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Indigenous livelihoods and the global environment: Understanding relationships

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Abstract: Simple simulation models have been built in remote locations with participation of local Indigenous peoples and their representatives to develop a shared understanding of the livelihood implications of conservation initiatives and the potential environmental impacts of measures to improve local livelihoods.

Models were built with Ba'aka people in the Congo Basin, Punans and other Dayak groups in East Kalimantan, Indonesia and rural communities in Ghana. Recently, the program began developing landscape partnerships and modeling initiatives with Papuans in the West Papua province of Indonesia. The models facilitated discussion and negotiation between Indigenous peoples and representatives of conservationist groups, resource extraction companies and government officials and allowed exploration of different scenarios for both conservation and development interventions.

The models failed to produce empirical evidence to support claims made by conservation organisations of the positive livelihood impacts of their conservation programmes. In all cases the material benefits to local Indigenous people of activities such as mineral extraction, logging, agro-industrial developments etc. greatly exceed the often hypothetical benefits postulated from the small-scale local development activities of conservation organisations. The modelling exercises also provoked debates and awareness of the broader dimensions of livelihoods as perceived by Indigenous peoples. Health care, education, infrastructure and employment consistently emerged as the highest priorities for Indigenous communities in all the study sites.

Including Indigenous people in the process of participatory modelling, alongside other stakeholders such as government officials, conservation NGOs, and scientists is important in confronting the challenge of making trade-offs between human well-being and nature. Biodiversity conservation will only succeed in the long term if it is based upon approaches that fully recognize and address the inevitable trade-offs between the development needs of local people and the maintenance of areas of intact nature.

Forest conservation programmes still do not give enough attention to the legitimate needs of people living within and dependent on the forests. It is all too easy to lay blame on developers, corrupt government officials, and other parties for forest destruction. Successful conservation programmes must allow for the improvement of and the stability of income streams and increasing food security.

Keywords: *Conservation and development, trade-offs, landscapes, system dynamics, Indigenous peoples.*

1. INTRODUCTION

For more than three decades there have been attempts to develop and implement supposed 'win-win' approaches to reconcile the interests of people and nature in the context of conservation and development programmes. Examples of success on the ground are few and there is substantial literature examining failings (Sayer et al. 2007). 'Win-win' outcomes are now regarded as exceptions rather than the norm and it is now recognized that pragmatism dictates an approach based upon "winning more and losing less". Although many organizations continue the pursuit of win win outcomes there is an increasing acceptance in the conservation and development community that there *are* trade-offs and that they must be addressed (Sunderland et al. 2008; Ellis & Ramankutty 2009).

Hundreds of millions of people around the globe depend directly on tropical forest ecosystems. A significant proportion of the populations of rural poor in Africa, South America, and Southeast Asia are to a greater or lesser degree forest dependent. These people modify forests but in general they do not threaten their existence – in fact forest dependent people have a strong interest in maintaining forests. Scientists have documented the destruction of forests and the associated dramatic declines in biodiversity (Sodhi et al. 2004; Fitzherbert et al. 2008; Bradshaw et al 2009). This has led to campaigns to modify or even stop economic development activities in these regions. The arguments have been that biodiversity conservation and reducing greenhouse gas emissions were over-riding priorities. Indigenous people's campaigners have often resisted logging, oil palm production and other developments (Boedihartono et al. 2007) on the grounds that local people preferred to retain natural forest cover. These campaigners often promote small to medium sized enterprises as alternatives (e.g. ecotourism) to industries that destroy or degrade forests. Such alternative micro-enterprises are rarely successful in remote areas with weak infrastructure and governance (Sayer and Campbell 2004): evidence suggests that at best they yield only marginal improvements in the economic well-being of local people (Sayer et al 2007). However, there is evidence that local people's material well-being has improved substantially from economic development through agroforestry, timber, mining and oil palm industries (Sargeant 2001, Susila 2004). External conservation and indigenous peoples' lobby groups are reluctant to recognize the positive outcomes of external investments in remote forest areas (Sayer et al. 2007). Identifying the impacts of development on people and nature requires a systems' level approach that can produce empirical evidence for both the positive and negative aspects of development and conservation interventions and make explicit the trade-offs involved.

In this paper, we present a set of case studies that used participatory simulation modelling to explore the implications on livelihoods of conservation interventions and other measures to improve livelihoods. Models were built with Ba'aka people in the Congo Basin, Punans and other Dayak groups in East Kalimantan, Indonesia and rural communities in Ghana. Recently, the program began developing landscape partnerships and modeling initiatives with Papuans in the West Papua province of Indonesia. The simulation models were built primarily to increase stakeholder communication, stimulate discussion on the implications of intervention scenarios, and increase understanding of the interrelationships between different actors in the landscape.

