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Linking Governance and Management Perspectives with Conservation Success in Protected Areas and Biosphere Reserves

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Abstract

The implementation of protected areas that effectively meet their conservation objectives is one of the principal challenges in the endeavour to halt biodiversity loss. Though more than 100,000 protected areas cover about ten percent of the Earth's terrestrial surface today, their success often leaves a great deal of room for improvement when regarded from the viewpoint of conservation.

The overall objective of the interdisciplinary GoBi (Governance of Biodiversity) Research Group is to identify and assess the success and failure factors of protected areas with a focus on biosphere reserves. This serves the higher-level goal of advancing empirical knowledge and conceptual understanding of the results of the establishment of protected areas. We are integrating ecological and socio-economic data in order to identify typical profiles of sets of variables influencing conservation success in protected areas. Typical research questions are, for example: What are the principal factors influencing the effective functioning of protected areas? How do they work? And how are they connected?

We specifically scrutinize governance and management approaches because we believe that they are the key to the success of protected areas but have not yet received the attention they appear to warrant. Also, contrary to other factors influencing the success of protected areas, e.g., invasive species, changes in climate or macro-pressures on resources, governance and management approaches can be relatively easily controlled by those intending to implement PAs.

This paper gives an overview over the challenges protected areas are facing in their endeavour to achieve conservation success. Subsequently, GoBi's approach to examining the determinants of conservation success and their relative importance is discussed, and initial theoretical and empirical findings are presented.

The Authors – Interdisciplinary Perspectives

Susanne Stoll-Kleemann, the leader of the GoBi Research Group, is a Geographer by training, with a focus on Sustainability Science.

The other authors are (associated) members of the GoBi Research Group: **Svane Bender** did her studies in Landscape Ecology with a strong interest in international aspects. **Augustin Berghöfer`s** background is in Economics and Political Science. **Monika Bertzky** was trained in Biology with a focus on Tropical Ecology. **Nadine Fritz-Vietta** holds a double degree in International Business as well as in Wildlife Management. **Rainer Schliep** did his university degree in Landscape Planning. **Barbara Thierfelder** holds a diploma in Geography and is a trained facilitator.

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1 Introduction

Although the last decade has seen growing concern over the protection and sustainable use of natural resources, most biodiversity - especially in tropical regions - is unlikely to survive without receiving more concrete and effective protection (Bruner *et al.* 2001; Myers *et al.* 2000; Baillie and Groombridge 1996). Many factors are responsible for this decline and the root causes are invariably some forms of human activity, such as habitat destruction and fragmentation, overharvesting, and pollution accompanied by the absence or failure of management and governance structures and processes to deal with these developments (Brooks *et al.* 2002; Myers 1993; Myers and Knoll 2001; Novacek and Cleland 2001; Pimm and Raven 2000; Singh 2002).

Protected areas are one of the principal options to establish alternative resource use regimes or to restrict human activity altogether with the aim of stopping biodiversity loss. The World Database on Protected Areas enumerates 113,851 protected areas world wide covering about 19.65 million km^2 or about 13 percent of the Earth's terrestrial surface (World Database on Protected Areas 2006). This constitutes a sharp increase from the 48,388 protected areas counted in 1992, covering about 12.8 million km^2. Unfortunately, many of them do not meet their stated objectives of protecting biodiversity[1] (Oates 1999; Terborgh 1999). Putting land under special legal protection might be a precondition for its effective conservation, but it is not sufficient as, globally as well as locally, socio-economic pressures on natural resources, ecosystems goods and services are rising, such as demands for forest products, arable land, and drinking water to name just the most prominent examples. At the same time, there is a severe mismatch between the current levels of global spending on conservation and the actually needed expenditure levels in terms of protected areas budgets and staff (Balmford *et al.* 2003; James *et al.* 1999). Consequently, the effective implementation of functioning management systems in already existing protected areas will be the foremost challenge for *in-situ* conservation in the years to come.

The enclosure or fencing off of areas has traditionally been a prominent approach to conservation, but it has received vociferous criticism concerning its ethical assumptions and effects on social justice (Wilshusen *et al.* 2002). However, irrespective of specific conservation approaches, protected areas need to have some form of correctly enforced resource use regulations in place if they are to conserve biodiversity effectively. Protected area implementation therefore entails resolving conflicts with local or non-local resource users who are potentially affected by these new regulations. The linkages between biodiversity conservation and local livelihoods are as diverse as they are complex, and their framing at the policy level ranges from separation to competition to symbiosis between the two issues (Adams *et al.* 2004).

The Convention on Biological Diversity (CBD), which was adopted by the 1992 United Nations' Earth Summit in Rio de Janeiro, picked up this question and

[1] Protected area coverage represents one indicator for the achievement of Millennium Development Goal 7 "ensuring environmental sustainability" (UN 2005) and the so-called CBD 2010 targets. This indicator remains questionable as long as many protected areas are rather 'paper parks' than truly meeting protected area objectives.

framed the integration of conservation and sustainable use of biodiversity as priority objectives. In 1995, the Conference of the Parties of the CBD adopted the Ecosystem Approach as the primary framework for action under the Convention highlighting the balance between the Convention's objectives: the Ecosystem Approach is shaped as a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way (SCBD 2006).

The Ecosystem Approach (EsA) consists of 12 principles with attached rationales and implementation guidelines complemented by five operational guidelines. According to the principles of the EsA, nature conservation policy is located in a field determined by site-specific ecological conditions and socially defined goals and objectives (principle 1), which requires the involvement of local stakeholders (principle 2) and the consideration of neighbouring socio-ecological systems (principle 3). Sustainable behaviour must be economically rewarded (principle 4), whereby this behaviour should mainly be oriented towards maintaining ecosystem functions and structures (principle 5) considering existing natural and social conditions (principle 6). The framing conditions must be analysed on the appropriate spatial and temporal scale (principle 7) taking into account that ecosystem processes are characterised by long-term and long-range effects (principle 8), as well as by non-linearity and the inherent dynamic of change (principle 9). These are the framing conditions for the local integration of conservation and use of biodiversity (principle 10). For the achievement of these objectives, all forms of relevant information should be assessed (principle 11) and all necessary expertise should be involved (principle 12) (Hartje *et al*. 2003).

However, there are numerous other - mainly sectoral - approaches to ecosystem management that try to integrate conservation and sustainable use of biodiversity, e.g. sustainable forest management (Häusler and Scherer-Lorenzen 2001), integrated coastal zone management (Welp 2000), integrated river basin management (Klaphake *et al.* 2001), the 'wise use' concept for wetlands (Ramsar Convention Secretariat 2004), just to name a few.

Already in the early 1970s, UNESCO had launched the Man and Biosphere (MAB) Programme with its World Network of Biosphere Reserves. The biosphere reserve concept combines a zoning scheme and participatory management requirements with the enhancement of social, economic and cultural conditions for environmental sustainability (Batisse 1997; Chape *et al.* 2003; UNESCO 2006a). Considering the similarity in the overall approach, the principles of the EsA and the policies of the MAB Programme, which were laid down in the Seville Strategy in 1995, have many shared concerns (UNESCO 2000).

Currently there are 482 sites worldwide designated in 102 countries (UNESCO 2006b). Biosphere reserves constitute a set of trans-sectional natural landscapes and ecosystems, many closely intertwined with human settlements and sustainable forms of use. This ambitious claim is, however, difficult to put into practice. As with "paper parks" (a definition of which is found in the glossary), many Biosphere Reserve management bodies neither have the capacity nor the resources to meet this mandate.

Including the need for sustainable human livelihoods in conservation planning is widely recognised as a requirement for protected area management in general. Nonetheless, for this research project we consider biosphere reserves to be a dis-

tinct form of protected areas: biosphere reserve management of core, buffer, and transition zones – in theory - requires a multi-institutional governance structure, an issue that is most relevant to all those protected areas that aspire to a better integration at the landscape level. In other words, through large-scale co-management systems the concept aims to reduce pressures on core zone(s), i.e., the characteristic ecosystems seen as valuable natural heritage (Bridgwater 2001).

The biosphere reserve concept's emphasis on research, monitoring, and exchange of experience within the world network highlights the need for permanent learning and adaptation at the management level, as seen for all protected areas. These aspects – the institutional dimension, the link between monitoring and management, and the conditions for organisational learning - illustrate the potential of the social sciences, within an interdisciplinary perspective, to advance the conservation debate. The GoBi Research Group focuses on these issues.

2 Assessing governance and management approaches

In this section the research approach of the GoBi Research Group is outlined. The guiding question – What makes protected areas successful tools of biodiversity conservation? - is based on the recognition that a large number of factors intervene in the functioning of protected areas, and that those factors associated with the management of protected areas and with the surrounding governance conditions are highly determinant.

In the following, (1) key terms are clarified, (2) a methodology for studying the research questions is presented, (3) a brief depiction of assessing conservation success in protected areas is exposed, and (4) analytic frameworks are addressed.

2.1 Key terms

We believe that in this interdisciplinary field of biodiversity conservation, clarity of terms among the realms of research, practice, and policy-making is particularly necessary but often not the case. In addition to the following definitions, the annex includes a glossary of further key terms.

Protected Area

A protected area is an area of land and/or sea managed through legal or other effective means that is specifically dedicated to the protection and maintenance of biological diversity and of natural and associated cultural resources (Chape *et al.* 2003).

Biosphere Reserve

Biosphere reserves are areas of terrestrial and coastal/marine ecosystems or a combination thereof that promote solutions to reconcile the conservation of biodiversity with its sustainable use. They are internationally recognized, nominated by national governments, and remain under the sovereign jurisdiction of the

states where they are located. Biosphere reserves serve in some ways as 'living laboratories' for testing and demonstrating integrated management of land, water, and biodiversity.

Each biosphere reserve is intended to fulfil three basic complementary and mutually reinforcing functions:

- a conservation function - to contribute to the conservation of landscapes, ecosystems, species, and genetic variation;
- a development function - to foster economic and human development that is socio-culturally and ecologically sustainable;
- a logistic function - support for demonstration projects, environmental education and training, research, and monitoring related to local, national, and global issues of conservation and sustainable development. (UNESCO 2002)

Governance

The term 'governance' as a scientific concept has grown in importance during the last ten years. It broadens the straightforward perspective in biodiversity management. Governance describes the structures and processes used by a variety of social actors to influence and make decisions on matters of public concern (Institute on Governance 2002). Thus 'governance' refers to both the organisation of governmental responsibility on the one hand, and the distribution of power among the civil and governmental actors in a society on the other. Next to the organisation and distribution of power, the nature or the characteristics of how power is exercised are of concern. Hence governance as a research concept covers issues ranging from corruption to institutional design.

Definition of Governance

Governance is the interactions among institutions, processes, and traditions that determine how power is exercised, how decisions are taken on issues of public and often private concern, and how citizens or other stakeholders have their say. Fundamentally, governance is about power, relationships, and accountability: who has influence, who decides, and how decision makers are held accountable. Governance may be used in different contexts – global, national and local, and social and institutional. Governance occurs wherever people organise themselves – formally and informally – to develop rules and relationships with each other in pursuing their objectives and goals (Institute on Governance 2002).

Governments and their administrations exert an important influence on public matters. However in the conservation arena, there are many powerful actors such as Non-Government-Organisations (NGOs) with environment and development goals, indigenous peoples' organisations, trans-national corporations, bodies of international and national law, scientific and local expert groups, and professional associations.

Various forms of collaboration among communities, government, businesses, and other actors ('public interest partnerships') have been growing in many countries (Abrams *et al.* 2003). Stoll-Kleemann and O'Riordan (2004) describe the possible role of public-private partnerships for biodiversity governance but emphasize that

any increase in business's role in biodiversity matters can entail both opportunities and perils.

