981). Collective action to protect resources or allocate them in a socially agreed-upon manner is likely to be associated with high startup costs, and if the group of users/managers is highly homogenous then decentralized efforts to meet these startup costs are likely to face significant obstacles. On the other hand, in an economically heterogeneous group, those with higher endowments may be willing to contribute the necessary startup costs either in exchange for a functioning collective institution, or for a proportionately higher share of benefits from the common-pool resource (Baland and Platteau 1999).

A second group of authors focuses on the ways in which social and economic inequality among users and mangers may make collective action around resource management difficult to sustain, and thereby, diminish the likelihood of ecologically sustainable resource governance outcomes. These authors focus on how inequalities in economic endowments and heterogeneities in the social context likely lead to unequal sharing of decision-making powers (Neupane 2003), low levels of trust (Kant 1998, Seabright 1993), and unequal allocation of benefits from a regulated common-pool resource. Socio-political and economic inequalities, the argument goes, likely generate social resentments and disincentives for the rich to contribute to collective action. In turn, these resentments and disincentives make it difficult to govern the commons effectively, leading to unsustainable environmental outcomes. Scholars of gender and those concerned with the political ecology of resource governance focus especially on the negative effects of gender-based social heterogeneity on resource governance outcomes, but also condemn institutions that produce inequitable outcomes even if such outcomes are associated with sustainable governance.

Molinas (1998), in contrast to those who have identified a monotonic relationship between socioeconomic heterogeneity and collective action around common pool resources, suggests on the basis of an econometric analysis of 104 local organizations that the relationship is in fact U-shaped. Low and high levels of inequalities are associated with lower likelihood of cooperation, and medium levels associated with higher levels of performance. Under low levels of inequalities, there are few who have the capacity to undertake the costs of collective action. When inequalities are too high they may generate resentments or force outmigration – each of which prevents cooperation.

However these generalizations about the positive relationship of heterogeneity with initiation of collective action, and its negative relationship with maintenance of collective action to regulate common-pool resources are complicated by empirical findings that do not conform, and additional theoretical considerations that can yield divergent outcomes.

According to some, economic heterogeneities in the social context can undermine the likelihood of initiation of self-organized collective action as well (Mukhopadhyay 2004). Those who are better off may well be able to gain their needs from private resources and the poor may not have sufficient resources to undertake collective action. Agrawal (1993) identifies how significant economic and caste-related social heterogeneities can lead higher status households to withhold contribution to collective provisioning because they can rely on private supplies of necessary resources. Poorer and lower status households may also then be unable to contribute the amounts necessary to provide the needed collective good.

On the other hand, some authors have argued that heterogeneities in interests and endowments are crucial to the maintenance of cooperation. Quiggin (1993), for example, argues that complementarities stemming from heterogeneities promote cooperative management of resources. Jodha's studies of commons in semi-arid parts of India suggests that successful collective action institutions to protect the commons during the colonial and precolonial period were founded on coercive feudal political-economic relations that denied access to poorer, marginal rural households (Jodha 1985). Similar concerns have also prompted many conservationists to defend assertive action on the part

of those interested in conservation to ensure the exclusion of consumption pressures by the poor from protected areas (Brockington 2002).

Other scholars have focused on the potentially perverse effects of steps to increase equality. Examining logging contracts between communities and corporations in Indonesia, Engel et al. (2006) suggest that efforts to improve the bargaining position of communities lead to increase in the area logged: greater equity in this study leads to worsened environmental outcomes. McPeak (2003) examines economic heterogeneities among users in relation to spatial heterogeneities in resource distribution, and argues that efforts to improve resource management by focusing simply on reductions in user heterogeneities without attention to spatial heterogeneities of resources are likely to fail in their objectives.

