Biodivers Conserv
DOI 10.1007/s10531-009-9613-7

ORIGINAL PAPER

Exploring the effectiveness of integrated conservation and development interventions in a Central African forest landscape

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Received: 31 October 2008 / Accepted: 19 February 2009

Abstract Integrated conservation and development projects (ICDPs) have had limited success in addressing the often conflicting objectives of conservation and development. We developed a model with local participants to explore the trade-offs between conservation and development in southeastern Cameroon, where illegal hunting is regarded as the greatest challenge to conservation. We simulated the effects of different ICDP strategies by varying the degree of focus on antipoaching activities, anticorruption measures and direct development investments, and by varying the overall budget for such activities. Our outcome variables were numbers of selected wildlife species and household incomes. The model outcomes from the different scenarios were used to stimulate debate among stakeholders. Contributing to poverty alleviation while maintaining current animal population sizes will be extremely difficult and will require long-term external financial support. Devoting greater attention to improving local environmental governance emerged as the highest priority for this investment. We used the model outputs to inform some of the

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Published online: 28 February 2009

major policy makers in the region. Participatory modeling is a valuable means of capturing the complexities of achieving conservation at landscape scales and of stimulating innovative solutions to entrenched problems.

Keywords Cameroon · Corruption · Environmental governance · ICDP · Integrated conservation and development project · Participatory modeling · Trade-offs · Simulation models

Abbreviations

ICDP	Integrated conservation and development project
NGO	Nongovernmental organization
SE TOU	South east technical operational unit

Introduction

Reconciling conservation and development is notoriously difficult and the pursuit of this objective has led to polarized positions and contentious debate (e.g., Guha 1997; Oates 1999; Chapin 2004). A number of reviews suggest that integrated conservation and development projects (ICDPs) have not reconciled conservation and development agendas, and both conservationists and social scientists have harshly criticized ICDPs (e.g., Wells et al. 1998; Neumann 1998; Agrawal and Gibson 1999). Many believe integrated approaches have failed to deliver on their potential or promise. For example, in a review of 36 ICDPs, only five contributed directly to wildlife conservation (Kremen et al. 1994). McShane and Wells (2004) provide a comprehensive account of the difficulties of integrating conservation and development at the site level. Ferraro (2001) suggests that the indirect approach favored by ICDPs of providing alternative sources of products, income, or social benefits as a means of encouraging communities to cooperate in conservation initiatives is best described as "conservation by distraction".

There are many advocates of disaggregating conservation and development initiatives. The proponents of the so-called preservationist or "fortress conservation" approach advocate focusing project investments on protection measures and largely excluding the economic and development aspirations of local people (Janzen 1986; Oates 1999; Terborgh et al. 2002; Sanderson and Redford 2003). However, critics argue that by pursuing a preservationist approach, local stakeholders are alienated (Chan et al. 2007), which ultimately leads to social conflict and noncompliance with conservation-related regulations (Ferraro and Kiss 2002; Romero and Andrade 2004; Robbins et al. 2006).

Some authors (Salafsky and Wollenberg 2000; Brown 2002; Malleson 2002) attribute the lack of success in integrating conservation and development interventions to the failure of conservation organizations to recognize that trade-offs exist and must be fully understood if they are to be reconciled. For example, it is argued there has been a persistent failure to provide communities with sufficient and appropriate alternative economic benefits to offset the restrictions on access to conservation areas (Ferraro 2001; Cernea and Schmidt-Soltau 2006). More specifically, Malleson (2002, p 100) suggests that, "[I]t is not the basic ICDP concept that has caused so many problems for Korup (National Park, Cameroon). Rather it is the lack of willingness among conservation biologists to support the devolution of the control of forest resources to communities and their failure to accept that difficult trade-offs have to be made between the interests of forest users, other key actors and the global concerns of conservation biologists."

We examined the trade-offs and potential synergies between conservation and development in a case study in southeastern Cameroon, an area characterized by dire poverty and an exceptional diversity of large mammals (Mittermeier et al. 2005). We explored the use of a participatory systems modeling approach (Sayer and Campbell 2004) that involved the key conservation and development stakeholders in the region. We explored whether such an approach can stimulate discussion among the key stakeholders and promote action that generates conservation and development synergies. We take up the challenge of Cowling et al. (2004) of ensuring that the social aspects of conservation issues are tackled. In particular, we examined livelihood and governance issues for people in conservation landscapes.