Management

While governance is about power, relationships among institutions, and accountability (see above), the purpose of management is to achieve objectives. The extent to which management objectives are achieved should be the principal measure used in assessing management performance. Assessment – defined as the judgment of achievement against some predetermined criteria - helps management to adapt and improve through a learning process (Hockings *et al.* 2000).

Hockings' management cycle is based on an iterative management model and illustrates the different aspects of management that should be evaluated in order to achieve full understanding of the processes involved. Feeding evaluation outcomes into future management activities makes the optimisation of protected area management systems possible, a process closely linked with organisational changes. Analysing learning processes reveals an organisation's adaptive capacity.

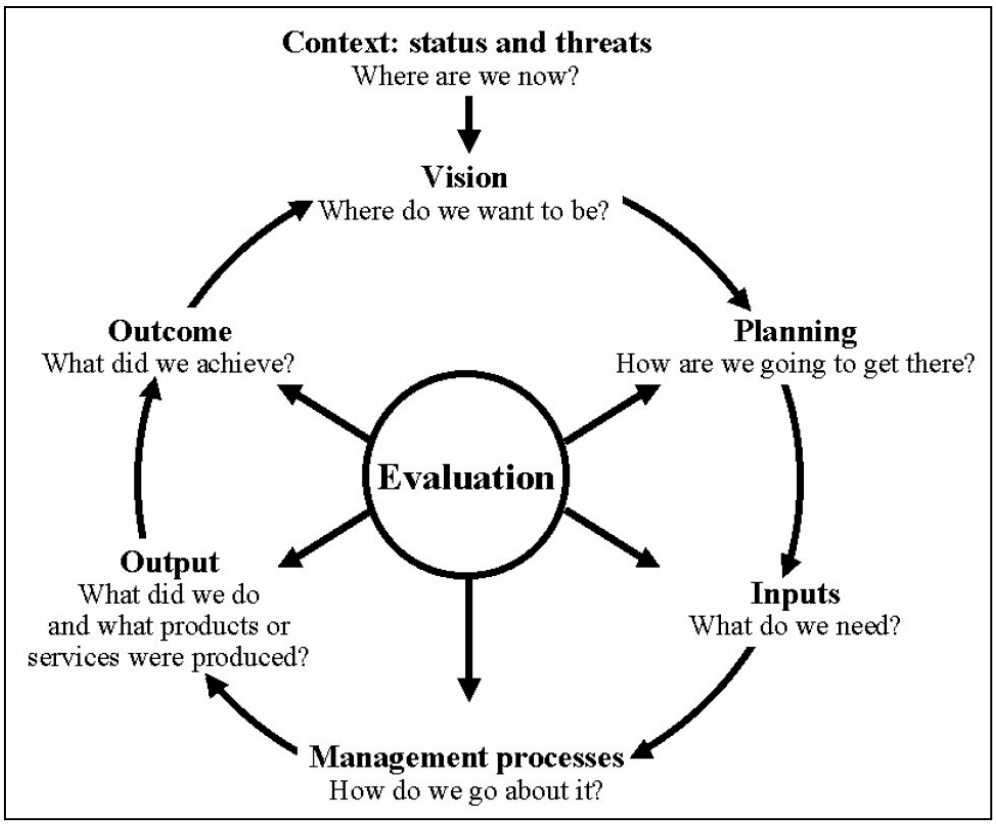


Figure 1: The Management Cycle: Evaluating Effectiveness *(Hockings et al. 2000)*

2.2 The GoBi Research Group's methodology

The GoBi Research Group seeks to understand how protected areas function and where they falter; knowledge regarding management and governance of protected areas is deficient. Often they are viewed as the outcome of a problem-

oriented view that focuses mainly on ecological complexity. For us they are the objects of the research itself.

Hockings *et al.* note that "... though there have been several calls for comprehensive protected area evaluation systems, few protected area management agencies have implemented such systems." (Hockings *et al.* 2000).

The interdisciplinary GoBi Research Group follows Hockings in his judgement and seeks to combine ecological and socio-economic data in the process of identifying important variables influencing conservation success in protected areas. As a matter of fact sustainably managed ecosystems turn out to be economically more beneficial than converted areas (Millennium Ecosystem Assessment 2005). Thus it is required to determine a wise balance between economic resource use and nature protection. The GoBi research concept combines theoretical and empirical findings from different disciplines; by distilling and testing a comprehensive set of criteria, GoBi investigates which particular factors correlate with the management and governance in (successful) protected areas.

Thus, the GoBi research will comprise:

- a comprehensive review of the relevant literature;
- a qualitative analysis and a quantitative meta-analysis of about ninety case studies from the literature;
- more than one hundred sixty expert interviews;
- several of our group's own detailed case studies, primarily in biosphere reserves in South Africa, Thailand, the Seychelles, Cuba, Ecuador, Brazil, Venezuela, Mexico and Madagascar;
- a ranking questionnaire with determining factors (referring to protected area success)
- the results of a global telephone survey that follows up on and complements the expert interviews
- analysis of databases and supporting fieldwork.

These elements provide insights at varying depth and with different orientations.

The case studies in the literature supply us with details of management experience gained in various typical PA settings. The cases were selected according to geographical representation criteria across (sub-) tropical countries with the aim of covering a wide variety of authorship and orientation. They form the basis of a qualitative analysis seeking to identify the full panorama of issues and a meta-analysis. The term 'meta-analysis' refers to the statistical analysis of a large collection of analytical results from individual studies for the purpose of integrating the findings. Unlike other research methods, meta-analysis uses the summary statistics or conclusions from individual studies as data points.

The expert interviews, mainly conducted with people working in or who had worked directly in protected areas (as conservationists, managers, or scientists), allow us to look beyond the political correctness of much of the written material. Experts were interviewed during our own 'fieldwork' and at working meetings and conferences such as the World Conservation Congress in Bangkok 2004. They

shared in-depth experiences and concrete examples regarding those aspects of their work that were most dear to them.

The case studies conducted by GoBi team members have raised sensitivities to the enormous complexity of protected area situations and have helped us to grasp the significance of the issues we have read and heard about by actually having been 'on the ground'. Furthermore, they have enabled us to pursue country-specific situations in more detail, e.g., in South Africa, where organisational structures and change processes are at the centre of the study; whereas, in Cuba the focus is on monitoring practices and problems.

The global telephone survey will follow up those issues that have appeared particularly interesting or about which we have not obtained consistent insight from the other empirical data.

In the following table, a selection of criteria that describe aspects of protected area management and governance is presented. We have used these and others in a ranking survey completed by 171 scientists and conservation professionals. We asked them to evaluate the significance of 41 aspects of their work, mainly from management and governance (cf. above) perspectives with regard to their influence on protected area success. Respondents to this survey were asked to sketch their own definition of a successful protected area first and then to rank (or comment upon) these and other factors with regard to their (imaginary) protected area's success.

Table 1: Criteria for protected area management as used in GoBi's ranking questionnaire *(Stoll-Kleemann 2005b)*

Dimension of Assessment	**Criteria**	**Indicators** to be established on site
Management	Conservation measures	
	Outreach: rural development	
	Compensation payments for use restrictions	
	Environmental education	
	Protected area-specific rules	
	Involvement of local population	
	Networking with other actors	
	Organisational structure	
	Staff (training and number)	
	Consideration of traditional knowledge	
	Mechanisms for conflict resolution	
Governance	National conservation policies	
	Coordination between governmental institutions and programmes	
	Distribution of responsibilities among authorities	
	Funding situation	
	Political support at regional level	
	Local support	

These and other criteria are the constitutive elements of what will evolve into an integrated conservation management success model. They have been distilled either from theory or from empirical work. The criteria are general enough to allow for various settings but are offered with recognition of the need for the on-site development of corresponding indicators to track changes. This approach does not capture the complexity and diversity of different protected area situations, but it gives an overview of trends and a weighting of thematic areas. The ultimate output of the GoBi Research Group will be a model that combines the ecological and the socio-economic aspects of a protected area.

The different methodological elements allow us to identify patterns of typical factor combinations that intervene in the performance of a protected area. The analysis of characteristic difficulties in recurring contexts (and the various responses to them) makes it possible to assess the effectiveness of different management approaches. Importantly, our multiple data sources and scopes enable us to crosscheck the validity and transferability of preliminary conclusions. As Agrawal (2001) points out, the comparability of case-study-based conclusions is at best limited, and for that reason we have opted for this multi-tier approach.

The Figure 2 below illustrates the steps and elements intended to lead to a grounded and comprehensive integrated model for protected area management.

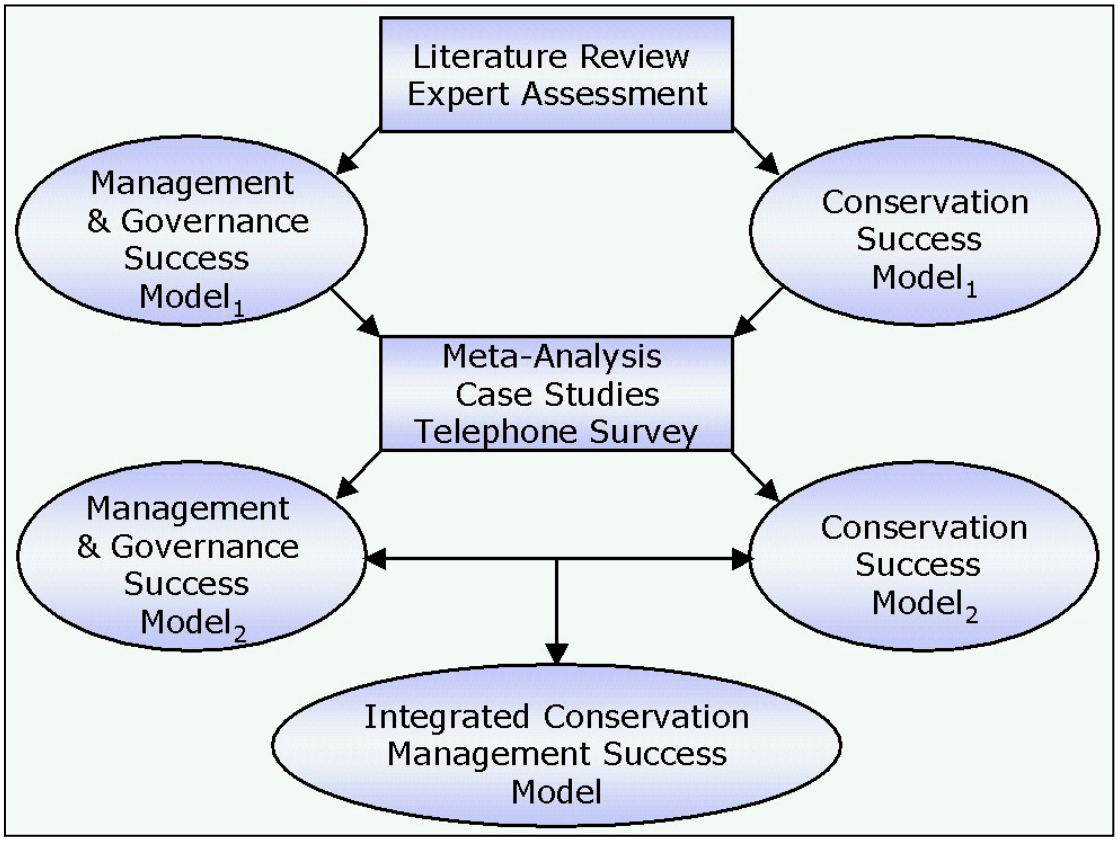


Figure 2: Methodological Approach of the GoBi Research Group

This methodology explicitly allows for changes in the explanatory models as a result of intermediate findings. We benefit from the experience of a study that took a similar approach (Wood *et al.* 2000), where researchers in a Mexican Biosphere Reserve revised their initial conceptual model. It appeared that regional context factors including socio-economic conflicts, a lack of fit with local conditions, and corruption were more important than anticipated in the first generation of the model. The methodological approach of the GoBi Research Group mirrors experiences of this kind and can therefore be understood as "adaptive research".