The above review of existing evidence on the relationship between different forms of inequalities and ecological outcomes suggests that there are substantial gaps in what is known about many aspects of this relationship. Despite some isolated efforts to study the relationship between equity and sustainability more rigorously through systematic observation and careful theoretical development, existing studies are typically based on single or few cases drawn from a single country. The generalizations one can offer on the basis of these studies are ambiguous at best. Indeed, this seems to be the obvious message from the work on the commons concerned with heterogeneity, collective action, and ecological outcomes. However, one of the central inferences to be derived from available studies is the importance of institutions in shaping resource governance outcomes as they are influenced by inequalities. Indeed, most of the causal mechanisms identified in the above studies on inequalities and resource-related outcomes

are built around how heterogeneities and inequalities have an effect on collective action and institutions – it is through such impacts of institutions that resources are affected and ecological outcomes produced.

THE ROLE OF LOCAL GOVERNANCE

Previous research has shown that local governance institutions play a critical role in explaining variations in forest conditions (Agrawal and Yadama, 1997; Agrawal and Ostrom 2001; Andersson and Gibson forthcoming; Gibson, Williams, and Ostrom, 2005; Gibson et al 2000; Geist and Lambin 2001). Agrawal and Yadama (1997) suggest that local institutions mediate the influence of exogenous drivers of forest governance outcomes such as demographic and market pressures. Extending Agrawal and Yadama's argument to the relationship between socioeconomic inequalities and ecological sustainability, we argue that effects of social, economic, and or political inequalities on ecological outcomes are also mediated through local institutional arrangements. In other words, the influence of socioeconomic inequalities or equity on the environment depends on the nature and effectiveness of local governance institutions and how these filter—by dampening, enhancing, or refracting—the effects of socioeconomic factors related to equity.

Indeed, local institutions may not only alter forest-related outcomes but may also modify the existing socioeconomic context. We argue that the role played by local institutions is often more dynamic that just a bivariate and unidirectional influence of socioeconomic inequalities on nature: local institutions may simultaneously *respond to and affect* both socioeconomic and biophysical factors in the local context. The diagram

below illustrates the suggested relationships among the three groups of variables. It also forms the basis for the ensuing data analysis.

[Figure 1 here]

DATA AND METHODS

The data for our study were collected during fieldwork conducted between 1994-2002 by researchers affiliated with the Collaborative Research Centers (CRCs) of the International Forestry Resources and Institutions (IFRI) in India, Nepal, Kenya, Uganda, Bolivia and Mexico.. The data set focuses on the attributes of 319 unique relationships between a forest user group and the forest on which it depends. Figure 2 shows how our observations are distributed across the selected countries.

[Figure 2 here]

According to the IFRI research protocols, a forest user group is defined as the set of people who share the same rights and duties to products from the forest(s). A forest, according to IFRI's operational definition, is an area of at least 0.5 hectares with woody vegetation. In any one IFRI site there may be several user groups using multiple forests. The primary unit of analysis for us is the relationship between a user group and the forest it uses.

Variables

We investigate the relationships between three distinct categories of variables represented in figure 1 above: (1) socioeconomic inequalities; (2) local institutions, and (3) forest condition outcomes. We examine different dimensions of these conceptual categories by using a minimum of three proxy variables for each category. The three variables representing forest condition are a)

forest improvement, b) tree density increase, and c) species diversity increase. Figure 3 provides a graphic display of the distribution of these three variables for all six countries.

[Figure 3 here]

Socio-political and economic characteristics of inequalities are represented by a) presence of university educated individuals, b) intragroup differences in wealth, and c) presence of timber harvesting. Figure 4 show how our cases are distributed for these variables.

[Figure 4 here]

Finally, figure 5 presents information in the same fashion as do figures 3 and 4, but for variables corresponding to local governance institutions. For this conceptual category, we use four variables: a) whether the forest in question is owned by the community, b) whether members are excluded from decision making, c) whether adequate conservation measures are being taken by local institutions, and d) whether governance is locally organized.

[Figure 5 here]

Table 1 shows how each of the ten variables has been operationalized, and the descriptive statistics for all variables.