Study area

Our model focused on the "South East Technical Operational Unit" (SE TOU) in Cameroon (Fig. 1). Part of this area is included in the Tri National de la Sangha landscape that extends

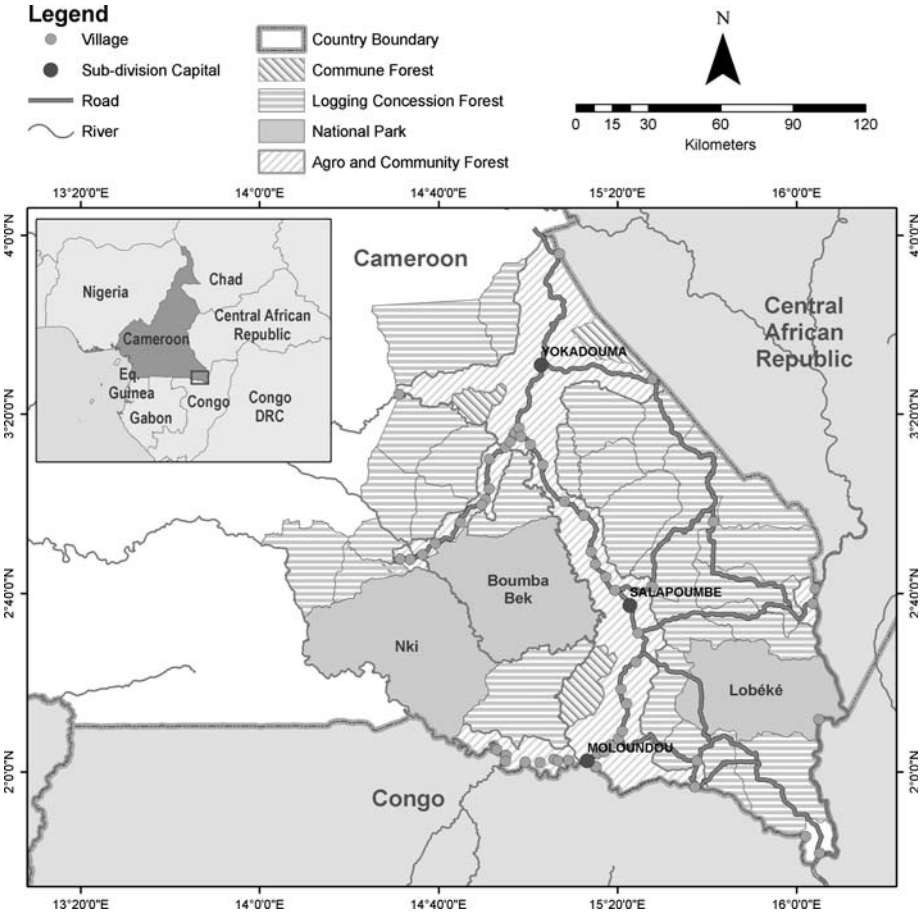

Fig. 1 Land use in the South East Technical Operational Unit of Cameroon (from maps from the German Development Cooperation and World Wildlife Fund)

into the Central African Republic and Congo-Brazzaville. The Tri National de la Sangha is one of 11 "landscapes" identified as conservation priorities under the Congo Basin Forest Partnership launched at the Johannesburg Earth Summit in 2002 (CBFP 2005). The area has outstanding assemblages of forest megafauna, including forest elephants (*Loxodonta cyclotis*), western lowland gorillas (*Gorilla gorilla gorilla*), chimpanzees (*Pan troglodytes troglodytes*), and bongos (*Boocercus euryceros*).

The total area of the SE TOU is 33,571 km^2 (26% national parks, 52% logging concessions, 3% commune forests, and 19% agroforests and community forests). Commune forest is for use by a commune—a local government unit headed by a mayor. It cannot be converted for agriculture but can be logged. Community forest can be converted and is subject to a management agreement between the state and local communities, through which the communities receive use rights, responsibilities and financial benefits from forest management. Sixty-five percent of the landscape is allocated to safari hunting (11,202 km^2 being community-managed and 10,722 km^2 state-managed), and these zones are superimposed on agroforestry and concession areas. The landscape is sparsely populated (ca. 4 people/km^2) with many different ethnic groups. In the systems model we characterized them as Baka-pygmies (ca. 43%), and indigenous and migrant Bantu (ca. 50 and ca. 8%, respectively) (GTZ 2001). Logging is the main economic activity and concessionaires contribute significantly to infrastructure development.

Methods

We held four annual workshops (2004–2007), each with 15–25 experts from conservation and development agencies working in the study area. During these workshops we conducted visioning and modeling exercises. We based the participatory modeling approach on methods described by Lynam et al. (2002), Sayer and Campbell (2004), Sandker et al. (2007), and described on http://www.cifor.cgiar.org/conservation/_ref/research/index.htm. The model was built in Stella (version 8) (HPS 1996), a user friendly modeling language with an icon based interface. As early as the first workshop in 2003 a model was produced showing the impact of various interventions on forest conservation and livelihoods. At subsequent workshops the model was further refined and we incorporated new sectors, data, and insights and explored new scenarios.

