The Role of the State in Biodiversity Governance: Theoretical Considerations and Empirical Evidence from Guatemala

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1 Introduction

The loss of biological diversity, especially in tropical countries, constitutes one of the major environmental challenges at the global level. In spite of international conservation efforts, most notably the Convention on Biological Diversity established at the Earth Summit in Rio 1992, the loss of biological diversity continues at alarming rates. The World Resources Institute estimates that the rates of natural forest loss have worsened in all tropical regions except Latin America, and that in absolute terms, more tropical forest was lost in the 1990s than in the 1980s (Matthews 2001: 5).

The most important policy instrument to deal with the loss of biodiversity worldwide is the declaration of protected areas. At the World Parks Congress in 1982 in Bali, the International Union for the Conservation of Nature (IUCN) set the goal that protected areas should cover 10% of the earth's surface. 20 years later, this goal has been reached (Durban Accord 2003). However, as the World Parks Congress 2003 in Durban clearly recognized, an effective management of these protected areas remains a major challenge. Especially in developing countries, the capacity of the state to effectively enforce the regulations of protected areas is limited, and conflicts between the protection of natural resources and their use for poverty alleviation and economic development are widespread. In view of such problems, the 1980s and 1990s have witnessed an increasing commitment to seeking means of meaningful participation of local communities in the management of protected areas. Community-based management, participatory management, and collaborative management have become important approaches in conservation (Borrini-Feyerabend et al. 2000). Such approaches seek to reconcile conservation and use of natural resources for the benefit of the local people (Buck et al. 2000, Agrawal & Gibson 1999). However, in spite of these efforts, the loss of biological diversity continues at a high pace, as indicated above. This aroused increasing criticism from conservation biologists against community-based approaches to conservation (Terborgh 1999, Oates 1999, Kramer et al. 1997, Brandon et al. 1998). The critics argue that community-based approaches have largely failed, and that therefore a much stronger role for the state is required to effectively prevent further loss of biodiversity. Social scientists have criticized this conclusion as ignorant of key aspects of social and political processes (Wilshusen et al. 2002). They point to the negative experience with state management that has given rise to community-based approaches in the first place. According to Wilshusen et al. (2002), the success of conservation efforts depends on the ability of the different actors involved to negotiate agreements, which all parties consider legitimate.

This debate shows that the appropriate role of the state in nature conservation remains disputed, and more theoretical and empirical research is needed. The goal of the present paper is to contribute to this research in two ways: We explore the potential of the New Institutional Economics, and in particular of transaction costs economics, for a theoretical contribution to this question, and secondly, we present an empirical case study from Guatemala. Guatemala was chosen for the case study because it offers an excellent opportunity for empirical research. Various approaches to conservation have been realized there, which differ in their degree of state involvement. Guatemala was the first country in Latin America to delegate the management of a protected area to an NGO. There is also the case of an NGO protecting the habitat of endangered species without any state involvement. And the typical cases of fully state-managed protected areas exist as well. Hence, Guatemala displays an important variety of administrative regimes in conservation.
This paper continues as follows: Section 2 presents the theoretical framework. An overview of the research areas and the methods are presented in Section 3. Section 4 presents and discusses the descriptive results of the three cases and the results of a comparative analysis. Section 5 draws some conclusions.

2 Theoretical Framework

2.1 The Contribution of Transaction Costs Economics

2.1.1 Extending Williamson's Transaction Costs Approach

Identifying the appropriate role of the state in protected area management can be considered as an "efficient boundary" problem, which corresponds to Williamson's question concerning the efficient boundaries of the firm. Williamson (1985) used transaction costs economics to identify efficient governance structures in the industrial sector. To delimit the efficient boundaries of the firm, Williamson applied the discriminating alignment hypothesis, according to which transactions that differ in their attributes are to be aligned with governance structures that differ in their costs and competence, so as to effect an economizing result. He distinguished three attributes of transactions: (1) frequency, (2) uncertainty, and (3) asset specificity. As governance structures, he considered markets, hierarchies, and hybrids. More recently, he also used the transaction costs approach to analyze public sector institutions (Williamson 1999).

2.1.2 Types of Costs Involved in Nature Conservation

On this basis, Birner and Wittmer (forthcoming) developed a transaction costs approach to assess governance structures in nature conservation. We show that the following extensions of the transaction cost framework are appropriate to account for the specificities of governance in nature conservation: (1) introduction of care- intensity and contest-intensity as additional key attributes of transactions; (2) introduction of co-operative types of organization as a third governance structure besides markets and hierarchies; and (3) the introduction of social capital and state capability as contextual variables.