[Table 1 here]

Figures 3-5 show the high inter-country variability for most of the ten variables. For example, the proportion of user groups that, according to a local forester's opinion, has experienced forest condition improvements in the last five years ranges from 26% in Uganda to 85% in India, with the rest of the countries falling between these values. The share of user groups with at least one member who has a university education varies from under 20 percent in Bolivia to over 70 percent in India. India also has the highest proportion of user groups that harvest timber as one of their most important forest products (44 %), closely followed by Bolivia (41%) and Nepal (38%). In Kenya, only 20 percent of all user groups in the sample harvests timber as one of their most important

products. Finally, the inter-country variation regarding institutional performance (based on the local foresters' opinion about the adequacy of conservation measures) is dramatic. Less than 10 percent of the user groups in Mexico are considered to have taken adequate measures whereas the proportion of user groups with adequate or more than adequate local regulations in place is over 60 percent for Bolivia.

These observations raise several important questions. One, in what ways are the three categories of variables presented here related to one another? Two, if there are systematic associations between variables, to what extent are they the result of inter-country vs intra-country variations? Finally, and most importantly for the objective of this paper, what is the role of local institutions in shaping how socio-economic inequalities influence resource governance outcomes.

Since all variables are binary variables, we explore the potential relationships between the three categories of variables through cross tabulations. At the first stage of our analysis, we tabulate the frequencies of two binary variables at a time in a two-by-two table, and then perform both parametric and nonparametric tests of association for the full dataset. For example, to test whether there is any systematic link between socioeconomic variables and forest conditions, we tabulate the possible combinations of paired variables (one from each category) and end up testing a total of nine relationships. At the second stage of the analysis, we test the same relationships for each of the six country sub samples, resulting in an additional 54 bivariate analyses of the multifaceted relationships between the two categories of variables.

RESULTS

Relationship 1: Socioeconomic inequalities and forest conditions

Contrary to generalizations advanced in parts of the existing literature, we find very weak direct links between our measures of socioeconomic inequalities and forest condition. For the full dataset, we found no statistically significant relationships between any of the three forest condition variables and the three socioeconomic variables. When we moved to the second stage of our analysis, to consider the same relationships for the six country sub samples, we detected a limited number of significant correlations between the two categories of variables. But even here, in performing the nine cross tabulations for each of the six countries, we found that only 8 of the 54 relationships showed statistically significant associations. Further, closer examination of the instances in which the associations were statistically significant suggested no consistent relationship. For example, the relationship between the variable measuring intra-group differences in wealth and forester's perceptions of forest condition improvements during the last five years is significant in both the Mexican and Nepali sub samples. But the tau-b statistic has the opposite sign in each of the correlation tests (positive in Mexico and negative in Nepal), suggesting that the relationship between the variables is quite different in the two countries. The measures for different country thus fail to show any strong, direct links between socioeconomic inequalities and forest conditions.

Relationship 2: Institutions and forest conditions

Consistent with the findings of several published IFRI studies, we find important statistically significant links between the performance of local institutions and variations

in forest conditions (e.g. Gibson et al, 2000; Varughese and Ostrom, 2001; Agrawal and Ostrom, 2001). For the full sample, we find a significant association between five out of the twelve pairs of variables. We find statistically significant relationships between user groups holding formal property rights to the forestlands that they use and all three forest condition measures. We also find that significant associations between the forester's opinion regarding the adequacy of conservation efforts by local communities and two measures of forest condition (density of trees and diversity of species). Both the chi-squared and tau-b test statistics for these five pairs of variables were statistically significant, indicating that we can reject the null hypothesis that these variables are independent. This result is supported by the sub sample analysis as well. Thirty two of the total 72 paired variable tests of association and ordinal comparison (44 percent) yielded statistically significant results. Among the three relationships examined, this is the one that empirical analyses suggest is most closely linked.

Relationship 3: Socioeconomic context and institutions

In the last stage of the empirical analysis we study the potential links between variables representing the socioeconomic and biophysical context one the one hand, and the performance of institutions on the other. We again found a number of significant links between the two sets of variables. Three out of the twelve pairs of variables in the large sample (n=319) showed statistically significant associations, and the same was true of 18 out of the 72 pairs in the country level tests.