An idealized sequence of steps can be identified from our approach although as in many multi-stakeholder processes there was plenty of iteration, backtracking, and changes in direction from one workshop to the next (Fig. 2). In the first step, we developed visions of the future around topics of interest. As a prelude to visioning, we encouraged participants to think about change by discussing historical events that affected conservation and development outcomes. We examined underlying trends in ecological and socioeconomic variables. We then identified some potential major drivers of change, and developed positive and negative scenarios from poverty and biodiversity perspectives. In so doing, we identified the key issues for future modeling.

The second step consisted of identifying conservation and development outcome indicators so we could be sure to cover these in the model. Because deforestation rates were low, most conservation efforts focused on preventing poaching of large mammals. Thus we used the population of forest elephants and western lowland gorillas as indicators of biodiversity conservation performance. We also included the populations of duikers (*Cephalophus* spp.) as biodiversity indicators because they are the most important species for (legal) subsistence hunting (Nzooh 2003). Hunting pressure on

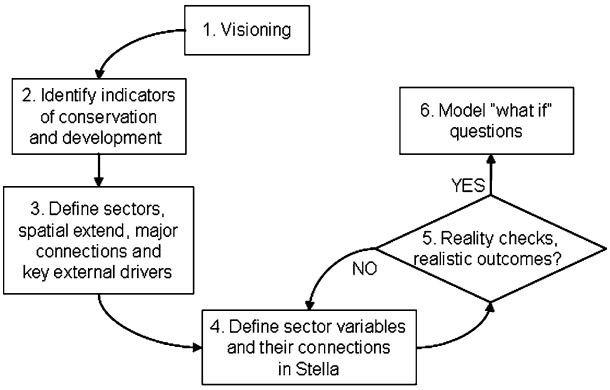

Fig. 2 The modeling process

duikers is high. We considered four individual species of duikers: Peter's duiker (*Cephalophus callipygus*), bay duiker (*Cephalophus dorsalis*), blue duiker (*Cephalophus monticola*) and yellow-backed duiker (*Cephalophus sylvicultor*). Duikers differ from elephant and gorilla in that they have very high birth rates and are largely hunted for subsistence and local sale, whereas elephants and gorillas have low birth rates and are mainly hunted for external commercial markets. Poaching of elephants for their tusks is largely by outsiders, or by locals temporarily employed by outsiders, whereas gorillas are poached to provide bushmeat for far-off urban centers. Due to the value of ivory, the hunting pressure on elephants is considerably higher than that on gorillas. As indicators of local development, we used average household cash income and the effective local development budgets (consisting mainly of forest taxes and wildlife royalties). Cash income is highly sought after by local people, and the local development budgets—the budgets actually used for development projects, so excluding the share which is misappropriated are regarded as a good indicator of access to health and education facilities.

The third step consisted of conceptualizing the landscape; this involved defining the major sectors for the model (see Table 1), the spatial dimensions, and the major connections between sectors and the key external drivers. This step is conducted on paper or in Stella's "map layer". The fourth step was the detailed model building in Stella: defining the main variables (stocks and converters in model terms) in each sector, collecting the initial values for these variables, and defining how variables influenced each other. Small groups of stakeholders worked on different sectors according to their specific knowledge, e.g., the governance sector of the model (on misappropriation of natural resource taxes) was built through a forum of local nongovernmental organizations (NGOs) working in the area. Table 1 specifies the main stocks and the data sources for initial values, and the main flows. These flows can be in- and out-flows to stocks (e.g., birth and death of human population) or flows between stocks (e.g., forest is converted into agriculture). We collected additional primary data through 50 household surveys among Baka-pygmies and Bantu in three villages in 2006 to fill information gaps.

The fifth step consisted of reality checks, running the model under different conditions and exploring how simulations compared to what is known by stakeholders. The simulations often led to revisions of assumed variables and relationships and revealed the need for additional data, for instance in this study data from household surveys.

Table 1 Overview of the sectors of the landscape model, and some of main stocks and flows