The transaction costs framework developed by Birner and Wittmer (forthcoming) starts with the distinction of two basic types of transactions in conservation: (1) transactions involved in decision-making, including the whole range of management decisions from long-term strategic decisions to day-to-day operational decisions, and (2) the transactions required to implement the decisions. Accordingly, we distinguish between the transaction costs involved in the decisions, and the transaction costs of implementation. In order to assess the comparative advantage of different governance structures, the production costs arising under the respective governance structure have to be taken into account, as well. The transaction costs of decision-making arising in a particular governance structure x (TC_D^x) consist of (1) the costs of obtaining the information that is required to make appropriate decisions, and (2) the costs of coordinating decision making if different individuals or groups are involved, such as costs arising for meetings and settling conflicts. There is obviously a trade-off between the resources spent for making decisions and the quality of the decisions. To capture this trade-off, we introduce the category of "decision-failure costs" (FC_D^x), which capture the damage caused by sub-optimal decisions. Assessing the quality of decision-making, especially with regard to long-term strategic decisions, involves fundamental problems of public choice that are discussed by Birner and Wittmer (forthcoming). The transaction costs of decision-making and the decision-failure costs can be subsumed under the term decision-costs ($TC_D^x + FC_D^x$). Transaction costs of implementation (TC_I^x) in nature conservation arise both for the implementation of regulatory decisions and the implementation of decisions concerning production. As both the transaction costs of implementation and the production costs arise in the process of implementing the management decisions, the two categories can be subsumed under the category *implementation costs* ($PC + TC_I$).

Based on these considerations, a governance structure x can be considered as more efficient than a governance structure y, if the sum of the decision and implementation costs for governance structure x is lower than for governance structure y:

$$(TC_D^x + FC_D^x) + (PC^x + TC_I^x) < (TC_D^y + FC_D^y) + (PC^y + TC_I^y)$$

This approach assumes that the benefits of the both governance structures are the same. In reality, it may be possible to reach a certain level of conservation benefits in one governance structure, but not in another (compare Mburu and Birner 2002).

2.1.3 Governance Structures

For analyzing the role of the state in protected areas management, it is necessary to distinguish between governance structures in the state sector, which include both political decision-making bodies and administrative agencies, and governance structures outside the state sector, which include organizations of the civil society, private, private sector organizations, and resource user organizations. One can, furthermore, distinguish between pure governance structures and hybrid governance structures, which combine organizations from different sectors on the basis of an explicit or implicit contractual arrangement. A third criterion to characterize governance structures is the type of coordination mechanism: While Williamson distinguishes hierarchical coordination mecha-

nisms from the market mechanism, it is useful to consider the co-operative co-ordination mechanism as a third type, when analyzing governance structures for nature conservation.

2.1.4 Attributes of Transactions

The key attributes identified by Williamson (1985), frequency, uncertainty, and asset specificity are also relevant in nature conservation, but they have a different meaning than in industrial production. Nature conservation is characterized by a high degree of uncertainty because both natural influences, such as climate variability, and human interference, e.g., the encroachment of protected areas, are difficult to predict. The degree to which a species is *endemic* and *endangered* can be regarded as a form of asset-specificity in nature conservation, because the threat of an irreversible destruction of such species by human activities can cause hold-up or lock in problems that are the parallel to Williamson's lock in problems in industrial production. The frequency of transactions in nature conservation depends on the type of transactions. While day-to-day operational decisions are frequent, the basic or strategic decisions on conservation as less frequent.

Adopting a concept introduced by Fenoaltea (1984), we suggest care-intensity versus effort-intensity as a further key attribute. Care-intensive transactions are difficult to monitor because they involve carefulness, watchfulness and diligence and, therefore, leave ample room for shirking or even sabotage. In contrast, effort-intensive activities require physical labour input rather than diligence and are, therefore, easier to supervise. The monitoring problem of care-intensive activities is aggravated if the outcome of a transaction is difficult to measure due to uncertainty.

Contest-intensity is introduced as a further key attribute, because nature conservation is often characterized by competing claims on natural resources. The degree to which resource management is characterized by conflicts obviously has an influence on the choice of the appropriate governance structures.

2.1.5 Contextual Factors

The contextual factors to be considered with regard to nature conservation are (1) the characteristics of the resource system, (2) the management capacity of the state, which depends on its internal organization, (3) the management capacity of the communities and other stakeholders, especially NGOs and (4) the history of the relations between the state and the stakeholders, such as local communities, to be involved.

2.1.6 Aligning Transactions with Governance Structures

Figure 1 illustrates the approach of identifying the "efficient boundaries of the state" according to the transaction costs framework developed here. The x-axis in Figure 1 represents a variable c, which is defined as expressing the following attributes: the threats to the natural resources in question (uncertainty), the care-intensity of the implementation activities and the contest-intensity of the management system. We assume that increased

incidence of these three attributes has a similar effect on the cost curves involved in different governance structures, which are measured at the y-axis.

Figure 1 compares the cost curves of two different governance structures, pure state management, and a hybrid type, which involves both a state agency and local communities, as it is the case for co-management. One can derive from the literature on user participation in natural resource management (Hanna 1995) and on co-management of protected areas (Borrini-Feyerabend et al. 2000) that this governance structure has a comparative advantage, if the resource use is contested (high conflict-intensity), the care-intensity is high and therefore, monitoring problems exist, and uncertainty is important. In this case, the hybrid governance structure, which allows for user participation, is able to create legitimacy, which reduces the transaction costs of monitoring and enforcement (implementation costs). Typical examples are co-management systems described in the literature, where representatives of local communities are members of a joint management board (compare Borrini-Feyerabend et al. 2000). Such a governance structure also allows for including local knowledge, thus having a greater potential for reducing the decision-failure costs. The transaction costs of decision-making, however, are higher in this governance structure, because fora for stakeholder involvement have to be set up and the views of different stakeholders have to be coordinated. Therefore, if the variable c has low values, implying that the advantages of this governance structures do not come to play, state governance involves lower total costs than co-management.