In these tests, we find that economic heterogeneity is directly related to exclusion from institutional decision making. The proportion of user groups in which some

members are excluded from decision making is associated with high proportion of poor group members (χ^2 =5.75; *p*=0.016). Based on the same cross-tabulation result, we also note that the user groups with a relatively high proportion of poor members have a higher than expected occurrence of exclusion of some user group members in decision making about forest use (Kendall's tau-b = 0.1342, ASE=0.050).

Contrary to what one might expect, we find that communities that have at least one group member who has received a university education have a higher than expected incidence of exclusion from decision making (Kendall's tau-b = 0.0977, ASE = 0.056) although the chi-squared test statistic for this association is statistically significant only at the p<0.10-level.

Finally, our analysis points to a statistically significant association between intra-group differences in wealth and community ownership of forests (χ^2 =3.41, *p*=0.065). However, the highly significant tau-b test statistic (Kendall's tau-b = -0.1035, ASE = 0.053) indicates that there is an ordinal relationship between the two variables (similar to a correlation between two continuous variables). The result suggests that high values of community ownership are associated with low values of intra-group wealth differences. This association indicates that such differences are less common when communities exercise a full set of ownership rights in relation to forests than when communities have only use rights in forests that are claimed by governments or private individuals external to the user group. This last result from the analysis is in tension with arguments according to which devolution of property rights to local communities would lead to an increasing incidence of elite capture and exacerbation of inequitable allocation of resources derived from resource use.

Institutional moderation

The most interesting results of our empirical analyses emerge when we test for the mediating effects of local institutions on the relationships between socioeconomic inequalities and perceived changes in the biophysical resources. Te test for the effect that institutions might have on these relationships, we rely on split crosstab analyses. For each of the four institutional variables that we are interested in, we split the 319 observations into two parts: one that scores high on the institutional variable of interest (x=1) and another that scores low (x=0). For each part we carry out the same tests of association between biophysical and socioeconomic variables as above.

While the previous tests of association failed to pick up any significant, direct links between the biophysical and socioeconomic variables, these links do appear when we control for the presence of local institutions. As an example, let us consider the results in Table 2, which shows the association between perceptions of relative tree density and two different socioeconomic variables: intragroup wealth disparities and university education under different forest property rights regimes.

[Table 2 about here]

Table 2 shows that the association between intragroup wealth disparities and perceptions of relative tree density depends on the forest property rights. That is to say, the association is not statistically significant when the government owns the forestland, only when the local community does. Similarly, the relationship between the density of trees and university education, also shown in Table 2 is only significant when the community owns the forest that they use. Local institutions seem to intervene in a systematic fashion in these relationships as we get similar results for all four institutional

variables considered in this paper. The strongest intervening effect of the four is the variable that denotes whether a user group excludes any of its members in rule making. Five out of the nine associations between biophysical and socioeconomic variables, showed a different result depending on the value of this institutional variable. Local institutions matter for the relationships between socioeconomic inequalities and forest conditions.

Our analysis shows that when taking the institutional variables into account, it changes the relationship between the socioeconomic and biophysical variables. The fact that we observe systematic differences in these associations depending on the local institutions supports the notion that local institutions have a moderating effect on the relationship between socioeconomic inequalities and ecological sustainability. Socioeconomic inequalities seem to influence ecological sustainability, not directly, but *via* local institutions that may mitigate, enhance, or even completely cancel out the effect that these end up having on the natural environment.

DISCUSSION AND CONCLUSION

Even the simple analysis we present above allows us to highlight some important implications of our research. Perhaps the clearest of these is the absence of any simple, unambiguous relationship between socioeconomic heterogeneities and ecological outcomes related to forests. None of the nine paired relationships were statistically significant for the full dataset, and even when we moved to the second level of analysis at by country, only eight out of 54 associations turned out to be statistically significant. Given the inconsistencies among country-level results, it may not be wise to place too

much reliance on them – indeed, some of the statistically significant relationships may be purely statistical artifacts. Even if the data were randomly distributed, we would likely see some statistically significant relationships if we conduct a high enough number of pair-wise tests. The absence of any statistically significant associations for the full dataset, and the identification of only 8 statistically significant associations for country-level tests suggests that at least our dataset of 319 observations does not provide much support for arguments that seek to defend greater social and economic equality because of its beneficial effects on ecological sustainability.