Sector	Stocks (with information sources)	Flows (with driving factors or information sources)
Land-use	Current land-uses (2003 landsat images, GFW 2005)	Land-use changes (driven by population increase)
Human population	Baka, local Bantu and immigrant populations (GTZ 2001), employment rate (jobs in other sectors), hunters (determined by population size and employment rate) and employment	In- and out-migration (driven by employment and loss of income), urbanization (UN 2006), natural population growth (UNFPA 2007; GTZ 2001)
Household income	Current average household income for Baka, local Bantu and immigrants (2006 household surveys, CEFAID 2005)	Income from various activities broken down by the three types of households (2006 household surveys, logging employment, bushmeat hunting)
Wildlife	Current population sizes of elephants, gorillas and duikers (Nzooh 2003; Nzooh et al. 2005; Ekobo 1998)	Natural birth and death rates (Cowlishaw et al. 2004, estimates by biologists), carrying capacities (estimates by biologists), extraction by hunting
Bushmeat hunting	Current number of elephants and gorillas poached per year, current number of snares for duiker hunting (estimates from ecoguards; 2006 household surveys)	Change in hunting (determined by numbers of hunters, loss of income, and directly affected by animal density, awareness creation, antipoaching activities)
Safari hunting	Current wildlife royalties paid (safari director interview), employment in safari sector (GFW 2005; safari director interview)	Change in wildlife royalties payment (depending on the number of safari hunters coming in each year, which will decrease if some key safari hunting species, like elephant, become rare)
Logging concessions	Current timber extraction (GFW 2005), logging employment (concession director and worker interviews), timber royalties (MINEFI unpublished), contribution to antipoaching (only if certified)	Change in extraction (depending on sustainability harvest—certification), employment and royalties (depending on extraction), and cost-effectiveness of the concession
Governance	Development budgets commune and communities (mainly timber tax and wildlife royalties), budget spent per development activity, and misappropriation (budget statements, NGO estimations)	Budget inflows (royalties paid, direct development investment) and budget spending (better governance)
ICDP interventions	Current ICDP budget (conservation NGO), current share spent on antipoaching, ecomonitoring, awareness creation, better governance, direct development investment, certification	Change in ICDP budget: three scenarios explored; change in budget spending: three scenarios explored (Table 2)

Once the model simulations were found to be realistic by all stakeholders, we moved to the final step of exploring scenarios. In some circumstances consensus was not reached by the stakeholders. In such situations we explored scenarios with alternative assumptions. To explore the existing and potential ICDP interventions in the landscape we introduced them in the model and defined their expected impact pathways. We defined the impact of each ICDP intervention—ranging from zero to a maximum expected impact—as a function of the budget spent on the activity (e.g., when US$ 1.5/ha or more is spent on antipoaching, a maximum of 80% of snares will be removed). This data was supplied by those working on these issues in the landscape. The scenarios were explored by varying the budget allocations to the different activities (antipoaching, anticorruption measures, and direct development investments) and by changing the overall ICDP budget.

We explored trade-offs and synergies between conservation and development by developing conservation and development indices (Fig. 5). The conservation index is the mean of standardized values for elephant, gorilla, and duiker numbers, with standardization performed using minimum and maximum numbers for each variable. The development index is the mean of standardized values for household income and for local development budgets. We then plotted the mean index values for three time periods.

Toward the end of the model building process, we presented the results to a forestry donor forum and to parliamentarians in the capital, Yaoundé, to stimulate discussion on possible solutions to the problems identified.

Funding and implementation scenarios

The current donor budget for conservation-development activities in the SE TOU is under the control of one large international NGO and is about US$ 1.7 million/year. In most donor-funded contracts for ICDPs there are objectives, activities or conditions related to the sustainability of interventions. The donor funds are meant to set in place systems and processes that will remain after the projects are completed. For this reason, and because participants from the conservation NGO did not believe the current funding levels could be maintained indefinitely, participants suggested that a reduced-funding scenario be

Table 2 Share of total ICDP budget spent on different interventions under the three management strategies explored

Interventions	Management strategy		
	Antipoaching	Better governance direct	Development investment
Antipoaching			
Inside park (%)	24	19	19
Outside park (%)	36	28	28
Ecological monitoring (%)	24	19	19
Awareness creation (%)	5	5	5
Sustainable forest management (%)	10	10	10
Lobbying for redistribution of royalties/taxes and activities that strengthen community governance (%)	0	20	0
Local development budget (%)	0	0	20

simulated. We explored the outcomes from activities under three different budget scenarios: a fixed high ICDP budget over the next 25 years, a diminishing ICDP budget dropping gradually to 30% of the current budget over 25 years, and a "no ICDP budget" in which no donor funds are available for conservation-development initiatives.

After much discussion at the workshops, we settled on simulating three intervention strategies. The first and current strategy was called the antipoaching strategy in which the bulk of the ICDP budget is spent on antipoaching and ecological monitoring (Table 2). In the second strategy, the governance strategy, some of the budget goes to lobbying at the central government level to redirect forest taxes to community organizations without the funds passing through the local administration and to improving the governance of these community organizations. In the third intervention strategy, the direct development investment strategy, governance activities are not undertaken; rather, funds are allocated directly to the communities for local development initiatives.

Governance of forest taxes and wildlife royalties

Companies pay taxes for the exploitation of timber, which includes taxes on forest rents, timber production, and product export. The most substantial of these are the forest rent taxes or area fees. They comprised 51% of the total amount of taxes paid by forest concessions from 2001 through 2005, and in 2005 the annual area fees amounted US$ 7.5 million in the SE TOU (MINEFI, unpublished data; MINEFI 2005). According to the Cameroonian forest law of 1994, a portion of the area fees should flow back into the communes and communities from which the resources were exploited. For example, 40% of the area fees should be made available to the communes (for development projects executed by the communes) and 10% should be made available to the communities (for development projects in villages).