2.3 Assessing conservation success in protected areas

2.3.1 The need for monitoring and evaluation

As mentioned previously, many of the existing protected areas are considered to be merely "paper parks" since in reality they do not fulfil protected area functions (Cifuentes *et al.* 2000). Depending on their national and/or international protected area category, their functions may range from the promotion of sustainable development to logistic coordination. However, one function will surely deal with biodiversity conservation. Consequently, in order to assess the overall success of a protected area, an investigation of whether conservation efforts are in fact successful needs to be undertaken. The term "conservation success" in the context of the GoBi Research Group is defined as the achievement of site-specific conservation objectives. In most cases, protected area conservation objectives include the maintenance of those biodiversity values that are characteristic for a specific protected area. In order to meet this goal, protected area management bodies can implement two types of conservation measures:

1. direct measures to maintain or restore ecosystem integrity[2]
2. indirect measures to avoid or reduce biodiversity threats and pressures

In order to control the current status and changes in ecosystem integrity by an analysis of scientific ecological data, adequate and suitable means of measurement need to be designed. A large variety of tools, methods, and approaches has been developed to gain an idea about ecosystem integrity, ranging from in-depth status assessments to rapid appraisals. These usually involve the use of indicators, which may, according to their purpose of use, follow different terminologies: biodiversity indicators (e.g., Delbaere 2002), ecological indicators (e.g., Dale and Beyeler 2001; Sheil *et al.* 2004), sustainability indicators (e.g., Mendoza and Prabhu 2003), and several others. Table 2 shows a selection of indicators for several processes occurring on different organisational levels for the assessment of ecological integrity.

[2] "The extent to which the interrelationships among and within ecosystems remain intact so that the number and variety of living organisms can be maintained" (World Bank 2003)

Table 2: Example components and indicators of ecological integrity *(Dale and Beyeler 2001)*

Hierarchy	**Processes**	**Suggested Indicators**
Organism	Environmental toxicity Mutagenesis	Physical deformation Lesions Parasite load
Species	Range expansion or contraction Extinction	Range size Number of populations
Population	Abundance fluctuation Colonisation or extinction	Age or size structure Dispersal behaviour
Ecosystem	Competitive exclusion Predation or parasitism Energy flow	Species richness Species evenness Number of trophic levels
Landscape	Disturbance Succession	Fragmentation Spatial distribution of communities Persistence of habitats

For an observation of how indicators change over time they need to be measured repeatedly. So-called "monitoring activities" accomplish several functions. They (a) serve as detection systems for changes in ecosystem characteristics, (b) assist decision makers in defining adequate management activities for the achievement of conservation goals, and (c) may be conducted in order to observe whether conservation activities which have been or are currently implemented do, in fact, lead to the intended results (known as 'performance monitoring').

A survey of more than 200 forest protected areas in 37 countries conducted by the WWF suggests a close correlation between a good monitoring and evaluation system and a high degree of conservation success (WWF 2004). Monitoring and project evaluation play a central role in any discussion of good conservation management (Sheil 2002; Stoll-Kleemann and Bertzky 2005, 2006).

As a matter of fact, with differing conservation objectives, there certainly cannot be one generally valid and applicable monitoring and evaluation system for all protected areas worldwide. Instead, site-specific characteristics of biological as well as socio-economic and political origin play an important role in shaping the components of such a system. The inclusion of socio-economic and political indicators has only gained popularity with the shift in conservation approaches from regarding human development and nature conservation as counteragents to reconciliation of both. In some cases, for instance, measures to reduce anthropogenic threats and pressures on biodiversity in protected areas receive a higher priority than extensive monitoring or evaluation programs - for good reason: As long as threats and pressures work against the intended conservation results, activities toward conservation goals are likely to be inefficient and ineffective. Investigation of socio-economic processes may thus help to identify reasons for existing pressures on biodiversity and consequently support the search for ways to diminish these pressures.

According to what has been stated until now it might seem proximate to just use monitoring and evaluation data to gain an idea about the progress toward conservation objectives. An effective management system that adequately uses the results of monitoring and evaluation efforts by feeding them into adaptive management processes should thus be able to assure protected area success. Therefore, several tools exist to evaluate management effectiveness, which - according to it's definition - includes the achievement of conservation goals, such as the WCPA framework to assess management effectiveness at site-level (Hockings *et al.* 2000; Stolton *et al.* 2003). But the establishment and implementation of monitoring and evaluation systems is very time and cost intensive, and most protected areas are constantly facing difficulties for long-term funding. Therefore it may well be possible that due to lack of financial capacities no monitoring and evaluation system exists. While the WCPA framework can still be conducted, it is time and cost intensive as well and only a small fraction of the world's protected areas has been evaluated so far.

But the pressure for evaluating conservation success, project, and management effectiveness is still increasing, especially in the face of the CBD's 2010 targets and the Millennium Development Goal 7 (UN 2005).

2.3.2 The GoBi Research Group's approach

In order to address this issue the GoBi Research Group carries out an integrated study, which, by combining different social scientific approaches and triangulation of data to assure the information's justification, results in an idea of a site's strengths, weaknesses, opportunities and threats. A so-called SWOT-Analysis is conducted in an adapted manner at any given specific site by asking as many stakeholder groups as possible to participate in qualitative interviews and quantitative questionnaires. Local people as well as internal and external experts are taken equally into account. This allows a researcher to illuminate a site-specific situation from different perspectives, which concomitantly minimizes subjectivity. Results of such a SWOT-Analysis serves protected area management bodies as they may support decision-making processes in order to distribute existing capacities for conservation action in the most effective and efficient way and work towards intended goals.

But again, the conduction of a SWOT-Analysis alone does not automatically indicate an effective management system and thus protected area success. Therefore, besides the SWOT-Analysis, several components of the existing management effectiveness evaluation frameworks have been adapted and included into GoBi's investigation method of conservation success. For example, when conducting case studies, personal observations are added as a study component to further consolidate the overall impression of a protected areas success. Additional information available from databases, literature, accessible GIS-data etc. is used to complete or verify information gained from interviews and personal observations. The entire information corpus is then analysed using qualitative data analysis software as well as statistical analysis, and then transferred into an evaluation scheme that has been developed throughout the project. Conservation needs are then correlated with existing conservation capacities. This is especially important, as there may exist possible influences on the protected areas biodiversity values whose control exceeds the scope of activities put in place by protected area man-

agement bodies. Funding authorities for instance, being part of the governance framework of protected areas, can also set a limitation on action. Large-scale economic interests may threaten a protected area's biodiversity values but often are beyond the protected area management bodies' influence. By recognizing the magnitude of issues potentially playing important roles in a site's success the GoBi Research Group covers political and governance factors in addition to ecological and socio-economic ones. Since nature - and with it its ecosystem services - contributes in various manners to the global environmental balance, but is in equal quantities dependent on human being's 'care' (Millennium Ecosystem Assessment 2005), conservation success needs to be observed under the broad scope of all relevant perspectives. The multiple facets involved in conservation success result in the need of a Conservation Success Model as an integrated tool that interprets information of very distinct nature.

2.4 Analytical frameworks

Analytical frameworks propose explanations for the relationship between man and nature and allow recommendations for the management of natural resources. Four such frameworks, which have stimulated our search for the adequate interpretation of our empirical data, are presented briefly in the following section.

2.4.1 The DPSIR-Framework

A well-known concept is the OECD's Pressure – State - Response framework (PSR). In this circular framework, a specific pressure, say illegal logging in the Indonesian forest, causes the fragmentation of forest ecosystems in an Indonesian protected area of "x" percent annually; response to this state of fragmented forest cover would be, for example, intensified patrol and the sanctioning of trespasses – reducing the degree of illegal logging.

The PSR concept was expanded during the 1990s to include drivers and impacts: The Driver – Pressure – State – Impact – Response framework (DPSIR) was considered an improvement that closed important gaps in the PSR: In our case, for example, it would be useful to consider the drivers of illegal logging, e.g., the high demand for wood by a thriving Indonesian paper industry, which in turn may be driven by expanding global markets. Taking this driver into account might result in a more comprehensive approach to reducing pressure on the forest: Instead of solely persecuting illegal loggers, tightened enforcement might be accompanied by measures that promote the establishment of tree plantations to increase wood supply. The new element, impacts, allows the differentiation between a generic state and resulting impacts alongside with local conditions. With funding limited, conservation planners have to allocate resources in the most efficient and effective ways.

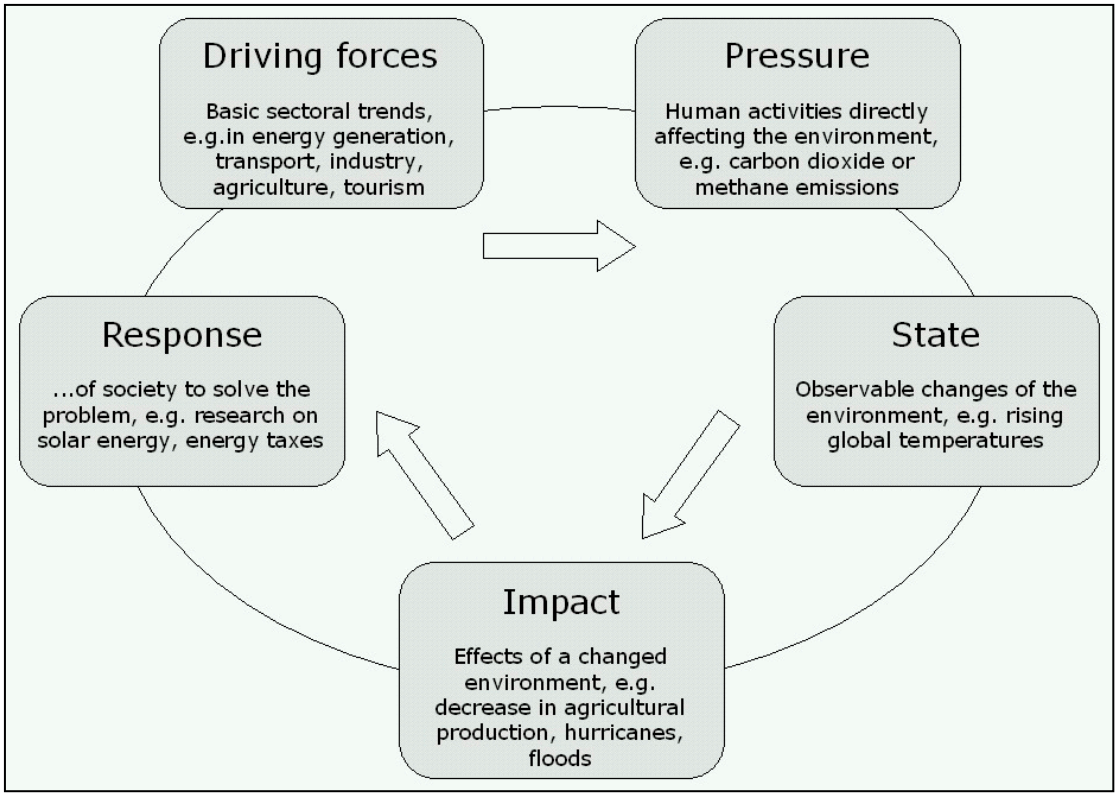


Figure 3: DPSIR Framework *(Jesinghaus 1999, adapted)***.**

2.4.2 The framework of the Millennium Ecosystem Assessment (MA)

In contrast to the DPSIR, the framework of the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005) is not circular. Instead, the (mutual) influences among four framework units are schematised: (1) indirect and (2) direct drivers of change, (3) the ecosystem services provided by a biodiverse natural environment, and (4) human well-being. The goal-oriented intervention is not presented in a process perspective as in the DPSIR but rather is located at the different influence streams between the framework's units.