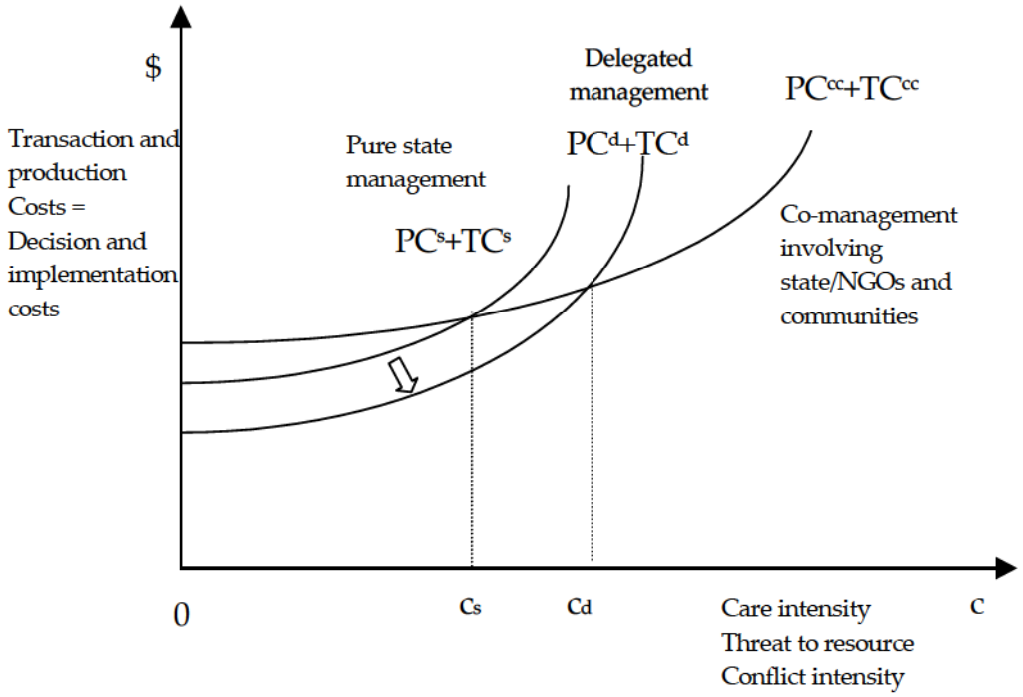
The point from which onwards co-management is more efficient than state management depends on the contextual factors. If the state capability is increased, the cost curve of state management in Figure 1 will be shifted to a lower level, because the state will then provide the same services at a lower cost. If the state capability is low, but there are NGOs with a high management capability, the state may delegate the management authority to such an NGO. This will also have the effect of shifting the cost curve downwards, as shown in Figure 1. Accordingly, the point from which onwards co-management involving local communities is comparatively more efficient occurs at a higher value of c.

For other governance structures, including those that do not involve the state, hypotheses on the cost curves can be derived in a similar way. The literature on such governance structures, however, is still relatively scarce. In case of voluntary agreements between either the state or an NGO with local communities, one can assume that the cost curve is similar to that of co-management, because such agreements will also create legitimacy. If voluntary agreements are made with individual households, the transaction costs incurred by the state or the NGO will increase. It is, however, unclear whether the total transaction costs will be higher than in case of the typical co-management approach where community representatives participate in a management board, because there are costs of community coordination in this case that are incurred by the community members.

Another factor to be considered when deriving hypotheses on the cost curves of different governance structures are economies of scale and scope. In nature conservation, the minimum size of the resource system to be protected depends on the habitat requirements

that are required to maintain viable populations of the target species. The possibilities of different governance structures to capture economies of scale, however, vary. One can assume that the involvement co-management systems are more likely to display diseconomies of scale, because the coordination costs may increase more than proportionately, especially if the heterogeneity of the communities increases with increasing area.
Even though it is possible to empirically measure the transaction costs of conservation (Mburu and Birner 2002, Mburu et al. 2003), this paper is concerned with a qualitative assessment of different governance structures, which aims (1) at discussing the potentials and problems of operationalizing this approach, and (2) at identifying advantages and disadvantages of different governance structures that need to be considered in further elaborating this approach.

Figure 1: Comparative Efficiency of Different Governance Structures



Source: adapted from Birner and Wittmer (forthcoming)

2.2 The Contribution of Other Approaches

The transaction cost economics approach presented here contributes to the choice of the appropriate governance structure from an economic perspective by assessing the efficiency of different structures. However, from a normative perspective, other considerations, such as principles of democracy and political participation, have to be considered as well, when selecting a governance structures. To some extent, such principles are reflected in the transaction costs. As argued above, participation in decision-making can reduce transaction costs arising for monitoring and enforcement by creating legitimacy. However, from a normative perspective, participation and legitimacy are considered as goals

in their own right, not just as instruments to increase efficiency. Therefore, it is suggested to combine the efficiency approach developed here with other theoretical approaches, such as constitutional theory and political philosophy. This combination is, however, beyond the scope of the present paper, which focuses on the contribution of the New Institutional Economics.

