

# Global financial crisis impacts forest conservation in Cameroon

J.A. SAYER<sup>1</sup>, D. ENDAMANA<sup>2</sup>, M. RUIZ-PEREZ<sup>3</sup>, A.K. BOEDHIHARTONO<sup>1</sup>, Z. NZOOH<sup>4</sup>, A. EYEBE<sup>5</sup>, A. AWONO<sup>6</sup> and L. USONGO<sup>2</sup>

<sup>1</sup>James Cook University, School of Earth and Environmental Sciences, Cairns, Australia

<sup>2</sup>IUCN (International Union for Conservation of Nature), Yaoundé, Cameroon

<sup>3</sup>Universidad Autonoma de Madrid, Spain

<sup>4</sup>WWF (World Wide Fund for Nature), Jengi Project, Cameroon

<sup>5</sup>CARPE (Central African Regional Programme for the Environment), Yaoundé, Cameroon

<sup>6</sup>Center for International Forestry Research, Yaoundé, Cameroon

Email: jeffrey.sayer@jcu.edu.au and agni.boedhihartono@jcu.edu.au

---

## SUMMARY

The forests of SE Cameroon lie within the Sangha tri-national landscape (TNS), a priority area for biodiversity conservation under the Congo Basin Forest Partnership. A monitoring program showed minimal changes in conservation and local livelihoods indicators from 2006 to 2008. Following the global financial crisis in late 2008 global demand for timber decreased and this led to suspension of logging activities and lay-offs of staff by logging companies; both biodiversity and livelihood indicators deteriorated. The unemployed workers lost their incomes, experienced declining living standards and reverted to poaching and slash and burn agriculture. Pygmies were no longer able to obtain employment in Bantu agricultural plots, sell forest products to logging company employees or sell bushmeat to passing logging trucks. These global economic forces had greater impact on livelihoods and the environment than local interventions by conservation organizations. Livelihood indicators improved in 2010 and 2011 when the economy picked-up but those for environmental values did not recover as rapidly.

Keywords: forest conservation, global economic crisis, conservation and development trade-offs, forest peoples' livelihoods

## L'Impact de la crise financière internationale sur la conservation des forêts au Cameroun

J.A. SAYER, D. ENDAMANA, M. RUIZ-PEREZ, A.K. BOEDHIHARTONO, Z. NZOOH, A. EYEBE, A. AWONO et L. USONGO

Les forêts du Sud Est Cameroun se trouve dans le paysage du Tri-national de la Sangha (TNS), qui est une priorité dans le cadre du Partenariat pour les Forêts du Bassin du Congo. Un programme de suivi a montré les changements minimes des indicateurs de conservation et du développement de 2006 à 2008. Suite à la crise financière internationale de fin 2008, la demande globale du bois a diminué et ceci a provoqué l'arrêt des activités d'exploitation forestière. Les compagnies ont licencié leur personnel qui a donc perdu leur revenu régulier. La condition de vie des populations est détériorée et ils se sont reconvertis dans les activités de braconnage et d'agriculture itinérante sur brûlis. Les peuples autochtones pygmées ne pouvaient plus obtenir les emplois dans les exploitations agricoles des bantous. Ils ne pouvaient plus vendre les produits de la forêt aux employés des exploitations forestières ou la viande de brousse auprès des chauffeurs des camions transportant du bois. Ces forces économiques globales ont eu un plus grand impact sur la vie des populations et sur l'environnement que les interventions locales menées par des organisations de conservation. Entre 2010 et 2011, quand l'économie a repris, les indicateurs de moyens d'existence se sont améliorés ; cependant il n'y a pas eu de répercussion équivalente sur les indicateurs environnementaux.