The forest taxes generate considerably more local income than the wildlife royalties. In 2005 in the SE TOU, US$ 59,000 in wildlife royalties was received by communities (Ngono, personal communication), which is insignificant when compared with the 10% of forest area fees of US$ 752,700 for the same year (MINEFI, unpublished data; MINEFI 2005). However, the redistributed forest area fees are often not managed transparently, and the bulk is misappropriated. The scale of misappropriation is estimated during the modeling by NGOs at 80–85% of the money destined to the communes and 75% of the money destined to communities. The recently established community-managed hunting zones bypass local administrations and the wildlife royalties and go directly to community structures that use it for local development projects. However, the effectiveness of this community-based approach is also of concern. For example, the amount of money spent on the administration of the funds is relatively high (33% of the total budget for the period 2001–2005) and Baka-pygmies receive few benefits from the disbursements (CEFAID 2004). However, according to the NGOs so far the level of misappropriation is significantly reduced under this arrangement.

The better governance scenario simulates strengthened community control and reduced levels of misappropriation. Although stakeholders thought governance could be improved if funds flowed directly to communities, they did not think misappropriation of commune forestry taxes could be halted. Thus, we simulated two governance scenarios, a more "optimistic" one in which misappropriation was reduced by 40% for both commune and community forestry taxes and a more "realistic" one in which only the misappropriation of community forestry taxes could be reduced, but not that of communes.

How to interpret the model's outcomes

In modeling landscapes such as the Tri National de la Sangha, there are numerous data gaps. In these cases we used expert knowledge and key informant interviews to estimate missing values (Table 1). Where possible, we got estimates from different sources to cross-check values, e.g., the number of animals poached per year was assessed through the 2006 household surveys and through ecoguard estimates. The figures entered in the model were midpoints. Where there were major discrepancies we conducted additional interviews. Nonetheless, it was impossible to fully remove all subjectivity from the model. For example, many stakeholders believed that if greater monetary benefits from natural resources could flow to local people, communities would work with authorities to reduce poaching. There is evidence that this is happening on a small scale, but many expressed doubt that this will apply at a larger spatial scale. Many of the stakeholders building the model were making budget decisions regarding the activities in the Tri National de la Sangha, preparing work plans, and implementing actions on the ground. Thus, their extensive local knowledge was already being used to drive conservation and development actions, and the simulations were what stakeholders believed to be happening, or might happen, on the basis of their knowledge.

Results

Human population growth

The simulation of human population in SE TOU showed a 1.6 times increase over 25 years. This increase was mainly due to birth rate because in- and out-migration is estimated to be about equal at the beginning of the simulation. Out-migration was simulated as increasing in the future because we assumed a continuation of the present trend for people to migrate to cities.

Animal population dynamics

The increase in human population resulted in increased pressure on animals as a source of bushmeat for consumption and cash. However, with the current fixed high ICDP budget and an antipoaching strategy, the ICDP activities seemed sufficient to maintain large populations of the selected large mammals over 25 years even though there would be continuing modest declines in numbers of elephant and duiker (Fig. 3). If there was a diminished ICDP budget, wildlife populations, especially elephants, would decline more rapidly.

The different intervention strategies lead to different outcomes for elephants and duikers (Fig. 4) but not for gorillas because they experience limited poaching. With a fixed high ICDP budget, an antipoaching strategy lead to 28% higher elephant numbers after 25 years compared with the realistic governance strategy (because the application of the strategy does not relate strongly to elephant hunting, given that the latter is driven by outsiders). With the optimistic governance strategy, larger sums of money made their way back to households and communities who, it was hypothesized, would see the benefits of wildlife and natural resources and thus work closely with the authorities and observe regulations to reduce poaching. The effect was greater for duikers because local people drive this hunting. The direct development scenario is not shown because it was intermediate in its effects between the antipoaching and governance scenarios.