3 Research Area and Methods

3.1 Research Area and Selection of Cases

Guatemala is the second largest country of Central America in terms of territory (108.889 km²) and population (11,7 million), with neotropical coastal lowlands and nearctic central highlands dominating the landscape. Independent since 1838, Guatemala has a long political history of conflict between the landowners and the landless. About 60% of today's population are considered members of the various indigenous ethnics and another 30% are considered Mestizo. More than half of the population lives in severe poverty while large parts of land are used for growing cash-crops for export, mainly bananas, sugar, cattle and coffee. From 1954 to 1986 the country was governed by various military regimes; violence and armed conflict between government forces and peasant resistance exacerbated mass poverty during the eighties. Today, ethnic and land issues are still unresolved. Guatemala's biological diversity is one of the highest in Latin America and the country ranks among the 25 most plant-rich countries of the world. The country has experienced a rapid loss of biological diversity.

The Protected Areas Law of 1989 (Decreto 4-89) provides the basic institutional and policy framework for nature conservation in Guatemala today. This law established the state administration in charge of protected areas CONAP (Consejo Nacional de Áreas Protegidas), it confirmed the legal status of existing protected areas and mandated the establishment of new ones, altogether covering almost 25% of the country's surface (Secaira et al. 2000: 6). During the seventies already, the Guatemalan University of San Carlos had been de facto in charge of administrating several protected areas. The first case of a formal delegation of management responsibilities to a non-governmental institution, as indicated in the introduction, was the Sierra de las Minas Biosphere Reserve in 1990: Decreto 49-90 puts the NGO "Defensores de la Naturaleza" by law in charge of the reserve.

Today the national parks administration system SIGAP (Sistema Guatemalteco de Areas Protegidas), which is run by CONAP, covers 115 different protected areas within 17 categories of protection. About half of the total protected area is considered under strict conservation whereas the other half is administrated under regimes that allow the use of natural resources to varying degrees.

21% of the country's protected area a total of 24 cases are under some form of delegated or co-management, either assumed by the university of San Carlos, by one of the few bigger national NGOs, or by the municipalities in the area. In addition to CONAP, other governmental organs are also administrating some protected areas, such as the bodies in charge of forestry (INAB), tourism (INGUAT) and of cultural heritage (INDAEH). Around

half of the 115 protected areas are privately run and on private lands, however, they make up only a minute percentage of the total area under legal protection. About 80% of the total protected area does have a management plan today, however, even official documents state that a shortage of capacity, personnel and resources seriously limits the effective management of Guatemala's protected areas (cf. CONAP 2002, Castro & de León 2003).

Three cases have been selected for this case study: The Laguna Lachuá National Park, the Sierra de Las Minas Biosphere Reserve, and the Proyecto Eco-Quetzal. All areas are located in the Department of Alta Verapaz. Research was conducted jointly by the Institute of Rural Development of the University of Göttingen and the Centre for Environmental Research (UFZ)[1].

The three cases have been selected because they cover the spectrum from full to no state involvement. The Laguna Lachuá National Park has been selected as an example of the conventional model of state-managed protected areas that is managed by a state agency, the state forest administration INAB (Instituto Nacional del Bosque). The Park was established in 1978 following a request of the state agency in charge of agricultural settlement in order to preserve a unique example of the Franja Transversal del Norte (UNEP 1996). At that time, settlement started to be directed towards this region. The Park is the only state-managed protected area of substantial size in Alta Verapaz. It is assisted by an internationally funded integrated conservation and development project.

As a model of delegated management, the Sierra de las Minas Biosphere Reserve has been selected, because it was the first model of this type, and therefore, substantial experience with delegated management exists today. Moreover, this Biosphere Reserve harbors around 70% of the country's reported diversity of reptiles, birds and mammals.

The third case is the Proyecto Eco-Quetzal, which is run by the local NGO BIDAS. The aim of this project is to protect montane cloud forests in the Sierra Aj Poop B'atz' and to help the population in the area to escape from poverty. The area harbors the highest density of Quetzal birds in the country (Unger 1990). The Quetzal is a national symbol, it appears on Guatemala's flag, and the currency is named after this bird. Supported by international funding, the project has purchased 47 ha of land. The remaining forest is held as private property by several large landowners and members of the local communities. 65% of forest in the area is protected by private agreements of the project with these landowners. The project offers development assistance in form of agricultural extension and eco-tourism development to the households in exchange for a commitment not to further cut the forest[2]. This case has been selected because it represents an example of nature protection activities without state involvement.

[1] Funding of this research within the interdisciplinary graduate college "Valuation and Management of Biodiversity" by Deutsche Forschungsgemeinschaft (DFG) and support by UFZ is gratefully acknowledged.

[2] For further information: www.fh-eberswalde.de/quetzalev/PEQ.htm

3.2 Research Methods

Empirical data was collected in three research visits between 2001 and 2003. Next to the review of secondary literature and project documents, we interviewed representatives of the organizations in charge of the three areas, including the persons directly responsible for their management, using an interview guideline. In Laguna Lachuá and Proyecto Eco-Quetzal, we also conducted a household survey. In the Eco-Quetzal area, we interviewed 60 households in three selected villages, two of which are involved in the project. In the case of Laguna Lachuá, 78 households were interviewed in four selected villages. The interviews were conducted by local counterparts on the basis of a questionnaire. The interviews covered household characteristics, agricultural and livestock production, perceptions concerning nature conservation, experiences with the Lachuá Park Management and the supporting project, or with the Proyecto Eco-Quetzal, respectively.

4 Results

The results of the empirical study are summarized in Table 1. As indicated above, we conduct an explorative qualitative assessment that serves to illustrate the potential contribution of the New Institutional Economics for an assessment of the appropriate role of the state in conservation. The major purpose hereby is to identify and discuss the methodological issues involved in operationalizing the proposed framework for empirical research.