The second important point our analysis highlights is the importance of local institutional arrangements in relation both to forest outcomes and measures of socio-political and economic heterogeneity. A quarter of the 84 pair-wise tests we conducted for the variables belonging to the categories of institutions and forest condition turned out to be statistically significant. The strength and frequency of statistically significant associations between forest outcomes and institutions is even higher: 37 of the 84 pair-wise tests had statistically significant associations. The relationships between local institutions and forest outcomes on the one hand, and local institutions and socio-economic inequalities on the other hand suggest that the proposed moderating role of local institutions is a distinct possibility. More importantly, we do find evidence to support the intervening role of local institutions. The results of our split, pair-wise crosstab analyses suggest that local institutions play a strong moderating role in the studied relationship. Future studies would benefit from considering the possible moderating role of local institutions mediating using different measures of the two groups

of variables as well as employing more sophisticated analytical methods. This would enhance both the reliability and validity of the results obtained in this study.

We should also note two important limitations of the results we have presented. The cases on which we have based our analysis are representative of socio-ecological and institutional processes in the selected countries only to a limited extent. One way in which this shortcoming may be partly compensated is by revisiting the same communities over time. As longitudinal data becomes variable for these sites, the validity of the findings will also improve. This is also the intention for the IFRI program, which has already revisited about 50% of all the sites included in this paper. As time series data becomes variable for these sites, we intend to re-examine the data to see whether our findings still hold and whether other patterns might emerge. As this new data becomes available, we would be particularly interested in exploring the question related to the particular conditions under which equity and ecological sustainability may be jointly achievable.

Secondly, the pair-wise tests for binary associations provide only limited insights into the way the identified variables are associated. They do not take the joint influence of other variables into account. A second strategy to improve our analysis would be to undertake similar tests but taking more variables into account.