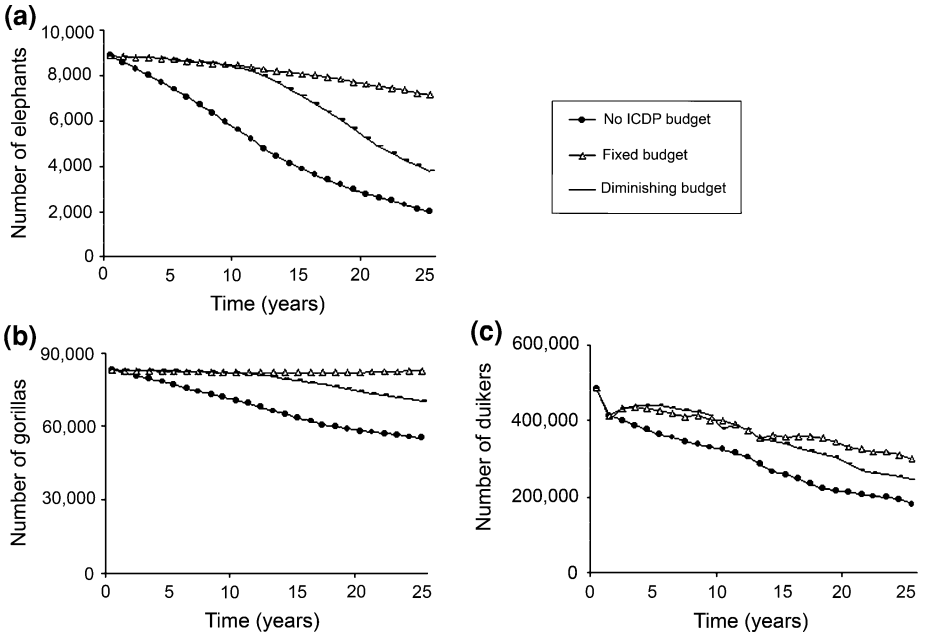

Fig. 3 Simulation of **a** elephant, **b** gorilla, and **c** duiker numbers under three different integrated conservation and development project (ICDP) budget scenarios: no ICDP budget, fixed high budget, and diminishing budget. An antipoaching strategy is followed in all simulated ICDPs (i.e., a large proportion of funds goes toward antipoaching)

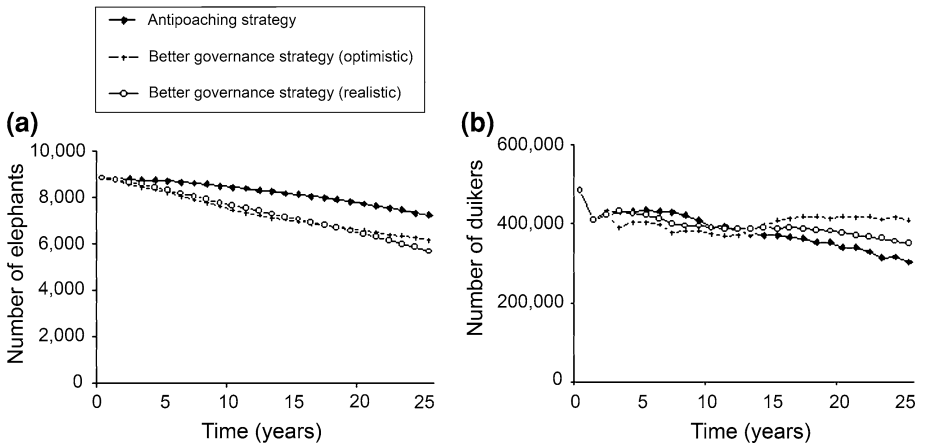

Fig. 4 Simulation of **a** elephant and **b** duiker numbers for three different intervention strategies: antipoaching, optimistic governance, and realistic governance, assuming a fixed high ICDP budget

For a diminished ICDP budget the outcomes for elephant numbers were 20% lower after 25 years for the antipoaching and realistic governance scenario compared with the optimistic governance scenario. The differences among intervention scenarios for duikers were

more marked. The budget for antipoaching diminished but this was offset by improvements in local governance and better local stewardship.

Household income and local development budgets

The household surveys revealed an average cash income in the SE TOU of US$ 250 per capita per year. Thus, poverty levels are considerably higher than in the rest of Cameroon, where the average annual per capita income is US$ 1010 (World Bank 2006). Of the households surveyed, 70% live below US$ 1 per person per day. The difference between the Bantu and Baka average cash income was significant: US$ 1,966 and US$ 864 per household per year, respectively. For the Bantu, agriculture was the most important cash source, whereas for Baka the collection of forest products, bushmeat hunting, and agriculture were equally important.

Of all the intervention strategies, only the optimistic governance scenario substantially improved household incomes in the long-term (Table 3). The increase was a result of the increased development budgets of which a share was spent on improving agricultural production and market linkages. Agriculture is more important for the Bantu, so their household income increased by 24%, whereas that for the Baka only increased by 13%. The direct development scenario was not as good at delivering household benefits in the long-term because the development budgets did not grow as strongly as they did in the case of the optimistic governance strategy.

Although the antipoaching scenario did not show improved household incomes, it did indicate a positive effect on the local development budgets. The local development budgets dropped by <5% after 25 years (Table 3), whereas with no funds directed to antipoaching these budgets would drop by almost 30%. This decrease was due to elephants becoming increasingly scarce and this scarcity subsequently leading to safari companies leaving the zone and no longer contributing to the local development budgets. The impact of the governance reforms, especially the optimistic reform scenario, was huge (Table 3). Where the ICDP budget was reduced, only better governance scenarios could lead to increases in local incomes. Governance problems appeared to be at the heart of the underdevelopment in the area. In the optimistic better governance scenario, there was a tenfold increase in local development budgets, and the scenario was set up to only assume a 40% reduction in misappropriation of funds.