4.1 Characteristics of the Three Cases

Following the theoretical framework, we first assess the attributes and the contextual factors of the three cases.

4.1.1 Attributes

Contest-intensity. With regard to contest-intensity, there are important differences in the three cases. Since Laguna Lachuá National Park was established when population density was still low and major settlement activities had not yet started, the contest-intensity in this area is low. The Park was already established and considered as a matter of fact, when the majority of the settlers came to the area. One community that was affected by the Park was able to reach a change in the boundaries at that time[3]. At present, conflicts concerning the park boundaries exist only with two communities.

In the case of the Proyecto Eco-Quetzal, the potential for conflicts in case of the declaration of a protected area by the state is high, because the land users in this area have private property rights. Declaring a protected area would, therefore, involve expropriation. Since the voluntary approach without state intervention avoids these conflicts, actual conflicts concerning the conservation approach are low. There are, however, conflicts within the community between participants of the program and those households that cannot

[3] Interview with village representative May 2001.

participate because they have no forest land. Proyecto Eco-Quetzal attempts to mitigate these conflicts by negotiating agreements at the village level, which transfer a share of the funds generated from eco-tourism to a village fund to be used for community projects.
In case of Sierra de las Minas, the contest-intensity is comparatively high in the areas that are settled. Already after the establishment, large-scale landowners filed a case in court, which they, however, lost (Secaira et al. 2000). A management board involving different stakeholders, which could mitigate conflicts as foreseen in the co-management model, was established only recently[4]. Before, an enforcement approach similar to that of the pure state management model was prevalent. The contest-intensity is further aggravated by commercial logging interests.

Uncertainty. The major threats to this conservation area are deforestation, fire, illegal logging, and poaching (Secaira et al. 2000). In the Eco-Quetzal region, land conversion is a major threat, whereas in Laguna Lachuá, logging and hunting, but not land conversion, are major problems. Therefore, uncertainty can be judged to be highest in Sierra de las Minas.

Care-intensity. The level of care needed to prevent the threats is largely dependent on the type of threat. Poaching with traps involves a high care-intensity, especially in remote areas. The same applies to the prevention of fire. Illegal logging can be controlled with a comparatively lower level of efforts, since trucks could be controlled at certain road posts. However, this constitutes a potential source for bribery. Controlling for land conversion also requires less diligence than preventing fire or poaching, since it is a process that is difficult to hide. The availability of satellite images even improves the control possibilities with regard to land conversion. The care-intensity also depends on the type of animals to be protected.

Specificity. With regard to the specificity attribute, one can note that Sierra de las Minas is characterized by a higher density of endemic species than Laguna Lachuá and the Eco-Quetzal region. Proyecto Eco-Quetzal concentrates on the Quetzal, which is endemic to Central America, but not specific to the area. The hold-up problem that can be caused by asset-specificity – in this case endemism – is aggravated, if the endemic species is also endangered. In the cases under consideration, the endangered species include the following: Howler Monkey (*Alouatta pigra*), Central American Tapir (*Tapirus bairdii*) and Golden-cheaked Warbler (*Dendroica chrysoparia*), both Quetzal (*Pharomachrus mocinno*) and Jaguar (*panthera onca*) are classified as near threatened by IUCN (IUCN 2003).

Frequency. The frequency of operational decisions and implementation activities depends on the type of threat and the conflict-intensity. Seasonal threats such as fire require a higher frequency of operational decisions and activities during the respective periods. The

[4] Interview with NGO representative August 2003.

threat of poaching and illegal logging requires more frequent monitoring activities than the prevention of land conversion. A high conflict-intensity may require not only more frequent operational decisions and activities, but also a more frequent revision of strategic long-term decisions.[5] Based on these considerations, one can assume that the frequency of transactions is higher in the Sierra de las Minas and the Eco-Quetzal case than in the Laguna Lachuá case.

4.1.2 Contextual Factors

At the time of establishment, the state capacity for conservation management in terms of funding and qualified personnel was low both in case of Laguna Lachuá and Sierra de las Minas. However, the Laguna Lachuá is now managed by the forest administration INAB, which was reformed in 1996. It was established as a decentralized and autonomous organization and is widely considered to be one of the most efficient and least corrupt public administration institutions in the country.

The capacity of the NGO *Defensores de la Naturaleza* in terms of experience, qualified staff, financial stability can also be judged as high[6].

The community characteristics differ considerably between the three cases. In case of Laguna Lachuá, most of the people living in the surroundings of the National Park are migrants who settled in the area since the 1960ies and came from different parts of the country. Ethnic groups include Q'eqchi', Kiche, Pocomchi as well as Mestizo communities. The communities in the area of Eco-Quetzal have settled there since the beginning of the last century and belong almost exclusively to the Q'eqchi'. The communities living in the southern part of the Sierra de las Minas are mainly Mestizo in the northern part Q'eqchi' and Pocomchi. Table 1 presents an overview of the results of the empirical case studies.