If you measure the 'state' of the ecosystem services unit and its 'impact' on the human well-being unit, the MA framework appears quite similar to the DPSIR, but several details are worth mentioning:

First, as the bullet points inside the direct and indirect drivers of change units summarize in-depth research within the subsystem, the framework mirrors important dimensions of sustainability science. However, because the aspects listed in the direct drivers unit refer to natural resource use in general, for research on protected areas this category might include other issues as well, such as the protection regime or the demand for protected area-related products.

Second, geographical and temporal scales are mentioned. This implicitly constitutes an important critique of the DPSIR: The time scales, as well as the interconnectedness of the local dimension with issues at national, regional and global levels, raise questions about the value of cause-reaction chains that are not considered in the DPSIR figure.

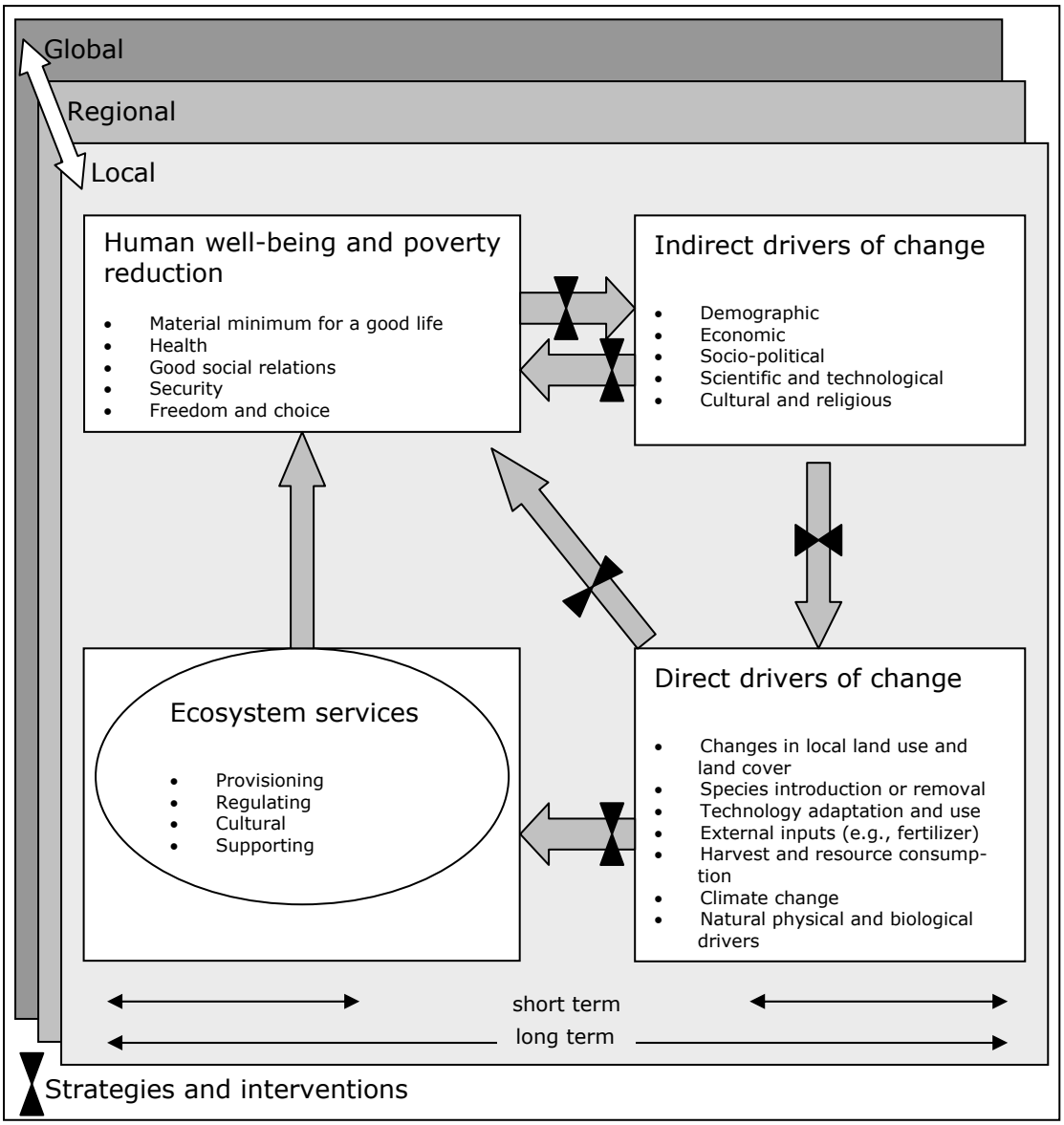


Figure 4: Conceptual framework of the Millennium Ecosystem Assessment *(Millennium Ecosystem Assessment (2005), adapted)*

Third, the MA framework is explicit in its ethical orientation: Biodiversity is considered a bundle of ecosystem services that provide the basis for human well-being and poverty reduction. These are the elements of today's human well-being that should shape strategies and interventions towards sustainability. In this context it is far from trivial how the MA has identified the five elements of human well-being: It was not a philosophical argument but rather empirical research across the continents that produced them.

2.4.3 Gottret and White's institutional framework

Gottret and White (2001) present a framework for natural resource management that puts the acting organisations and institutions at the centre, interlinked with development resources (five capitals), development processes (strategies), and development impacts (sustainabilities). Institutions provide the rules and norms by which individuals and their organisations operate and therefore provide structures that can either hinder or foster the development processes.

The value of this approach is that it sharpens the focus on institutions and organisations as the first objects of (public) management, whereas the DPSIR does not locate interventions and the MA framework neglects them (at least visually!). Furthermore, the units of analysis reflect a local resource-user perspective and allow distinguishing between his/her livelihood assets and livelihood strategies. This user-focused analysis provides very relevant insights for any kind of intervention.

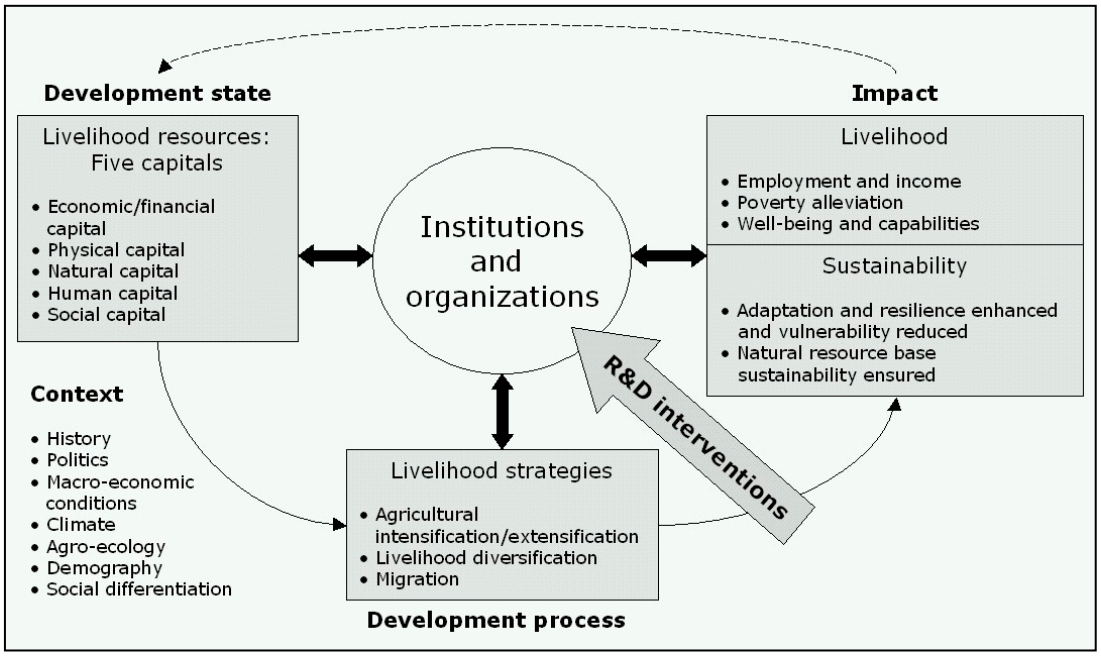


Figure 5: Institutional Framework *(Gottret and White 2001).*

A conceptual difficulty we find is the fact that the institutional and organisational setting is not considered a livelihood resource, that is, as political or governance capital that should be counted alongside the other capitals. In addition, the context category remains unconnected in the framework, reducing the explanatory value of how impacts materialize.

2.4.4 Bossel's systemic framework

Finally, we want to present Bossel's framework of interacting nested systems (Bossel 1999). It takes a very different way in approaching the social-ecological complexity of natural resource management. From a systemic perspective, the interrelations between elements constitute the crucial factor. The model assumes that systems are made up of subsystems. Subsystems contribute to the viability and performance of the component systems, which in turn contribute to the viability and performance of the total system. This is to say that, for example, a farm is a subsystem within a community because it has variables, relations, and dynamics that pertain to it in a particular way. Farms are qualified by their functioning as subsystems, not by a convenient number of variables to be observed. They can in turn be divided into even smaller subsystems, for example, the family system and the livestock system (at farm level), etc.

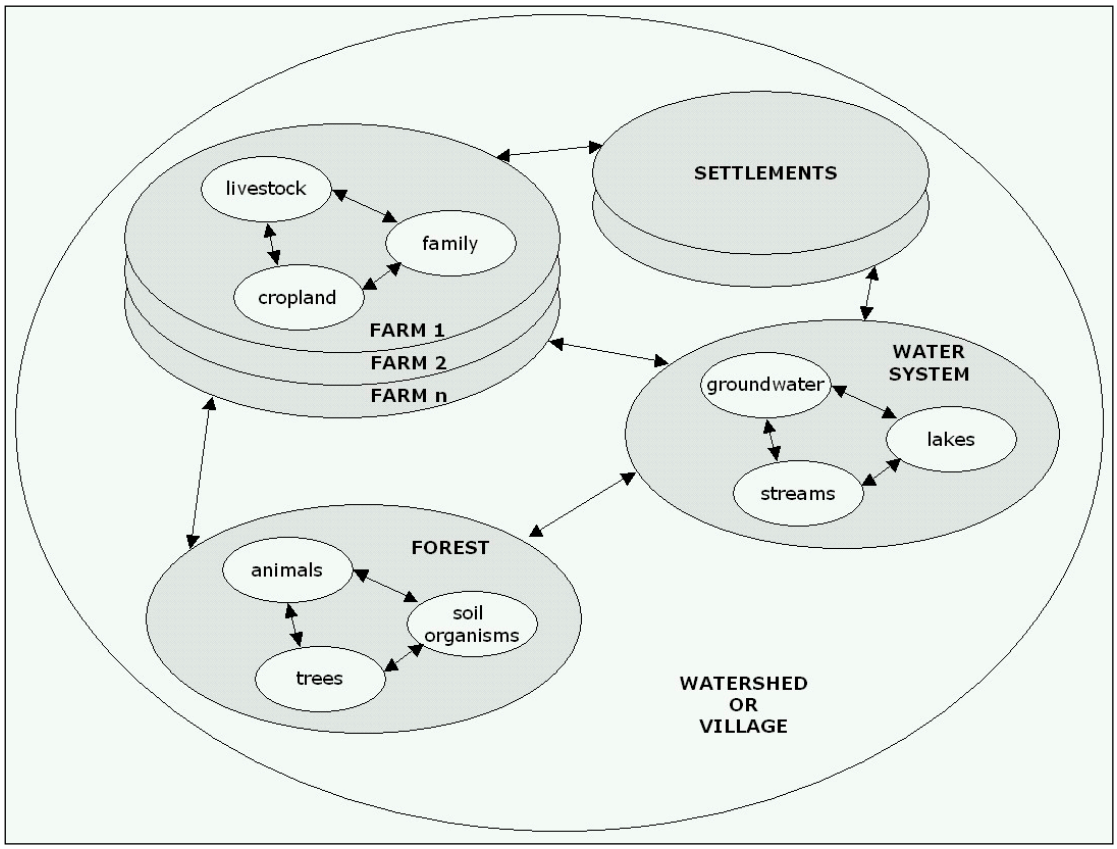


Figure 6: Systemic Framework Interacting nested systems
(Bossel 1999, adapted).