Synergies and trade-offs

Exploring trade-offs and synergies between conservation and development was not simple because trade-off conditions change over time and different indicators of conservation (e.g., elephant vs. duiker) and development (e.g., local development budgets vs. household incomes) show different patterns. The conservation and development indices (see methods) show little potential for win-win situations (Fig. 5). For the first 6 years of the simulation conservation thrived and development stagnated. Positive results for both conservation and development were only achieved under the optimistic governance scenario with a fixed budget (Fig. 5a). The long-term outcomes for conservation under all the other scenarios were not promising, with declines in the conservation index, especially when the ICDP budget diminished (Fig. 5b). The different ICDP interventions did not do much for local development, except under the optimistic and to a smaller extend the realistic governance scenarios.

Table 3 Simulation results of average annual household income and annual local development budgets from forestry taxes and wildlife royalties for the three management strategies explored assuming a fixed integrated conservation and development budgets

	Management strategy							
	Antipoaching		Better governance				Direct development investment	
			Optimistic scenario[a]		Realistic scenario[a]			
	Household income (US$)	Development budget (US$)	Household income (US$)	Development budget (US$)	Household income (US$)	Development budget (US$)	Household income (US$)	Development budget (US$)
Now	1,452	241,071	1,452	241,071	1,452	241,071	1,452	241,071
In 5 years	1,443	242,849	1,452	252,037	1,424	245,856	1,611	586,583
In 10 years	1,399	244,074	1,487	512,414	1,459	399,261	1,554	585,829
In 15 years	1,436	240,657	1,760	1,901,321	1,550	688,522	1,543	584,199
In 20 years	1,417	240,468	1,765	2,332,497	1,513	677,929	1,509	564,521
In 25 years	1,388	233,323	1,666	2,352,880	1,497	670,066	1,446	525,767

[a] The optimistic governance scenario assumes that under the better governance strategy misappropriation is reduced by 40% for both the commune and community forest area fees; the realistic governance scenario assumes misappropriation is reduced by 40% for community forest area fees only

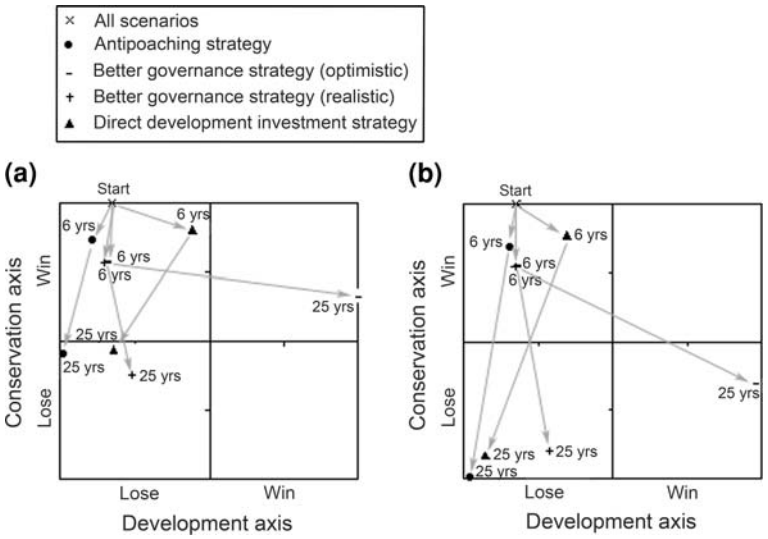

Fig. 5 Trade-offs between conservation and development for different intervention strategies assuming **a** a fixed high ICDP budget and **b** a diminished ICDP budget. Only the present (start), 6-year, and 25-year scenario values are shown (see methods for axis derivation)

Promoting dialogue

The model building promoted considerable discussion among the workshop participants. Initially the scenarios focused on the typical conservation concerns: animal numbers and how antipoaching could be organized. Only through questioning by the facilitators did the governance issues surface. The discussions made conservation agents question two of their underlying assumptions: they were effectively combining conservation and development, and their work would yield sustainable outcomes. In the case of the first assumption, project documents and presentations from conservation agencies characterized their approach as "conservation and development". The model outputs questioned whether the development outcomes were being considered seriously because most of the modeled scenarios did not contribute to lifting people out of poverty. An analysis of project budgets showed clearly how the bulk of the work was directed to conservation activities, such as antipoaching and ecological monitoring. Another refrain from conservation agencies was that their projects are sustainable, yet the diminished ICDP budget scenario showed clearly that long-term outcomes could not be assured once external funding is withdrawn. Currently, different donor and stakeholder forums in the region are discussing how to assure long-term funding.