4.2 Assessment of the Choice of Governance Structures

The assessment of the attributes and contextual factors of the three governance structures shows that the three cases are rather different. According to the theoretical considerations, different governance structures will be required to reduce the production and transaction costs arising under these governance structures. In the case of Laguna Lachuá, where contest intensity is comparatively low, and land conversion as an important type of threat is almost absent, state governance is expected to have comparative advantages, especially, if a state agency with high management capability is available. Since 1996, INAB is in charge of the management. As indicated above, INAB is considered as an institution with high management capacity. Before, the capacity of the managing state agencies were certainly lower, but the level of threats was also even less pronounced as long as the population density was still lower. Therefore, state management can indeed be expected to be a comparatively efficient governance structure for the Lachuá case.

[5] One has to take into account that the governance structure that is established will then have an influence on the time spans in which basic decisions are typically reconsidered. In the Eco-Quetzal approach, a revision of strategic decisions, which does not involve a parliamentary decision, can occur more frequently.

[6] Expert Interviews May 2002

Table 1: Comparative Assessment of the Three Strategies

	A) National Park Laguna Lachuá	**B) Proyecto Eco-Quetzal**	**C) Sierra de las Minas Biosphere Reserve**
Characterization			
Strategy	Protected Area managed by state agency, supported by international project	Voluntary agreements between landowners and internationally funded local NGO, no state involvement	Protected Area with management delegated to a national NGO with national and international funding
Year of establishment	1975	1990	1990
Size	14,500 ha, National park 45,000 ha with buffer zone	approx. 5,500 ha of forest 65% protected	242,000 ha 103,000 ha (core zone)
Attributes			
Frequency	Low frequency of strategic decisions, High frequency of operational decisions and implementation activities	As in Case A)	As in Case A)
Contest intensity	Low due to early establishment	Potentially high due to private property rights	Low in non-inhabited areas High in inhabited areas
Specificity	Comparatively high – Jaguar – very few animals, but not endemic	Comparatively high – Quetzal not endemic to area	High – high density of endemic species
Care intensity	Look into management plan	Medium, due to concentration on one species – Quetzal	High due to the large variety of species concerned
Uncertainty	Threat of illegal logging and hunting, fire	Threat of land conversion and fire	Threat of illegal logging, poaching, land conversion and fire

Contextual factors			
State capacity	Since 1996 managed by INAB with a comparatively high capacity; earlier "paper park"	State not involved; Low capacity of the state to work in remote areas	Very low state capacity at the time of establishment;
Community characteristics	Heterogeneous population due to migration Not yet legalized property rights	Q'eqchi' communities, since 1-3 generations Well defined private property rights	Large scale land owners and Q'eqchi' communities often with not yet legalized land rights
Assessment			
Reaching protection goals	Effective protection apart from some cases of illegal logging, almost no land conversion	Deforestation effectively stopped, situation for next generation not clear	Comparatively low forest losses (xx%), recently some encroachment
Costs of protection	Comparatively high, if costs of internationally funded support project are taken into account	Comparatively low due to high contribution of voluntary work	Comparatively high
Possibilities of funding	Problems of effectively linking international funds to Park management	Problems to attract sufficient and continuous flow of financial resources, especially for overhead costs	Funding possibilities better than in case B) due to officially declared protected area
Community participation and benefits	Participation left to the discretion of the Park / Project management	Participation guaranteed by the voluntary character of the approach	Formal participation foreseen by law, implementation left to managing NGO
Legitimacy	Depends on the legitimacy of state decisions, and the international influence on such decisions, in the given political system	Depends on the acceptance of the "market mechanism" underlying voluntary agreements as a source of legitimacy	Depends on the legitimacy of state decisions (as in A), and on the legitimacy of the NGO to which the management is delegated

Source: own presentation

Problems occurred at a time when the enforcement capacity of the state was reduced due to a general uncertainty at the end of the civil war. In this situation, the threats increased as the case of illegal logging showed. INAB and the project supporting the Park reacted by promoting the establishment of a regional forum of the communities surrounding the Park, where problems concerning conservation and development could be discussed. The project then supported the communities in their efforts to get land titles. Even though this regional forum did not become directly involved in the management of the Park, this support can be considered as an approach to adopt collaborative elements as reaction to changing attributes.

At the time of the establishment of the Sierra de las Minas case, the management capacity of the state agencies were comparatively low. Since it was clear from the beginning that the establishment of the Biosphere Reserve was contested, as the court case showed, it appeared appropriate to delegate the management to an NGO with a high management capacity and a high commitment to conservation. Even though a community involvement was envisaged from the beginning, the establishment of a management board involving representatives of the communities was established only recently, as indicated above. This can also be seen as a reaction to increasing conflicts with the local communities, which are indicated by efforts of communities to settle within the core zone (Diario 2003). An earlier shift to a collaborative approach that does not only provide development benefits to local communities, but also involves them into decision-making might have reduced conflicts.

In case of Eco-Quetzal, the fact that the land users already held formal private property rights to the forest resources to be protected indicates that a voluntary approach was appropriate in order to avoid conflicts. Moreover, the comparatively small area and the focus on the Quetzal as major species to be protected favored the approach to make voluntary agreements with individual farmers and communities.

In summary, the governance structures that were chosen can be expected to be comparatively efficient for the respective situation.

4.3 Assessment of the Performance

4.3.1 Reaching Protection Goals

One major indicator for the assessment of the three cases is their ability to reach conservation goals. As satellite image and field evidence shows, the Laguna Lachuá National Park has effectively reached the goal to prevent deforestation from the Park area. Apart from some incidences of logging of Mahagony (*swietenia macrophyla*) trees in a period of unrest and lacking law enforcement after the end of the civil war, no major losses of biological diversity have been recorded.