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TABLES AND FIGURES

Figure 1: Relationships between the Three Categories of Variables

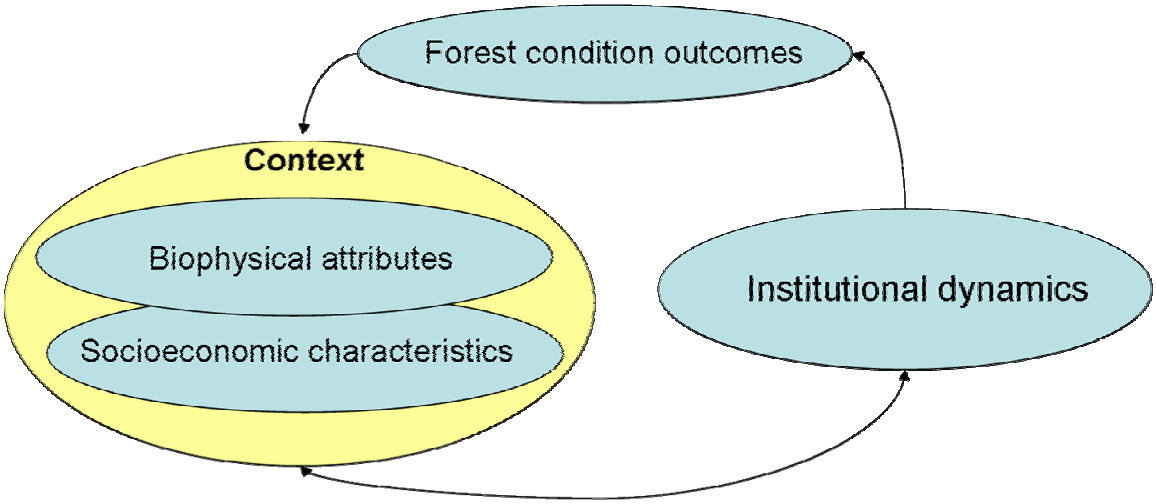

Figure 2

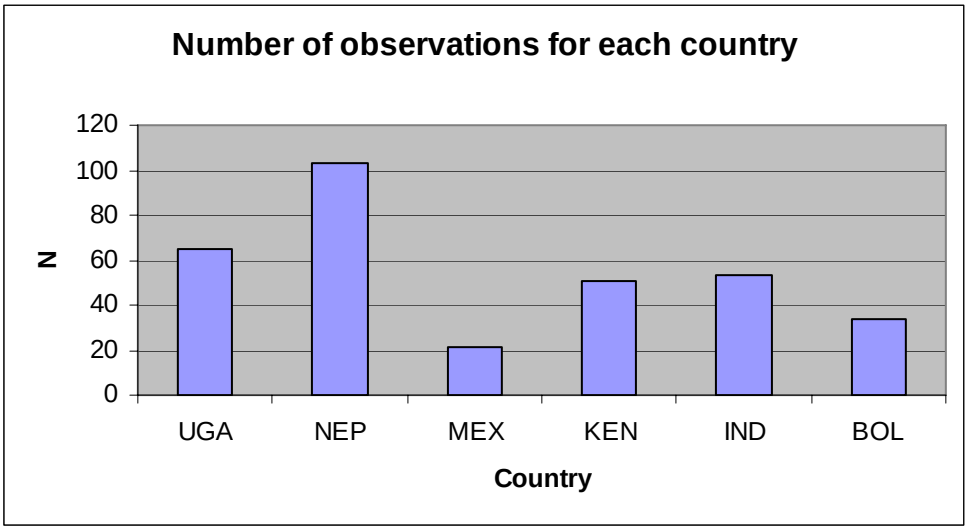

Figure 3: The Ditribution of Forest Condition Proxy Variables in the Six Countries (n=319).

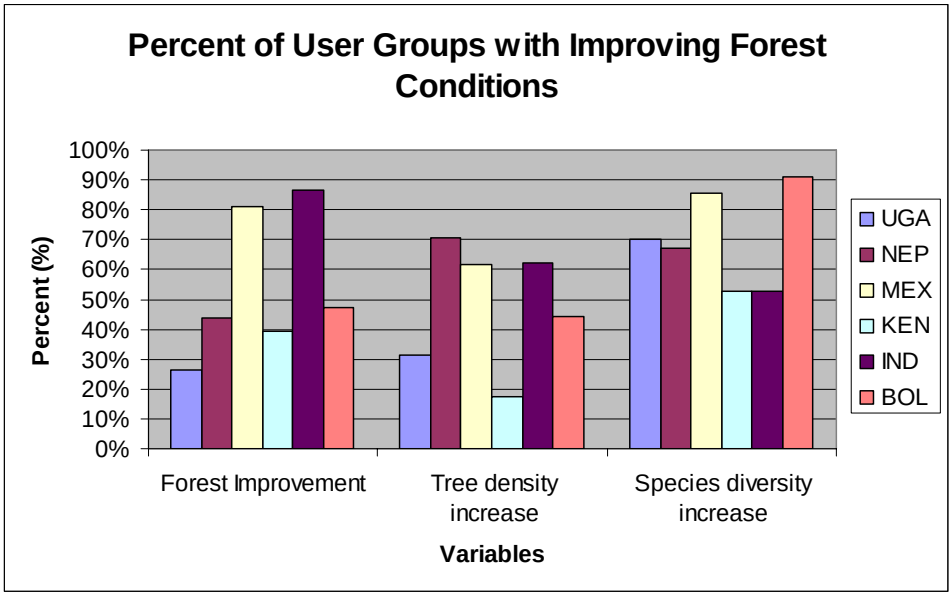

Figure 4: The Ditribution of Contextual Variables in the Six Countries (n=319).