2.4.5 Conclusions

These four frameworks offer different possibilities for interpreting and integrating empirical data to answer the question of what makes protected areas successful. Bossel's systemic view accommodates the highest degree of complexity, whereas Gottret and White's institutional view focuses on the room to manoeuvre and provides a user perspective. The MA framework includes the highest concentration of sustainability science, and the DPSIR's circular approach guides toward learning-oriented management thinking.

In principle, the frameworks presented are complementary, i.e. their basic assumptions about actors and properties of relations are not incompatible. Rather, they depict and emphasize different aspects of natural resource management, and they differ in their objective: Bossel's systemic view is more diagnostic than Gottret and White's institutional framework or the DPSIR's action-oriented approach for decision support.

The GoBi Research Group is working on an adaptation of these and similar frameworks to apply to the specific situation of protected areas and decision-making in conservation. Such an adapted framework is central to the interpretation of our empirical findings.

3 Intermediate results

3.1 Literature review

3.1.1 Influence factors: General drivers of biodiversity loss

The Millennium Ecosystem Assessment Synthesis Report (2005) points out that sixty percent of the ecosystem services are being degraded or used unsustainably. "Any progress achieved in addressing the goals of poverty and hunger eradication, improved health and environmental protection is unlikely to be sustained if most of the ecosystem services on which humanity relies continue to be degraded" the scientists state. Even if the specific risks of biodiversity loss are not clear in detail, its extent is alarming. Addressing the root causes of biodiversity loss appears to be the most reasonable response to this situation; however it means nothing less than changing the world's economic and political system. In a meta-analysis of tropical deforestation, Geist and Lambin (2001) show in which ways and to what extent proximate causes – wood extraction, infrastructure extension, and agricultural extension – are driven by political, economic, technological, cultural, and demographic factors of national and global dimensions. Changing these drivers abruptly does not find the necessary consensus – apart from being a colossal endeavour. Transformation of unsustainable developments will be slow at best (Millennium Ecosystem Assessment 2005). Therefore setting aside areas for conservation is favoured as a feasible and relatively fast strategy to halt biodiversity loss. But this reasoning is only valid as long as protected areas are actually capable of maintaining biodiversity.

Protected area management seeks to intervene in a complex social-ecological system to achieve conservation. The success of a protected area is hence determined by the impacts of this system and by the adequacy of the management intervention to mitigate these impacts: If sound protected area management meets enabling governance conditions at the local and regional levels, biodiversity should be protected. These two conditions themselves are most demanding, but the crux is a rise in pressures that makes sound management and enabling governance even more difficult – and less probable.

In the following we will concentrate on the difficulties in *protecting* biodiversity by means of protected areas, and not on *changing* the drivers of biodiversity loss in general. It is not within the scope of protected area management to change these drivers, but they still have to be taken into account.

Climate change

Although there is still a lot of arguing about global change, the understanding of the potential risks that climate change poses to the functioning of ecosystems and consequently to natural-area protection has increased (Halpin 1997). In the USA, 7,000 miles of protected shoreline that include eighty coastal parks are at risk from a rise in sea level; for South African protected areas, increasing drought and aridity could lead to huge losses of biodiversity; a study of Canada's national parks concluded that changes related to hydrology, glacial balance, waning permafrost, increased natural disturbance, shorter ice season and range changes with loss of tundra and an increase in temperate forests will occur in over half the country's protected areas (WWF 2003). As a result, species for which a particular protected area has been established may no longer survive, and entire protected areas, especially in coastal, arctic and mountain zones, may change completely or even disappear. For instance, modern inland water systems entail a great deal of pollution and biodiversity loss in many populated parts of the world, which is only one example out of countless other cases (Millennium Ecosystem Assessment 2005). This development represents a major challenge to the achievement of conservation mandates for Protected Areas Management and implies the need for major changes in conservation strategies and management types.

Interestingly, our interview survey of 171 participants at the World Conservation Congress Bangkok 2004 revealed surprisingly low awareness of the fundamental consequences of climate change (cf. section 5). This may be attributed to the fact that other challenges are often more acute in a short–term perspective.

Invasive alien species

Invasive alien species are a challenge to many protected areas that have devastating effects. Due to increasing global exchange, species spread or are moved from their own habitats to new ecosystems and even to foreign continents. This may happen accidentally, for example through ship ballast water, or intentionally, e.g., because of their specific qualities. When natural enemies or human control are missing, such species may turn into invasive ones, able to expand and displace endemic species, thereby changing entire ecosystems. So for instance in Hawaii and New Zealand, the number of non-indigenous plant species today exceeds that of domestic ones (Lovejoy 2002).

Species become invasive if they (i) are introduced to a new range, (ii) establish themselves, and (iii) spread (Jeschke and Strayer 2005). Invasive species are often claimed to be one of the major drivers for biodiversity loss, second only to habitat loss as a main reason (Wilcove *et al.* 1998).

A study on exotic introduced plant species in the UK led to the development of a 'rule of thumb' that is often cited as the 'tens rule' (Willamson and Fitter 1996). It asserts that approximately one out of ten imported species escapes to the wild, one of ten of these introduced exotic species successfully establishes itself in the

wild, and again one of ten established species in fact becomes invasive (Vander Zanden 2005). Among vertebrate species, the probability that an introduced species turns into an invasive one that harms or even changes the composition of the original species has been found to be as high as one in four (Jeschke and Strayer 2005).

Another example mentioned in the Millennium Ecosystem Assessment (2005) proclaims a "...net annual loss of economic value associated with invasive species in the fynbos vegetation of the Cape Floral region of South Africa in 1997 (..) estimated to be $93.5 million, equivalent to a reduction of the potential economic value without the invasive species of more than 40%. The invasive species have caused losses of biodiversity, water, soil, and scenic beauty, although they also provide some benefits, such as provision of firewood." (p. 57)

Global trade

Growing global trade relations translate into a growing demand for protected area-related products, prominent examples of which include ivory, horn, and endangered species sought as pets, including birds, aquarium fish, and amphibians. The amounts of money these commodities fetch encourage poaching since even dabbling in this commerce can produce sums that may never be earned in 'regular jobs'. Admittedly, the commercialisation of protected area products and services is urgently required to strengthen the financial sustainability of protected areas, and market demand is therefore essential. However, sustainable commercialisation requires marketing structures that most protected area management bodies are still lacking. Poaching is a severe threat to the biodiversity of many parks and to their possibility of raising funds through regulated commercialisation. Brian Child notes that in Zambia's Luangwe Valley alone, about 100,000 elephants and all 6,000-8,000 rhinos were killed by poachers during the 1980s (Child 2004).

Another aspect of economic globalisation affecting protected areas is bioprospection. A famous example is the agreement between the Merck pharmaceutical company and Costa Rica's National Institute of Biodiversity (INBio) in 1991. Merck agreed to pay INBio in exchange for biological samples from the country's protected areas. Though this helped finance protected areas – they received about 10% of the income from the agreement – there is ongoing controversy about the sharing of benefits and the pricing of these potentially very profitable genetic resources. The Earth Summit in Rio de Janeiro 1992 and the subsequent Convention on Biological Diversity (CBD) made an attempt to regulate fair and equal access to (genetic) resources through benefit sharing, especially for local indigenous tribes. However, national legislation remains deficient in many countries with high biodiversity. The rights of indigenous communities, the defence of strategic resources, the role of transnational corporations, and the possibility to patent ancestral knowledge all form part of the ongoing controversy.

Agriculture, forestry, and fisheries

Modern agriculture has high impacts on protected areas. At the ecosystem level, the biggest threat to biodiversity conservation occurs through conversion of natural habitats and the intensification of land use by new technologies. Today about 24% of the world's terrestrial surface is under cultivation (Millennium Eco-

system Assessment 2005). At the species level, the discussion of agriculture and biodiversity touches the question of safeguarding agro-biodiversity: Of the 7,000 species traditionally cultivated, only thirty are still in large-scale use (WBGU 1999); new plant breeding technologies and genetic improvement are further reducing and transforming plant variety. The global distribution of modern crop species and cultivation techniques drives standardised forms of land use. Modern agriculture within or near a protected area is generally less adapted to the specific ecosystem than traditional farming. It implies higher pressure on the protected area in terms of resource use (e.g. water), pollution (pesticides, GMOs), and exploitation/damage of ecosystem services (erosion, soil formation).

In an analysis of 152 cases of tropical deforestation, commercial wood extraction is identified as a significant proximate cause in 52% (Geist and Lambin 2001). Particularly noteworthy is that illegal (illicit or undeclared) logging plays a major role in twelve percent of all cases with higher incidences in the Asian subset. For example, in Indonesia an estimated ten million hectares are thought to have been cleared illegally. The Indonesian government as a primary strategy against this illegal clearing has adopted curbing the trade in illegal logs. Due to political instability in the course of the post–Suharto transition of the country, though, illegal logging has spread widely and protected areas, devoid of resources for staff, have become welcome targets (FWI/GFW 2002).

Policy makers have often ignored marine ecosystems from a conservation or resource management perspective until serious environmental degradation or species depletion by fisheries have forced them to act. Today it is no longer possible for anyone to ignore the fact that "at least one quarter of important commercial fish stocks are over-harvested" (Millennium Ecosystem Assessment 2005). Historically the oceans have been perceived and managed as an open-access commons and are often subject to multiple, conflicting uses, which makes marine protected area (MPA) establishment particularly challenging (Carr 2000). Less than ten percent of the world's oceans are declared as MPAs, and fewer than ten percent of them are achieving their management goals and objectives (Pomeroy *et al.* 2005).

In comparison with terrestrial systems, very little is known about marine processes. MPAs need to respond to changing ecological conditions, pollution being transported over large distances, and the ecological needs of migratory species; to do this they are required to take long-distance processes into account. Furthermore, conflicting objectives of stakeholders (e.g., ecosystem conservation, fisheries enhancement, eco-tourism), competition for fishing grounds between artisanal and industrial fisheries, and financial dependency of local artisanal fishing communities on marine resources are severe challenges to successful MPA management (Carr 2000).

Tourism

In many countries, authorities responsible for protected areas have taken a strong interest in tourism, seeing it as a source of income, an opportunity for a sustainable livelihood for park-based communities, and as an activity that needs careful management (UNEP 2005; Eagles *et al.* 2002).