2. METHODS

2.1. Participatory modelling

A participatory modelling approach was used to develop dynamic systems models in the three landscapes. We followed an iterative modelling process (van den Belt 2002; Sandker et al. 2009) that engaged a suite of diverse stakeholders from within and outside the landscape of interest. Participatory methods have been developed for and conducted with a variety of stakeholders such as those living in poverty, government officials, policy-makers, and natural resource managers (Lynam et al. 2002; van den Belt 2004; Sandker et al. 2007; Kassa et al. 2009; Collier et al. Submitted; Sandker et al. Submitted). Indigenous and other local people (internal migrants) were included in the process in all landscapes.

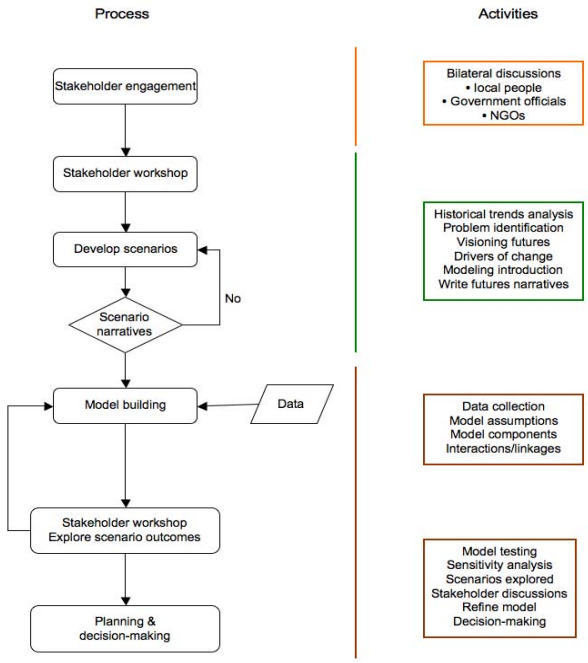

Figure 1. Process diagram for using systems modelling in landscape approaches. The three case studies followed this process to engage actors in participatory modelling of the three landscapes.

We engaged stakeholders in participatory modelling workshops. Stakeholder engagement was critical in the process because of its importance in representing adequately the system under study and thus making the model simulations 'grounded in reality'. Indigenous people and other actors were engaged in visioning and historical trends analysis through facilitated discussions and group exercises. These exercises helped to identify the problems and issues in the landscape, the perceived drivers of change, and the aspirations of the different actors. Scenarios of change – sometimes called scenario narratives – were finalized and were used as the basis to define the scope of system exploration and model simulation.

Indigenous people and other actors then participated in building parts of the model, after introductory theory and practical sessions run by trained modellers and facilitators. An iterative process of model building, exploration and simulation, and discussion was conducted for each landscape. The process time varied greatly: in the Congo it took several years of engagement while in Ghana it was completed after an intensive six-day workshop. All modeling was carried out in the Stella environment (HPS, 1996).

2.2. Landscape case studies

Congo Basin biodiversity and livelihoods

African tropical forests are centers of high biodiversity and support vast numbers of Indigenous people that rely on their natural resources to sustain livelihoods. In a South East Cameroon landscape the key issues included the conservation of biodiversity such as elephants (*Loxodonta cyclotis*: Matschie) and lowland gorillas (*Gorilla gorilla gorilla*: Matschie), the hunting of duikers (*Cephalophus* spp) for bushmeat, and the distribution of taxes from forest concessions as potential sources of benefit to local people. The conservation stakeholders were targeting conservation actions and were allocating a considerable budget to anti-poaching programs. However, stakeholder discussions revealed that anti-poaching strategies would not work if there were no investment in programs to improve people's lives. People would continue to poach as long as it provided them with greater benefits than alternative activities. The other critical issue was direct development funded from taxes collected from logging companies. The study examined three scenarios that explored changes to conservation and development budget allocations: (1) spend 85% of the entire budget on anti-poaching (as occurs currently), (2) allocate 20% of the budget to improving governance of natural resource taxes to be used for local development, and (3) allocate 20% of the budget directly to local development.