In case of the Proyecto Eco-Quetzal, the approach to purchase land from large land owners and to offer voluntary agreements to small-scale land owners has effectively stopped deforestation in the area and protected the habitat of the Quetzal.

In case of the Sierra de las Minas, an analysis of satellite images showed that it was possible to slow down deforestation considerably in most of the watersheds. It is expected that deforestation, which had taken place at a rate of 1.1% per year prior to the establishment

of the Reserve, will eventually be halted. Large-scale logging operations have been cancelled, and two communities were resettled from the Core Zone of the Reserve, which led to a regeneration of forest cover in the respective areas. Fire and hunting continued to be a problem, even though efforts for its reduction have been implemented (Secaira et al., 2000).

4.3.2 Costs of Protection and Possibilities to Attract Funding

A quantitative analysis of the costs involved in the different approaches is beyond the scope of this contribution. The methodological issues involved in assessing the production and transaction costs of conservation are discussed in Mburu and Birner (2002) and Mburu et al. (2003). One problem is comparing costs are economies of scale effects that are also relevant for the comparison of the three cases considered here. Another challenge is the valuation of benefits. The theoretical approach implies a cost-effectiveness analysis that assumes the same level of benefits. However, as discussed in Mburu and Birner (2002), the benefits that can be achieved under different governance structures may differ. There are reasons to assume that in cases of high conflict-intensity, collaborative approaches may be required to reach conservation goals that are not achievable under pure state management.

In spite of these difficulties, some observations on the cost-effectiveness and the possibilities to secure sufficient funding of the three cases considered here may be useful. In case of Laguna Lachuá, the state has provided the basic funding, and it was possible to attract additional funding for the support project. While the costs of protection are relatively low for the state administration, they reach comparatively high levels, if the resources spent by the international support project are taken into account. For the Sierra de las Minas Reserve Defensores has been solely responsible for privately raising reserve management funds from within Guatemala and abroad. CONAP's contribution is the provision of eight park guards. In monetary terms, that represents only about 2 percent of the reserve's overall budget (Secaira et al. 2000:7). The NGO was, however, able to attract considerable international funding, even though the need to apply for international funds constitutes a potential problem for securing a continuous flow of funds. The Proyecto Eco-Quetzal faced considerable problems of financial security. Funding showed high fluctuations and it was particularly difficult to receive funding for overhead costs. The fact that the area was not officially declared as a protected area certainly contributed to the problem, and considerations are now underway to declare the area as a private protected area in order to deal with this problem. The fluctuations in funding also led to change of personnel and disruptions in providing assistance to the communities. The costs of protection were comparatively low in case of the Proyecto Eco-Quetzal, because of a high contribution of voluntary work, which the NGO approach has been able to motivate.

4.3.3 Community Participation and Benefits

In view of the conflict between nature conservation of biodiversity and rural development, which is especially prominent in developing countries, the capacity of different

governance structures to ensure community participation and benefits is an important indicator in assessing their performance. In the case of Laguna Lachuá, the participation of local communities was largely left to the discretion of the Park Manager. The Park Manager in charge at the time of the survey, placed a high emphasis on a close collaboration with the adjacent communities and supported the establishment of a regional community forum, which also served to discuss problems related to the Park. However, there was no legal or other mechanism that would have required such participation. Providing benefits to the communities was a major goal by the internationally funded support project. The project promoted activities such as bee-keeping and handicraft. The income contribution of such activities appears, however, limited. According to the survey, the major benefit was seen in the organizational support provided by the project for communities to participate in the land reform/land titling program. However, the survey also showed that linking such benefits provided by the project to the conservation efforts of the Park is a major challenge. Many respondents were not aware that there was any relation between the Project and the Park.

In case of Proyecto Eco-Quetzal, the participation of the communities and households and the provision of benefits is part of the "mechanism" upon which this governance structure is based. In principle, the households only participate if they consider the benefits provided by the project as an adequate compensation for costs, including the opportunity costs of reduced resource use, which they incur for conservation. In this sense, the "market principle of willing consent" applies. In practice, however, other factors, such as the emergence of a "patron-client" relationship between the project and the farmers may also emerge. Moreover, as indicated above, problems may arise if not all households can participate because not all own resources, such as forest, that are expected to be protected. In the Proyecto Eco-Quetzal case, the households considered investment in the agricultural sector, such as planting of fruit trees, as most important benefits. The income contribution from eco-tourism was comparatively low.

In the Sierra de Las Minas case, a committee was foreseen by law, which provides a forum for the participation of local community representatives, as indicated above. In practice, however, this committee was established rather late[7]. The NGO also implemented a number of community development programs. Problems to reach conservation goals appear to have stimulated the focus on such programs. However, due to the conservation orientation of the NGOs, developing the capacity for the successful implementation of such programs constituted a challenge. This was, however, also observed in the other two cases.

4.3.4 Legitimacy

Legitimacy can be considered as another criterion to assess governance structures that differ with regard to the role of the state. In case of pure state governance, it is the legitimacy of the general political system that determines the legitimacy of the protected area system under consideration. However, Guatemala's political system is characterized by a

[7] Expert interview August 2003

far-reaching exclusion of the indigenous population from political decision-making. Nevertheless, the legitimacy of the area was not challenged at the time of the survey, because it had been established rather early and, as indicated above, was considered as a matter of fact.