Global 'nature tourism' is estimated to be growing at rates higher than ten percent annually (Drumm and Moore 2005). It has an enigmatically ambiguous effect

on protected areas: If managed well, nature tourism is a vital source of income to the protected area itself and to the surrounding communities. This income may alleviate pressure on the protected area's natural resources that would normally be exploited, i.e., in the absence of tourism. However, tourism easily causes ecological and cultural degradation, as it is a very rapidly changing and powerful industry that is difficult to control. The more sensitive and adapted form of tourism, the so-called 'eco-tourism' or 'green tourism', receives a great deal of attention as a possible reconciliation of conservation and development needs, especially in protected areas, but it is a concept that requires particular conditions in order to be sustainable. Thus successful, sustainable nature tourism in protected areas requires sophisticated and intensive management and significant investments (Eagles *et al.* 2002).

3.1.2 Influence factors: protected area governance

Aspects of governance affecting conservation success can be divided into the political embedding of protected areas, institutional structures, and protected area-related conflicts.

Political embedding

Protected areas and their management differ substantially in their autonomy vis-à-vis the political environment. Political autonomy here refers to the degree that a protected area management is the object of political interests and dependent on them. In a highly politicised environment, a protected area may frequently have to adapt to changing conditions. Generally, an enabling political environment is considered necessary for a protected area to function effectively, and it can generally be contended that the more favourable the conditions within regional and national politics, the greater the protected area's autonomy, i.e. the lower the degree of its dependence on the political climate.

The protected area managers' room to manoeuvre can be constrained by administrative responsibilities, by a lack of resources, or by a highly politicised environment in which the protected area is part of a larger game or constitutes the arena for other actors' political conflicts. The higher the autonomy, the better the possibility to develop and implement rules and longer-term activities adapted to the site-specific situation.

As this kind of autonomy is rarely the case, the protected area's own political weight counts. This is engendered in varying measures by its leadership, the financial situation, supporting actors, effective networking, prestige, conflicting interests (pipelines, mines, etc.), the national conservation discourse, the constellation of actors, and the general political situation.

Furthermore in many cases, the political arena for protected areas is closely connected to other issues such as indigenous politics, rural development programmes, or industrial exploitation of natural resources (e.g., wood, minerals). Together they make up a complex and dynamic web of concurring and conflicting interests. Though conservation concerns can claim to be of fundamental importance, in daily management they have to compete with several other political concerns.

Traditional conservation approaches tend to neglect the political complexity involved in biodiversity conservation. Chapin (2004) traces the tension between stated principles, agency requirements, and donor interests in the conservation business, and thereby reveals the need for a more thorough and consistent political positioning as an essential component of sustainable conservation.

Institutional structures

To date, inadequate attention has been paid to the importance of institutions, and analysis is required of the compatibility of conservation policies with the institutional setting within which they operate. Incorporating institutions increases the chance that implemented policies will have the intended consequences of promoting conservation and sustainable use. Research on common property institutions and sustainable governance of resources has identified the conditions under which groups of users will self-organise and sustainably govern resources upon which they depend (Agrawal 2001; Ostrom 1990). Agrawal (2001) provides a useful list: resource system characteristics, group characteristics, institutional arrangements, and external environment. This approach can be taken further: Institutions govern the relationships between the resource system, the user group, and contextual factors. They are therefore highly responsible, as a proximate cause, of the sustainability of these relationships (Wood *et al.* 2000).

Institutions are the 'rules of the game' and therefore in themselves an expression of the existing distribution of power. In our case, institutional failure can further be explained by a general conceptual mismatch between socio-economic and ecological scales, which results in weakened feedback between decision makers and their natural environment and thus produces inappropriate incentives and poor sets of protected area-related rules and regulations.

Institutional factors such as sound, stable, and supportive legal and political frames are crucial for the successful adoption of conservation measures. Another frequent challenge is the unclear distribution of responsibilities among governmental administrative authorities with regard to decisions affecting the protected area. Authorities governing protected areas, public lands, agriculture, forest, rural development, indigenous affairs, tourism, or marine resources often work without sufficient coordination, leading to prolonged decision procedures or still worse, to counterproductive or competing programmes. The lack of integration of protected area management into regional development plans and land use policies in the surrounding areas is in many cases a serious threat to effective protected area implementation.

Regarded from the research perspective, there is still a clear lack of understanding of ecosystem functioning and of interactions between ecosystems and socio-economic systems (Alberti *et al* 2003). The actual state of publicly available monitoring data shows that data coverage is fragmented, and standardised data gathering systems are not in place. The narrow organisation of research efforts along single-disciplinary lines or sectoral approaches constitutes a further institutional deficiency to the facilitation of needs-oriented interdisciplinary biodiversity research.

Conflicts

The loss of biodiversity has a significant impact on the viability of socio-economic systems that depend on the various direct and indirect functions of biodiversity that are being harmed (direct, such as provision of food or indirect, such as tourism) (Millennium Ecosystem Assessment 2005). The more individual interests and societal values are affected, the more biodiversity becomes a source of conflicts, ranging from disputes between local actors to serious conflicts that can arise between nations. Actions and decisions are linked on multiple levels. For example, unbridled local action can create global problems. Similarly, good resource management at one scale may be dissipated by poor practices at another (O'Riordan and Church 2001). Furthermore, because of harmful effects on ecosystem services, which lead to a persistent decrease in the capacity of an ecosystem to deliver its services, an increase in poverty is unavoidable, especially in underdeveloped countries, and thus social conflicts bow to the inevitable (Millennium Ecosystem Assessment 2005).

In order to avoid unsustainable exploitation of resources in or around protected areas, the management has to determine and enforce rules and use restrictions up to zonation of the area with 'no-go' or 'no-take' zones. This often implies conflicts (e.g., Amend and Amend 1995). But the closer these restrictions are to the traditionally practised forms of resource use in that area, the less the risk of conflict. Nevertheless, traditional use regimes are challenged by in-migration of people and new forms of resource use like commercial exploitation or access to new markets outside the area. The increased competition for resources enforces further potential for conflict.

Conflicts arise from incompatibilities of interest and are part of every social system (Fischer *et al.* 1995). Consequently the challenge for successful protected area management is peaceful conflict resolution. But a protected area is not a closed system where protected area managers and local population groups can progressively develop agreements on resource-use restrictions based on trust and past experience. Instead non-local actors with political and economic interests intervene in protected area issues to defend their stakes. Thus protected areas function as political arenas for pursuing diverse interests. This gives rise to conflicts with multiple actors and multiple issues, which can have paralytic effects.

Biodiversity conflicts can either focus on the differing preferences, values, and objectives of actors, on the options and instruments they choose for action, or on a combination of both. Conflicts can be found in a variety of actor relationships and in the pattern of linkages between managing institutions:

- Conflicts among actors (Who holds the power, governance?)
- Conflicts within the local population (access and use of resources, use and property rights, tourism, ethnic groups, etc.)
- Conflicts between the local population and protected area management or state authorities (conservation against resource-use activities like agriculture, poaching, logging, fishing, or collection of medicinal plants)
- Conflicts about the legal status and financial compensation.

In many cases, biodiversity governance and management policies have failed to solve these conflicts and therefore to establish efficient protection or real sustainable use of biodiversity (Hanna 2002).

3.1.3 Influence factors: protected area management

The scope of work of the protected area's management is characterised by manifold lines of tension. Managers of protected areas have to deal with divergent - though not necessarily conflicting - demands such as ones related to "ecology" and others relating to "development". The interests they face are often prima facie antipodal (individual vs. communal), though - again - they are not automatically antagonistic. Nonetheless, protected area managers always have to be prepared to address the uncertainty of developments.

We divide challenges to conservation arising from aspects of protected area management into management approach, management organisation, financial aspects, conservation objectives, stakeholder involvement, enforcement, and consideration of local livelihood needs.

Management approach

What is the state of current protected area management concepts and practice? Stoll-Kleemann and O`Riordan (2002a) note a paradigm shift gaining ground, from a top-down, rigid, conservation-by-fences concept to a collaborative, flexible, stakeholder-oriented approach. However doubts remain as to the pervasiveness of this new approach: though it may have become omnipresent at conferences and in policy statements, on the ground, evidence of a comprehensive change is lacking (Stoll-Kleemann 2005a).

Proponents of conservation approaches are struggling with a common difficulty: They postulate certain causal relations and recommend a corresponding strategy without comprehensive empirical proof for their analysis. protected areas constitute complex social-ecological systems in which the variables may be known, but whose inter-linkages in a dynamic perspective have escaped our understanding so far. The influence of the wider political, economic, and ecological contexts surrounding protected areas further complicates the analysis. Varying concepts of the relationship between the natural and the social sphere build the base for management approaches (Scheffran and Stoll-Kleemann 2003). Apart from the ethical concerns this implies, the situation is equally a scientific challenge: The links between the system's complexity, its reconstruction through analytic frameworks, and the protected area management characteristics have not yet been explored.

Two opposing approaches are at the heart of the conservation debate: a restrictive ecology-first position and an integrative people-included one (Stoll-Kleemann 2001a-c, Stoll-Kleemann and O'Riordan 2002a, Stoll-Kleemann 2005a). As stated above, the two approaches centre on different understandings of the link between humans and nature.

The restrictive approach puts biological conservation first: Biodiversity is conserved if it is effectively protected against human exploitation. It is either nature left untouched or nature used and spoilt (Terborgh 1999; Oates, 1999). The continuous high speed of biodiversity degradation within the borders of protected

areas is proof of the incompatibility of these interests. Attempts to reconcile resource use with conservation in the long run have always worked to the detriment of nature.

Biodiversity hotspots are threatened to such an extent that experiments with sustainable-use forms should be done outside and not inside parks. The poor state of most tropical protected areas and the speed and extent of biodiversity loss in general call for a restrictive, exclusionary approach to protected area management.

The poor success of Integrated Conservation and Development Projects provide ample evidence that indigenous people are not 'noble savages' living in harmony with nature; instead they are equally as open to influences of the market or of a corrupted environment as the other actors involved in such projects. This is a principal underlying reason for the failure of integrative conservation concepts.

As a critique of this position, the integrative approach emphasizes social and political implications of restrictive protected areas: Wilshusen *et al.* (2002) point out that biodiversity conservation is essentially a political issue of distributing costs and benefits. Conservation should not happen on the backs of the already poor rural populations, who have few economic alternatives to the use of natural resources for their living.

This critique is more fervent with regard to the enforcement of rules and the forced resettlement of hundreds of people who formerly lived within protected areas. In the past, the restrictive approach has justified actions that appear to constitute egregious violations of human rights (Brechin *et al.* 2003).

The integrative (people-included) approach argues for using an explicit consideration of the ethical implications of in-situ conservation and its associated use restrictions. Multiple actors pursue their interests within and by means of protected areas; the economic and political conditions frame the possibilities for sustainable resource use. Apart from this political argument, integrative approaches value local ownership and local knowledge, which can greatly enhance the success and sustainability of conservation efforts. Co-management has been promoted as an alternative approach. If fully implemented, it allows for a balanced and locally informed use-and-conservation regime at relatively lower costs and with the acceptance and support of the population (Borrini-Feyerabend *et al.* 2004).

In addition, an ecological argument supports the joint consideration of the human and the biological sphere: Man and nature have often co-evolved, and the abundance of cultural landscapes indicates this. Rural populations generally heed and care for biologically diverse cultural landscapes by means of traditional forms of resource use, and the claim that traditional rural societies are most often paragons of maintaining sustainable resource use systems (Adams *et al.* 2004) appears not to be an exaggeration.

The debate about conservation approaches reflected in the two positions above suffers from a fragmented understanding of the factors that influence the functioning of a protected area. The restrictive as well as the integrative conservation approach are based on arguments that favour certain mechanisms or causal relations while neglecting others. Due to the lack of deeper understanding of the interaction among protected area management, the social-ecological system, and

context, paradigmatic truths have entered the debate about the right strategy for in-situ conservation. They conveniently take the place of weak empirical evidence.