The simulations revealed that continued investment in anti-poaching measures would likely have very good conservation outcomes contingent upon continued funding levels, but there would be very little or no improvement in local livelihoods (Sandker et al. 2009). Alternatively, governance reform (reduced corruption and better local reinvestment of forest concession taxes) would likely have almost as good conservation outcomes (i.e. reduced poaching) and would also improve livelihoods through increasing household income.

The modelling process initiated in this landscape stimulated much debate among the local and national actors including parliamentarians, donors and NGOs and even precipitated change in local governance. The modelling stimulated local officials and NGO project managers to consider whether the project was genuinely integrating conservation and development or whether it was mainly addressing purely conservation outcomes. This raised fundamental questions about the sustainability of current interventions.

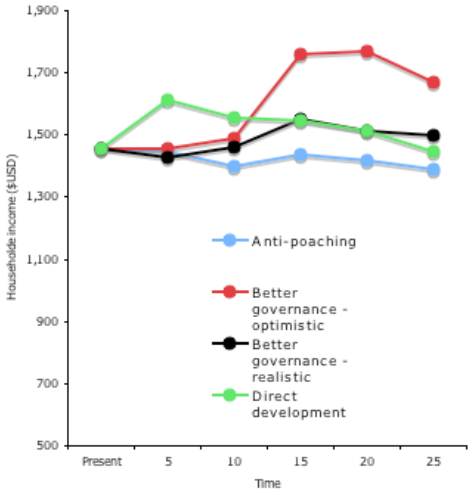

Figure 2. Simulations of conservation and development scenarios for a Forest landscape in Cameroon. This figure shows simulated trends of average household income ($USD) for households in the conservation landscape of Cameroon. Four scenarios were modeled based on the current conservation intervention strategy, implemented and supported by NGOs, and three alternative management scenarios discussed and explored during the participatory modelling exercises: "Better governance – optimistic"; Better governance – realistic"; "Direct development".

Oil palm in East Kalimantan

Kalimantan, the Indonesian part of the island of Borneo, is a vast area of pristine tropical forests, oil palm and pulp plantations. The oil palm industry makes major contributions to the Indonesian economy and is directly and indirectly responsible for employing approximately 5 million people (Sargeant 2001). Conservation agencies have openly condemned the oil palm and paper/pulp industries for destroying forests throughout Kalimantan and many other regions of Southeast Asia. Around 2005 a major oil palm development was proposed in East Kalimantan near the town of Malinau (3^0 35′ 06.19″ N, 116^0 38′ 47.96″ E): The development would eventually have replaced more than 1.5 million hectares of forest. In this landscape we explored the effects of a 500,000 ha oil palm development on livelihoods and forest cover. Indigenous Dayak and Punan were involved in the modeling along with government officials, conservation agencies and developers and together they explored the implications for local livelihoods and for forest conservation of different oil palm development scenarios for the landscape. The simulations of oil palm development demonstrated that these could yield significant improvements in household income (see Sandker et al 2007 for details). This was consistent with the retention of significant forest areas remaining in the district. Such large-scale oil palm development would stimulate significant immigration that would most likely change the entire socio-political make-up in the district. The modelling stimulated constructive thinking and debate; in particular district officials were extremely nervous about the potential impacts of high levels of immigration and were therefore encouraged to explore alternatives to oil palm development to avoid some of the negative impacts. The payments that they might receive for maintaining forests as a carbon sequestration measure were seen as an attractive alternative to oil palm.

Carbon payments in Western Ghana

A six day workshop was held at Asankrangwa in the Wassa Amenfi West district in Ghana (5^o 48′ 37.04″ N, 2^o 26′ 08.89″ W) during September 2008. The workshop investigated incentive payments of reduced deforestation and degradation (REDD) in the Ghanaian context, and investigated the trade-offs between cocoa production and REDD payments. REDD is a potentially lucrative proposal for countries with tropical forests (Kindermann et al. 2008), and an effective mechanism to reduce tropical deforestation, conserve biodiversity, reduce greenhouse gas emissions, and improve local livelihoods. However, despite the rhetoric the application of the scheme and its benefits compared to existing livelihood strategies could not be

demonstrated. Stakeholders from government, the private sector (timber company), Indigenous people, scientists, and non-government organizations participated in the development of the model, data collection, and the exploration of REDD scenarios. Three scenarios were modeled:

1) Deforestation only: farmers paid to stop clearing primary forest

2) Deforestation and degradation: farmers paid to stop clearing primary *and* secondary forest

3) Business as usual.