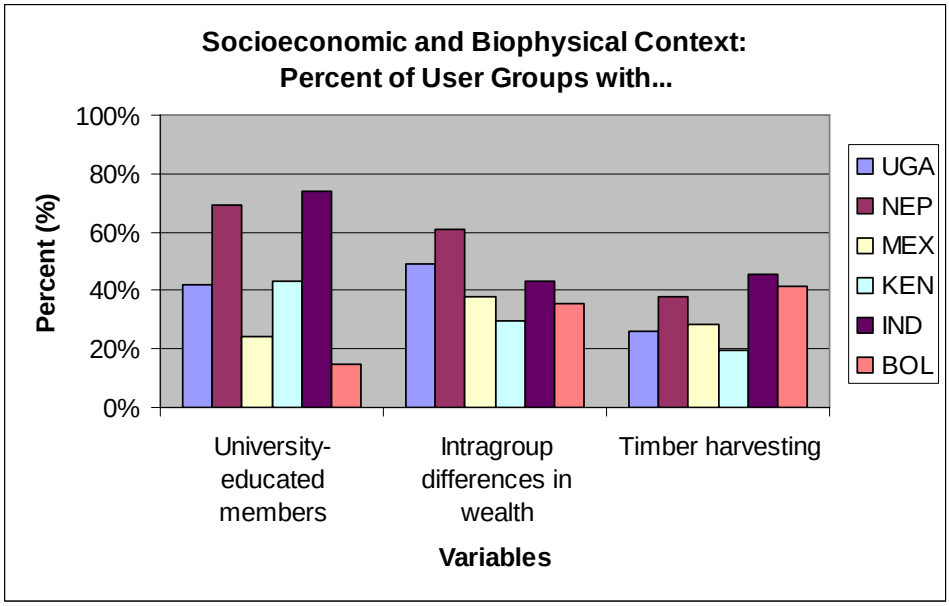

Figure 5: The Ditribution of Variables Related to Local Governance Institutions in the Six Countries (n=319).