To sum up, the restrictive position believes effective rules and corresponding patrol and sanctioning are indispensable; the integrative approach believes protected area management should consider local concerns and seek local ownership and support. These arguments are not necessarily in contradiction, as one could well have an effective enforcement supported by the local constituency. The debate though is polarised, and positions are defended with institutional interests playing an important role (Chapin 2004). This situation is not beneficial for the further improvement of protected area management concepts and practice, and it is a sign of how urgently conceptual integration is needed.

Only few frameworks exist for managing a protected area in a holistic manner as an entity with various dimensions and as a physically restricted area administrated under a different regime than the one in force in surrounding areas (by means of laws, policies, etc.). The UNESCO biosphere reserve concept provides an orientation that comprises a combination of participatory mechanisms and a zoning scheme for reconciling development and conservation goals. However, a biosphere reserve area often includes different landowners/administration bodies, and the implementation of activities depends on negotiation and mutual agreement.

IUCN's World Commission on Protected Areas seeks to deal with the complexity by focussing on characteristics of management effectiveness independently from the context (Hockings *et al.* 2000). Clear prioritisation is seen as a major factor for a successful holistic protected area management (Driver *et al.* 2003), and even more for large-scale and integrated approaches such as biosphere reserves. As an example, the Nature Conservancy operates with a 'Five-S Framework' (systems, stresses, sources, strategies and success measures) and uses a ranking procedure (scorecards) to prioritise action for consolidating protected areas (TNC 2003).

Management organisation

Child describes the innovations in park management in southern Africa and points out that budget-driven public management structures are far less innovative and efficient than their goal-driven counterparts in public-private or private protected areas (Child 2004). Goal-driven management based on good information systems, strategic priorities, outsourcing, frequent performance assessments, and financial controlling has delivered astounding results – but is still the rare exception. This pragmatic approach to conservation, which involves considering biodiversity within the protected area as a resource to be managed according to economic standards, needs to be met with clear social and ecological criteria so as to reap the benefits of performance-based management without narrowing the perspective to economic reasoning.

At the other side of the spectrum, Borrini-Feyerabend *et al.* (2004) provide a rich collection of cases where traditional and indigenous knowledge allow for common property arrangements; very different from market logic - and very effective. The diversity of protected area management is a rewarding research question by itself: Under which conditions do such different approaches work and by which

criteria shall we compare them? If we take the leadership example again: Presumably, 'charismatic leadership' in Child's book (Child 2004) is different from the leadership concept in the case studies of Borrini-Feyerabend *et al.* (2004) – a difference that needs to be understood in order to design effective intervention strategies for protected area implementation.

No matter whether the type of management is state run, community owned, private, or collaborative; recurrent difficulties with communication arise where there is interaction among actors with distinct concepts of nature, of conservation, of development, and of each other: NGOs, government bodies, local representatives, and scientists. This fact has not yet been sufficiently recognised to develop protected area management structures and approaches accordingly. Instead, collaborative approaches – which indeed focus on such communicative difficulties – are often considered to be ideological in their rights-oriented reasoning.

Financial factors

One of the main challenges to protected areas is a lack of financial sustainability (e.g., de la Harpe *et al.* 2004, Amend and Amend 1995). Though some protected areas are managed to function well even without money, e.g., Cuba's Humboldt National Park (Bender 2002), others fail to reach their conservation goals despite significant funding due to adverse circumstances (e.g., corruption) or weak management.

In general though, lack of resources strongly inhibits protected area activities. Poor infrastructure, unpaid staff, and missing outreach cannot be counterbalanced by political support. High financial insecurity renders planning useless and causes serious conflicts in itself: For inhabitants of protected areas it can be more than disappointing to see hopes that been generated by protected area officers destroyed (Amend and Amend 1995).

Earmarked funding is a further difficulty: Though conditions linked to money may have a steering function and give incentives, protected areas are often in a situation where they have to respond first to the requirements of their various governmental and non-governmental donors and only in the second place to their acute needs.

Conservation objectives

Conservation approaches vary in their priorities between restrictive and accommodative positions. Unless they are modified according to the specific situation at site level, blueprint strategies of either priority setting can fail miserably. Many protected area management bodies only perform infrequent evaluation of the conservation measures undertaken and the adequacy of the prior fixed objectives in a possibly changed environment.

Conservation objectives can easily become inadequate or even contradictory. In wilderness protection, for example, toward the aim of re-establishing natural wilderness processes, areas have been left alone. Consequently natural succession starts, and bushes and small trees recapture the area. At that point the protected area management realises that this development contradicts the objective of having breeding birds in the meadows.

The process of fixing conservation objectives and their measurable targets is often the product of scientific-administrative discussion alone, without public negotiation, despite the consequences for the local public and without recognition of the need for local support. Furthermore, local knowledge is neglected as a source of valuable information for decisions on conservation objectives (e.g., in terms of needs, land uses, and observations over time).

Stakeholder involvement

protected area management needs the support of the local and neighbouring population (cf. Baudoin 1995; Stoll-Kleemann 2001a-c; Stoll-Kleemann and O'Riordan 2002 a-b; Stoll-Kleemann and O'Riordan 2004). India's Keoladeo National Park, for example, nearly collapsed when upset farmers were not allowed to let their cattle graze in the park's wetlands where they had been allowed to graze before (Niekisch 2000).

'Sharing Power', a recent guide to co-management of natural resources, identifies the synergetic character of collaborative natural resource management arrangements: Traditional management systems, instead of vanishing with the advent of modern resource use forms, evolve into 'hybrid' forms of management, drawing on the strengths of the different (i.e., local and non-local, modern and traditional) actors (Borrini-Feyerabend *et al.* 2004). This, however, requires a strong recognition of the diversity of views and interests involved and a disposition to follow the much more dynamic and hence less predictable road of collaborative management.

Meaningful involvement of local stakeholders toward the aim of increasing their commitment and ownership of the protected area implies that part of the decision-making power is indeed shared. Participants need to compare the costs of spending their time in participatory exercises and round tables with the benefit they expect to obtain for themselves or for their community. They are not disposed to sharing their opinion and knowledge freely, even if their culture allows them to do so, which is not always the case.

Enforcement

Having established a protected area with a management plan, policy, and legislation in force does not necessarily result in its success (Stoll-Kleemann 2005a). Enforcement of protected area rules takes different forms but is always a complicated affair apt to seriously harm relations with the neighbouring population. In past decades many different forms of enforcement were put into practice. The military was called in to tear down illegal settlements in Venezuela's prominent El Avila Park. In Benin, a German project made special use arrangements for religious feasts at sacred places within the protected area and hired women as guards at the park gates because they had proven to be more trustworthy than men. In other parks, former poachers were hired as park guides and guards. In Zambia, foreign aid for conservation in the Luangwe Valley was disbursed directly to the guards according to the number of days they were on patrol.

Often enforcement is not transparent in the sense that local users know where the limits of the park or the no-go areas are, what they are allowed to do in

which zone, and what the sanctions for the violation of rules are. This creates further tension and limits local acceptance.

However, enforcement does not refer to illegal settlers and local resource users alone. Logging and mining companies, tourism operators, and large infrastructure projects have often violated protective legislation, sometimes with the approval of high governmental institutions. In these cases enforcement takes the form of organised public protest, lobbying, and court cases. Corruption sometimes turns these conflicts murky, making public deliberation of the conflicting priorities difficult (Stoll-Kleemann 2005a).

Consideration of local livelihood needs

It is important not only to have people participating in management processes but also to respond to their livelihood needs (Stoll-Kleemann 2005a). Ethical reasoning that conservation costs should not be borne by the already poor supports this view. Stable livelihoods around a protected area are the best pre-condition for acceptance of use restrictions inside the park.

The development of alternative sources of income can take very diverse forms, considering the potential of various ecosystem services, such as food production, to contribute significantly to global employment and economic activity (Millennium Ecosystem Assessment 2005). Alternatives include new cultivation techniques, better access to nearby markets, but also tourism-related services. They are certainly preferred to compensation payment schemes, which promote dependence, conflict, and corruption.

Promoting or securing stable local livelihoods is a long-term task that requires considerable capacity and resources (Stoll-Kleemann 2005a). Hence the dilemma of optimal resource allocation arises: Should scarce conservation funds be used for conservation measures in the strict sense, backed by (equally costly) enforcement, or should they be spent on building a protective buffer of stable livelihoods around the protected area? A further aspect to be considered here is the attraction effect of development money. Stable livelihoods might be a motivation for other people living further away and in worse conditions to move to the area, thus reinforcing - and even exacerbating - the pressure on the resources in and around the protected area.

3.2 Intermediate empirical results

3.2.1 Quantitative success factor evaluation

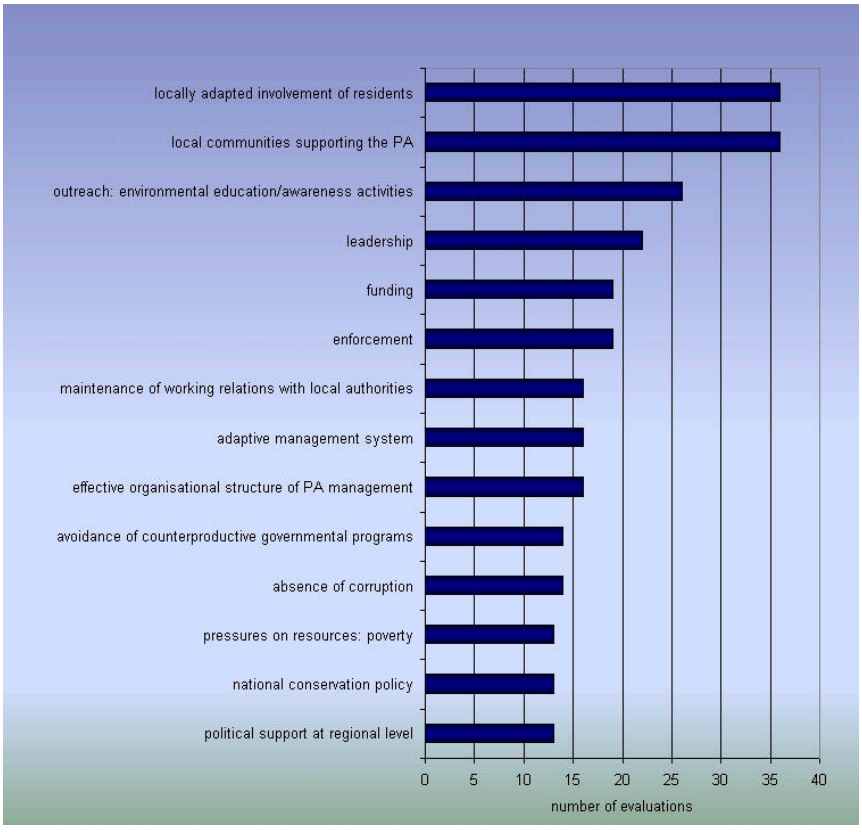
The results of the GoBi Factor Ranking Survey (Stoll-Kleemann 2005b) reveal what experts consider particularly relevant for protected area success. As mentioned, more than 171 people were asked to rank 41 factors with regard to their importance for the overall protected area success. Professional positions ranged from conservation professionals, government officials, and scientists to representatives of indigenous groups; most respondents had a university degree.

To differentiate among varying conceptions, we asked respondents to first give their definition of a successful protected area. They could then choose among four ranks to describe each factor with regard to its relevance for protected area

success (from relevance "very high" to "no relevance at all"). Respondents were asked to state whether their evaluation was in reference of a specific protected area, country, or region or whether it was general in outlook. Finally we asked them to identify the top three factors based upon their experience. While going through the ranking sheet, we commented on the different factors, clarifying our understanding of them and asking the experts to name further aspects of the issues that they deemed important.