A complex interaction between land cover, population growth, and the price of cocoa indicated that a majority of farmers would not be able to achieve improved household incomes under either REDD scenarios (Fig. 3). Under both scenarios household income would decrease for two reasons. First, cocoa is not sustainable (i.e. land degrades after 20 years and becomes unproductive) so new plots are required to maintain incomes: new plots means clearing more land and thus lower the revenues from REDD payments. Second, the population is growing and land is being divided to accommodate more farms. Scenario three was particularly negative for farmers because clearing usually takes place on secondary forest lands. When payments include 'degradation' (i.e. no clearing of secondary forests) farmers can no longer clear either primary or secondary forest so their incomes decline over time.

2.3. Conclusions and Recommendations

Simple simulation models, using participatory approaches with Indigenous people and other stakeholders, can demonstrate the impacts of conservation interventions on livelihoods and help explore different scenarios for conservation and development interventions. Models can be presented to stakeholders in a simplified format so they can collectively explore ideas, learn about the system, and eventually engage in negotiations and decision-making. We have demonstrated their utility in several diverse landscapes with equally diverse contexts of livelihoods, conservation, and development.

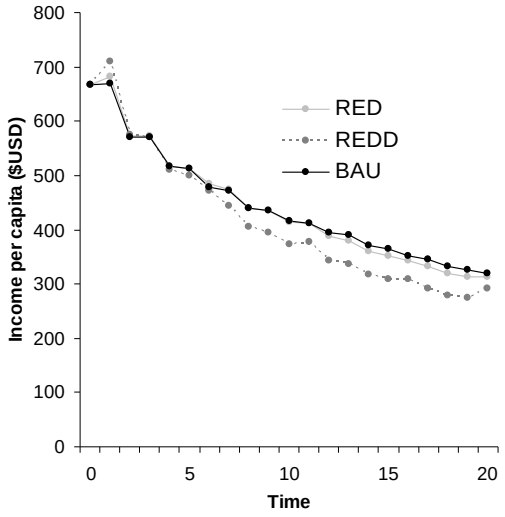

Figure 3. Income per capita (US$) over a twenty year period for the rural population in Wassa Amenfi District, western Ghana. The rural population is mostly farmers growing cocoa for cash income, and food for consumption. Per capita income is plotted under three scenarios employing incentive payments for reducing deforestation and forest degradation (REDD): (1) business as usual, (2) RED halting deforestation and (3) REDD halting forest degradation *and* deforestation. Scenarios are based on contracts of 20 years duration with installments over the entire period.

In Ghana, it was clear that there is very little incentive for farmers to adopt REDD to improve their incomes. Therefore there is virtually no conservation benefit and forest will continue to be cut to grow cocoa. The Kalimantan example showed that alternative enterprises (i.e. Small to medium size) for Indigenous people and transmigrants were unlikely to provide equivalent economic benefits to large scale oil palm development. Forest clearance for oil palm would heavily impact biodiversity but only on a small part of the landscape, elsewhere vast stands of forests would remain. The Congo basin example demonstrated the shortsighted and simplistic strategy of anti-poaching, which essentially deprives Indigenous people of a resource they have long used. Scenario simulation indicated that efforts to address the more difficult topics of governance and reinvestment of forest taxes in local development would be far more effective in improving people's lives.

Including Indigenous people in the process of participatory modelling, alongside other stakeholders such as government officials, conservation NGOs, and scientists was found to yield benefits in creating trust and

shared understanding and enabled us to confront the challenge of judging trade-offs between livelihoods and nature. Without the participation of Indigenous people in the modelling, or models, it would not have been possible to properly explore the consequences of conservation or development interventions. Indigenous people were able to include aspects of their livelihoods in the models and therefore the simulation results reflected the positive and negative impacts of the intervention scenarios. The presence of Indigenous people in the participatory process was a catalyst for other actors to confront the realities of trade-offs in these systems. Without their involvement it is likely that their aspirations and concerns would go largely unheeded given the unequal power relations operating outside this process.

Developing country peoples will continue to pursue economic development and will not forgo their development options in favour of notional benefits from biodiversity conservation. Not until there are viable livelihood alternatives presented to Indigenous and local people reliant on forest resources will there be substantial improvements and success in conservation initiatives. It is all too easy to lay blame on developers, corrupt government officials, and other parties (Koh and Wilcove 2009) for forest destruction. These arguments focus on the global benefits of biodiversity and climate change mitigation at the expense of local livelihood benefits, and they rarely consider the people that live within the forest landscapes.

2.4. Acknowledgments

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