In case of Proyecto Eco-Quetzal, the assessment of the legitimacy of the approach depends on the extent to which the "market mechanism" is considered as a source of legitimacy. In principle, the fact that the approach is voluntary rules out legitimacy problems. In practice, however, the problem of inequality between the bargaining parties poses questions concerning the legitimacy of the approach – extremely poor land owners with limited formal education on the one hand – and well-established representatives of rich foreign donor agencies, on the other hand.

The case of Sierra de las Minas shares the legitimacy problem of the state governance approach. In addition, the question arises to which extent it is legitimate that the state transfers authority, to a non-governmental organization, which does not have the mandate of the voters. The legitimacy of such delegation can be considered to be dependent upon the capacity of the NGO to reach both conservation and development goals better than a state agency. At the time of establishing the Reserve, the NGO *Defensores de la Naturaleza* certainly had a higher capacity in both respects than the state agencies concerned.

5 Discussion

5.1 Challenges in Assessing the Attributes

The empirical application of the framework shows that in nature conservation the different attributes are closely related. The frequency at which operational decisions and implementation activities have to be made is obviously related to the contest intensity and the threat – an aspect of uncertainty, in the sense that a higher contest intensity concerning threatened resources may require more frequent decisions and activities. The hold-up problems arising depend both on endemism, which is an aspect of asset-specificity, and their degree of being endangered, which is also related to the type of threat. The required care-intensity also depends on the type of threat, as the example of controlling for traps shows. Theoretical considerations and empirical evidence suggest that the attributes are related in a multiplicative way. For example, if contest intensity and uncertainty are relevant, high specificity in form of endemism aggravates the resulting challenges.

What emerges from these considerations is that the type of threat, in relation to the management goals, especially the species and resources to be protected, are of crucial importance for the choice of governance structure. The same two factors – the resources to be protected and the type of threat by which they are endangered – are also crucial in determining the size of the area to be protected, which in turn, influences the comparative efficiency of alternative governance structures.

The empirical application indicates that there is a need to identify observable and, if possible, measurable indicators of the attributes. Otherwise, comparisons may remain dependent on expert opinions and difficult to standardize. The empirical application also

shows that one has to disentangle the effects of the attributes from the influence of the established governance structures. For example, if a governance structure is able to mediate conflicts, the observed conflicts are low. Still, the contest-intensity, as defined in the theoretical framework, may be high. Therefore, for empirical applications, it is useful to have baseline information on the situation before the establishment of the respective governance structures, and to have cases with different governance structures that are comparable with regard to the attributes.

5.2 Challenges in Performance Assessment

The empirical application also shows that the empirical assessment of existing governance structures on the basis of the proposed framework involves an identification problem. A low performance can be due to two basic reasons: (1) The governance structure chosen was not appropriate under the given attributes and contextual factors. (2) Even though the governance structure was appropriate for the attributes and contextual factors, performance was low, for example, because of persisting problems that no governance structure could solve.

5.3 Further Research

The performance assessment showed that the possibility to attract international funding can be considered as an important factor for the choice of governance structures in developing countries. This factor is, however, not adequately captured in the attributes and contextual factors and should be considered in a further development of the proposed framework.

Further applications of the proposed framework to nature conservation may lead to a specification of the attributes with concrete indicators that are specific to conservation. For example, the attribute of asset-specificity may sufficiently be captured by endemism. The attribute of uncertainty may be decomposed in type of threat and level of being endangered. As indicated above, the empirical application shows that the type of threat, in relation with the resources to be protected, is of crucial importance for the choice of governance structure. Replacing the rather abstract attributes derived from transaction cost economics by concrete indicators that are widely used in biodiversity management will also improve the communication between economists and conservationists. If the proposed framework is applied to other resource systems such as irrigation, other specifications of the attributes will have to be developed.

Another issue for further research is the development of a theoretical basis for judging the legitimacy of different governance structures. For example, public choice theory and normative constitutional theory could be taken into account when assessing the legitimacy of delegating regulatory functions to non-governmental organizations.

Further research may also concentrate on the direct measurement of transaction costs. As the study by Mburu and Birner (2002) and Mburu et al. (2003) shows, the direct measurement of transaction costs is empirically feasible. However, as discussed above, challenges arise from the problems of identifying comparable cases and from economies of scale.

Moreover, since the benefits achieved under different governance structures may differ, the analysis of the costs alone is not sufficient, and valuing the benefits remains a topic for further research in connection with the approach proposed here.

6 Concluding Remarks

In view of accelerating loss of biodiversity and persisting conflicts between conservation and development, the identification of appropriate biodiversity governance structures remains a major challenge. The paper has shown that important insights can be drawn from empirical examples that represent innovative approaches in biodiversity conservation, especially with regard to the role of the state, local communities and civil society. However, in order to derive generalizable lessons from such empirical experiences, a sound theoretical framework is needed. We hope to have shown that transaction costs economics is an important avenue to develop such a framework. The transaction costs approach makes it possible to derive hypotheses on the comparative efficiency of different governance structures, and to identify the factors influencing this comparative efficiency. The empirical application shows that a close collaboration with scientists from different disciplines, including conservation biology, cultural anthropology and law, is useful to apply transaction costs economics to nature conservation.

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