Table 3 shows part of the top three factors selected. The results are surprising: The two factors attracting the highest score refer to the necessity of good relations between the protected area management and the local population. Almost twenty percent of the respondents chose them; this is especially interesting because the distribution of factors identified was quite large, with many factors receiving between ten and fifteen votes. The issues of funding and enforcement, typically emphasized in the literature, did rank high but received less than twenty votes each, whereas participation and local support attracted more than 35 votes each. Leadership and the raising of environmental awareness also ranked high, again emphasizing a people-oriented approach (Stoll-Kleemann 2005b).

Table 3: Top factors influencing protected area success
171 experts selected their top three from among 41 factors. The table presents the fourteen factors with the highest scores



One might argue that a selection of 41 factors with a focus on management and aspects of governance implies bias. However, issues like planning, monitoring, boundary demarcation, resource conflicts, invasive foreigners, and climate change are included in the factor list and attracted significantly fewer votes.

The results are even more surprising if we consider the strong presence of people with ecological (and not anthropological) backgrounds, and if we take into account the diverse understandings of what a successful protected area is. Definitions range from 'conservation first', to 'reconciliation between preservation and use' of resources, to 'people-first' concepts. Despite these differences, the necessity to work closely and in an atmosphere of mutual trust with the local population was recognized as central to conservation efforts.

3.2.2 Qualitative case studies

Results from case studies in Cuba and Thailand reinforce and extend these findings (Stoll-Kleemann 2005b). Guiding questions in the case studies were "Is the biosphere reserve concept successfully implemented in the case study sites?" and "Which historical, socio-economic and management factors influence successful implementation?"

The "Reserva de la Biosfera Sierra del Rosario" is located in the lower mountain region of western **Cuba** and was designated in 1984. It covers an area of 26,686 hectares and has a population of 5,500 people (2002). This Biosphere Reserve can be regarded as quite successful. Concrete success factors in this regional context are the existence of strong and positive leadership with a long continuity and a successful reforestation project that dates back to 1972. Further success factors in the biosphere reserve are sophisticated ecotourism projects and large and long-lasting environmental education and awareness programs (Stoll-Kleemann 2005b).

At the second Cuban biosphere reserve we intended to investigate, "Reserva de la Biosfera Ciénaga de Zapata", the time was not ripe to conduct a detailed study, as only slow progress in implementing the Biosphere Reserve concept can be ascertained since its designation in 2000 (Stoll-Kleemann 2005b).

Fortunately, a success story similar to that in the first Cuban biosphere reserve emerges in the Thai Mangrove Biosphere Reserve Ranong in the southwest of **Thailand**. The existence of strong and positive leadership with a long continuity, a reforestation project (this time of mangroves) with a long history, and extensive and long-lasting environmental education and awareness programs are the three dominant features of success.

Another case study was carried out in **South Africa**'s Cape Floristic Region (CFR), a biodiversity hotspot that encompasses the smallest of the six worldwide Floristic Kingdoms. It is especially characterised by the greatest non-tropical concentration of higher plant species in the world: 9,000 species of which 69% are endemic (CI 2006). The CFR expanse today contains only 18,000 km^2 from 78,000 km^2 of the original vegetation. Cowling and Pressey (2003) specify the problems facing biodiversity conservation in the Cape Floristic Region as follows: (a) escalating threats, (b) an unrepresentative reserve system and (c) a lack of institutional governance and management capacity.

The case study included two biosphere reserves, Kogelberg Biosphere Reserve (the first South African biosphere reserve, designated in 1996) and Cape West Coast Biosphere Reserve (designated in 2000), as well as the Greater Cederberg Biodiversity Corridor, which is managed in a similar way. The case study intended to make a comprehensive assessment of the on site management conditions as

well as the political and administrative environment surrounding each area. Furthermore, the aim was to compare several biosphere reserves in a similar overall governance setting in order to distil factors influencing their different development and dynamics and thereby allow for a detailed analysis of the governance arrangements and management institutions (Thierfelder 2005).

As all line functions in a biosphere reserve area are fulfilled by their respective agencies, the value a biosphere reserve adds to its region is seen as co-ordination, facilitation, enhancement and support of all those activities within its scope, from conservation efforts to socio-economic development. Despite how little tangible this might sound, most experts agree, that biosphere reserves have positive impacts which would not have been achieved without their existence (Thierfelder 2006). Using the example of South African biosphere reserves, a SWOT analysis (see chapter 2.3.2) of the biosphere reserve concept as a natural resource management institution is described in Figure 7.

From the concept, biosphere reserves should mobilise social resources. The assessed examples have shown that this is a possible, but not an easy task to fulfil. However, setting up a successful biosphere reserve within a soft-institution setting is a challenge. Their cooperative approach is in contrast to the dominant (natural resource) management culture that values activity, control, comfort, and clarity over reflection, learning, and embracing complexity and variability (Thierfelder 2006).

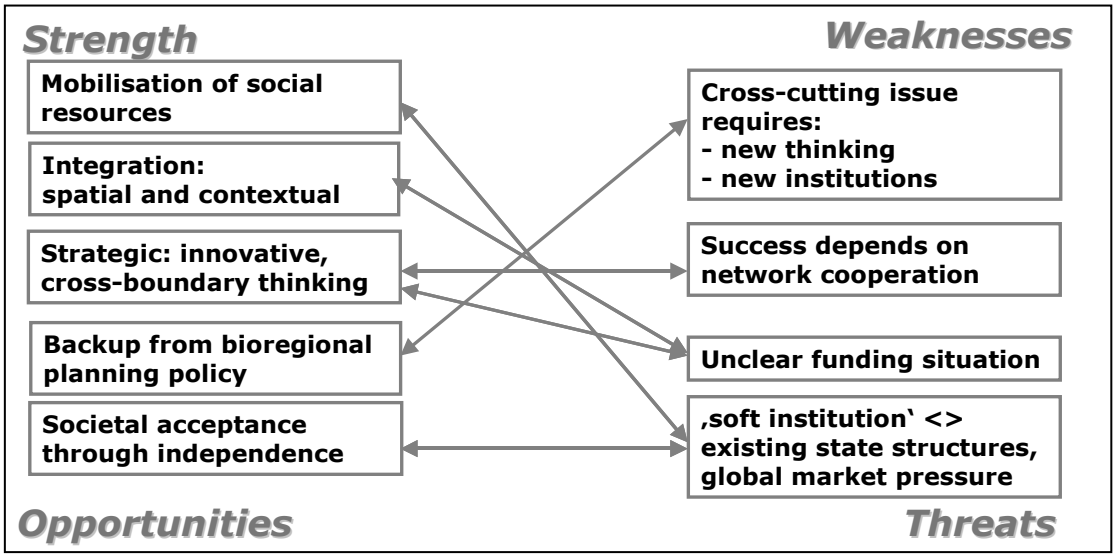


Figure 7: Chances and challenges of biosphere reserves as natural resource management institutions *(Thierfelder and Stoll-Kleemann 2005)*

For most activities the biosphere reserve, as a soft institution (based on mutual interest), is dependent on the compliance and liability of the involved institutions as implementing agents. This is a very difficult task to ensure, because in the existing practice all entities that join in the biosphere reserve arrangement will all keep their own responsibilities and have their own agendas. Consequently, the added-value of a biosphere reserve is in creating the opportunity for mainstreaming conservation and sustainable development into non-conservation sectors and the adjustment of sectoral policies and different interests between political and civil society arena. In order to meet the mentioned coordination tasks and

facilitation activities the outcomes of the field study (Thierfelder 2005) highlight the importance of clear requirements concerning the functioning of a biosphere reserve as a management entity: 'bureaucratic body', adequate funding, and staff capacities.

The research clearly shows that, despite all challenges and obstacles, biosphere reserves are a promising approach for sustainable development at regional level, and contribute to the resolution of biodiversity conservation's major challenges. Coordination activities can fill the gaps of sectoral policies and allow for a broad scale thinking and planning in order to avoid further threats. The Western Cape's bioregional planning approach documents the spillover effect of the biosphere reserve management idea, as it is applied within the bioregional planning policy (DEA and DP 2003). The biosphere reserve approach offers new innovative possibilities, beyond governmental control and ordering, by opening up the pre-assigned political actor's arena to civil society. Nevertheless, using the biosphere reserve management idea as a tool can only succeed, if it is adapted to the circumstances.

4 Conclusions

A central motivation of the research project described in this paper is the hypothesis that management and governance are crucial to the success of protected areas, but have not been recognised as such.

Protected area management is still largely the domain of public administrators and biological conservation professionals; they are trained in administration and ecology but not necessarily in moving forward complex social processes with multiple actors pursuing diverse agendas. This capacity gap is particularly apparent in biosphere reserves that, in theory, pursue sustainability of resource use and conservation *inter alia* by means of management arrangements with multiple institutions involved. These arrangements require political and managerial skills and a solid ethical basis for the difficult trade-offs that need to be decided upon - skills far beyond the administrative and ecological. Terms like 'charismatic leadership' and 'enabling political environment' have been used to describe these requirements and their corresponding skills; a useful contribution of interdisciplinary research would be to spell out exactly what they mean. By leadership, for example, we would understand the capacity to translate and move with ease between the different worlds of the local population, governments, BINGOs (Big International Non-Governmental Organisations), and academia in order to combine their diverse aspirations productively. Furthermore, sound leadership should imply working not only with transparency but also with strategic intuition. Concerning 'charisma' it might refer to a level of energy, vision, and enthusiasm beyond the ordinary; it is a necessary ingredient for public management where consent needs to be won across the lines.

The GoBi Research Group aims to develop a model to understand and improve local biodiversity governance and protected area management systems based on a critical and systematic examination of protected areas, i.e., their context, their management structures, and their strategies. This paper has been an attempt to provide a sound introduction to the theoretical, empirical, and methodological implications.

5 Definitions

Ecosystem integrity
Ecosystem integrity is the extent to which the interrelationships among and within ecosystems remain intact so that the number and variety of living organisms can be maintained (World Bank 2003).

Evaluation
Hockings *et al.* (2000) define evaluation as the judgement or assessment of achievement against some predetermined criteria (usually a set of standards or objectives); in this case including the objectives for which the protected areas were established. Information on which such assessments can be based could come from many sources, but monitoring has a particularly important contribution to make in providing the basic data that should underpin the evaluation (Hockings *et al.* 2000).

Monitoring
Monitoring means a continuing function that aims primarily to provide managers and the main stakeholders with regular feedback and early indications of progress or lack thereof in the achievement of intended results. Monitoring tracks the actual performance or situation against what was planned or expected according to pre-determined standards. Monitoring generally involves collecting and analysing data on implementation processes, strategies and results, and recommending corrective measures (UNDP 2002).

Paper Park
A paper park is a legally established protected area where experts believe current protection activities are insufficient to halt degradation (Dudley and Stolton 1999).

Threats
Threats are those dynamic influences that cause some degree of deterioration or destruction of the biodiversity on the site. Some writers have called these 'pressures', 'impacts', 'drivers', or 'barriers'.

Threats can be divided into several types:

Internal direct threats: factors caused by the stakeholders living on the project site that have a direct impact on biodiversity such as over-hunting of large mammals by community residents.

External direct threats: factors caused by outsiders that have a direct impact on biodiversity such as logging by large multinational companies.

Indirect threats: social, political, and economic factors that induce changes in the direct threats such as threats from poverty or inadequate government policy. (Margoluis and Salafsky 2001)

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