The NGO participants who were shown the modeled results were shocked by the simulated difference between the potential commune budget for development and what was actually spent on development projects. They indicated their intention to use the simulated budget graphs to create awareness among the population and government about the misappropriation taking place. In fact, during the last municipal elections in Cameroon in July 2007, the then mayor of Yokadouma lost his local constituent support and a new mayor advocating better governance was subsequently elected.

Discussion

Role of participatory modeling

Participatory modeling is an efficient way to gather information and, more importantly, to stimulate discussion among different stakeholders (van Noordwijk et al. 2001; Bousquet et al. 2007). Because data is often lacking on the relationships among components of modeled socioecological systems, such simulations largely reflect local expert opinion. Various points of view and subjective criteria elicited from different local experts are made explicit in the modeling process so as to improve understanding and shared representation of the problems at hand and to provide an improved basis for negotiation when views are divergent (Bousquet et al. 2007; Castella et al. 2007). Understanding of the trade-offs and synergies between conservation and development improves during the modeling process and this encourages participants to seek alternative solutions. Models can help capture the complexity of conservation landscapes (Castella et al. 2007). We found that although discussions are useful to change ways of thinking at the project level it is often impossible for local implementing agencies to change projects drastically because project activities and budgets are largely fixed externally. The discussions with donors, parliamentarians, and local development NGOs emerged as major opportunities for influence because they were in a better position to facilitate change. The model was useful in redirecting discussion toward livelihoods in conservation projects hitherto largely focused on animal populations, antipoaching, and ecological monitoring. The model encouraged project implementers to consider long-term perspectives.

Possible scenarios for improving conservation outcomes

The antipoaching strategy did little for local people and in many ways was only a holding operation. McShane and Wells (2004) conclude most ICDPs need ongoing financial support or they collapse. In the case of the SE TOU, if conservation funds became unavailable, and antipoaching efforts had to be scaled back, animal populations would decline dramatically. We therefore question the long-term impact of such short-term interventions. Securing biodiversity with the current approaches will require continuing external funding. Unfortunately, the funding for most ICDPs is relatively short-term and few institutional or fiscal mechanisms exist to ensure long-term support for protected and surrounding areas (Emerton et al. 2006).

Our results suggest that a conservation-development approach that does not give attention to governance does little for people in the long-term and will do little for animal populations unless donor investments continue. Investing solely in livelihood projects without governance reform (the direct development scenario) will also do little to secure long-term outcomes for people and nature. Our model suggests that the only hope for improving long-term conservation and development is if considerable effort is given to governance reform. Some of the workshop participants did not believe the governance work would be successful, especially at the commune level, where misappropriation is endemic (see also Oyono et al. 2006). And even if it was successful, many participants thought satisfactory management of the local development budgets was only possible if civil society could exert pressure through NGOs. Decentralization brings increased vulnerability to misappropriation by local elites (Assembe-Mvondo 2006). This negative aspect of decentralization is well documented in Indonesia (Fritzen 2007; Duncan 2007) and other countries (Ribot 2007).

Integrated sustainable-use approaches that focus on empowering local communities to improve livelihoods on the basis of sustainable management of biological resources have gathered ground in recent years (e.g., Wilshusen et al. 2002; Hutton and Leader-Williams 2003; Bennett et al. 2007). In some cases, large amounts of funding allocated for local conservation and development activities are misappropriated by local elites (Fritzen 2007; Ribot 2007). It is therefore surprising that the conservation-development literature gives so little attention to governance (Barrett et al. 2001; Smith and Walpole 2005). Many authors have sought to explain why ICDPs do not reach their dual objectives but they have generally failed to recognize weak governance as one of them (Alpert 1996; Chape 2001; Schmidt-Soltau 2004; Christensen 2004). There are few empirical studies that explicitly highlight the linkages between corruption and conservation (Smith et al. 2003a; Ferraro 2005), and some suggest that the perceived linkages are more complex than previously thought (Barrett et al. 2006), with causality remaining unclear. Our work shows that the impacts of poor governance can be simulated in models and that, in the case of south-eastern Cameroon, none of the present approaches to conservation and development problems will succeed in the absence of improved governance. Combating corruption is complex and difficult especially in countries with weak governments (Smith et al. 2003b; Palmer 2005) and worldwide there is little progress on improving governance (Kaufmann 2003). However, Cameroon does show a very modest but positive trend in improving governance between 1996 and 2007 and examples of other African countries like Tanzania and Madagascar show corruption can be controlled significantly in a short period (Kaufmann et al. 2007). The replacement of the corrupt mayor by one promoting better governance is a positive signal for the SE TOU landscape and might indicate that it is on the road towards truly integrating conservation and development.

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