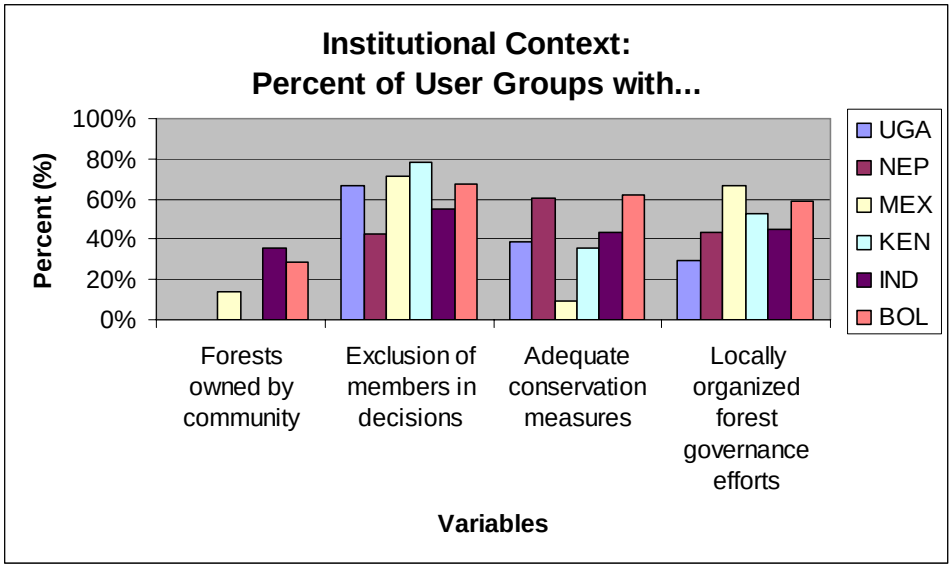

Table 1: Descriptive Statistics for all Binary Variables

Conceptual Category	*Variable*	*Description*	*mean*	*st dev*	*n*
Forest Condition	FIMPROV	1=forester rates the forest as improving in condition over the last five years, otherwise 0	0.4984	0.5008	319
	FTREEDENS	1=forester says the forest's tree density is stable or increased, otherwise 0.	0.5047	0.5008	319
	DIV_BI	1=the forester assesses the forest's biological diversity as at least as rich as neighboring forests, otherwise 0.	0.6677	0.4718	319
Socio-Political and Economic Characteristics	TIMBER	1=the user group harvests timber from at least one of the forests that they use, otherwise 0.	0.3386	0.4740	319
	UWEALTHDIF	1= there are great differences in wealth within the user group, otherwise 0.	0.4671	0.4997	319
	POOR_BI	1=at least 30 percent of the group's members are considered poor, otherwise 0.	0.1223	0.3281	319
	UNIVERSITET_BI	1=at least one group member has a university degree, otherwise 0.	0.5204	0.5004	319
	FOWNLAND	1=community owns the forestland, otherwise 0	0.1003	0.3009	319
Local Institutions	CONS_BI	1=forester thinks the conservation measures are just right or even too strict, other wise 0.	0.5643	0.4966	319
	SORGREG	1=there is a local organization that regulates forest use, otherwise 0	0.4608	0.4992	319
	GNORULE	1=some group members are excluded from rule making about forest use, otherwise 0.	0.5925	0.4921	319

Table 2: Split Pair-Wise Crosstabs for Varying Property Rights Regimes

Government Ownership

```
           |       ftreedens
uwealthdif |         0          1 |     Total
-----------+----------------------+----------
         0 |        73         75 |       148
         1 |        76         63 |       139
-----------+----------------------+----------
     Total |       149        138 |       287

          Pearson chi2(1) =   0.8225   Pr = 0.364
          Kendall's tau-b =  -0.0535  ASE = 0.059

------------------

           |    universitet_bi
 ftreedens |         0          1 |     Total
-----------+----------------------+----------
         0 |        73         76 |       149
         1 |        64         74 |       138
-----------+----------------------+----------
     Total |       137        150 |       287

          Pearson chi2(1) =   0.1966   Pr = 0.657
          Kendall's tau-b =   0.0262  ASE = 0.059
```

Community Ownership

```
           |       ftreedens
uwealthdif |         0          1 |     Total
-----------+----------------------+----------
         0 |         8         14 |        22
         1 |         1          9 |        10
-----------+----------------------+----------
     Total |         9         23 |        32

          Pearson chi2(1) =   2.3638   Pr = 0.124
          Kendall's tau-b =   0.2718  ASE = 0.139**

------------------

           |    universitet_bi
 ftreedens |         0          1 |     Total
-----------+----------------------+----------
         0 |         7          2 |         9
         1 |         9         14 |        23
-----------+----------------------+----------
     Total |        16         16 |        32

          Pearson chi2(1) =   3.8647   Pr = 0.049**
          Kendall's tau-b =   0.3475  ASE = 0.157**
```

Government Ownership

```
           |       ftreedens
uwealthdif |         0          1 |     Total
-----------+----------------------+----------
         0 |        73         75 |       148
         1 |        76         63 |       139
-----------+----------------------+----------
     Total |       149        138 |       287

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------------------

           |    universitet_bi
 ftreedens |         0          1 |     Total
-----------+----------------------+----------
         0 |        73         76 |       149
         1 |        64         74 |       138
-----------+----------------------+----------
     Total |       137        150 |       287

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```

Community Ownership

```
           |       ftreedens
uwealthdif |         0          1 |     Total
-----------+----------------------+----------
         0 |         8         14 |        22
         1 |         1          9 |        10
-----------+----------------------+----------
     Total |         9         23 |        32

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-------------------

           |    universitet_bi
 ftreedens |         0          1 |     Total
-----------+----------------------+----------
         0 |         7          2 |         9
         1 |         9         14 |        23
-----------+----------------------+----------
     Total |        16         16 |        32

          Pearson chi2(1) =   3.8647   Pr = 0.049**
          Kendall's tau-b =   0.3475  ASE = 0.157**
```