## Los impactos de la crisis financiera global en la conservación de los bosques en Camerún

J.A. SAYER, D. ENDAMANA, M. RUIZ-PEREZ, A.K. BOEDHIHARTONO, Z. NZOOH, A. EYEBE, A. AWONO y L. USONGO

Los bosques del SE de Camerún se sitúan en el Paisaje Tri-nacional del Sangha (TNS), área prioritaria para la conservación de la biodiversidad dentro del Acuerdo de los Bosques de la Cuenca del Congo. Un programa de monitoreo mostró cambios mínimos en los indicadores de conservación y medios de vida locales entre 2006 y 2008. Tras la crisis financiera global a finales de 2008 la demanda de madera disminuyó, llegando a la paralización de actividades y el despido de trabajadores de las empresas madereras; los indicadores de biodiversidad y medios de vida se deterioraron. Los parados perdieron sus ingresos, disminuyendo su nivel de vida y retomando el furtivismo y la agricultura de tumba y quema. Los Pigmeos perdieron sus empleos en los cultivos de los Bantú, sus ventas de productos forestales a los empleados de las compañías madereras y de carne de monte a los conductores de los camiones. Estas fuerzas económicas globales han tenido más impacto en la economía y medio ambiente locales que las intervenciones de los grupos conservacionistas. Los indicadores de medios de vida mejoraron en 2010 y 2011 a medida que la economía se relanzaba, pero los indicadores ambientales no se han recuperado tan rápido.

---

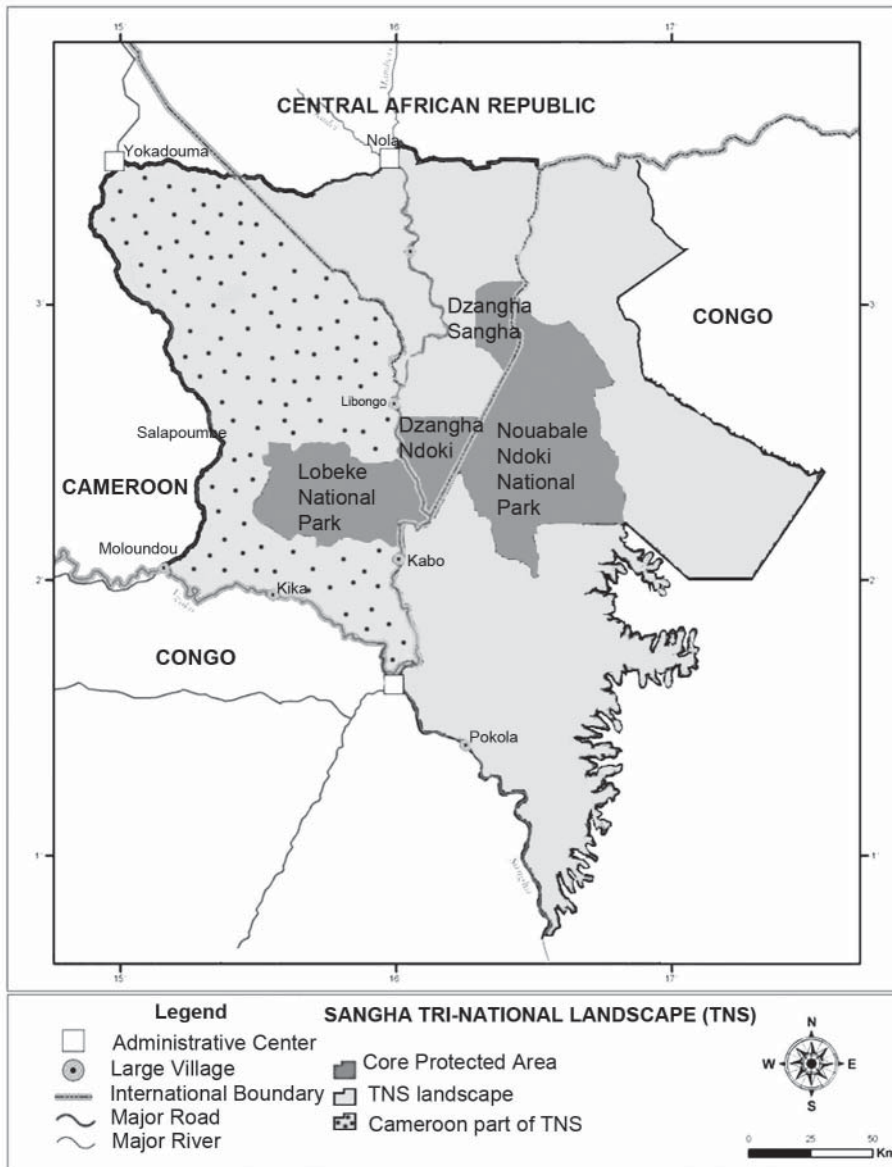
INTRODUCTION

The countries of the Congo Basin together with a number of European and North American donor countries established the Congo Basin Forest Partnership (CBFP) as an initiative of the Earth Summit in Johannesburg in 2002. The underlying assumption of the CBFP was that conservation could not be achieved as long as extreme poverty persisted in the Congo Basin and that the goal of conserving forests and their biodiversity had to be addressed through measures that improved the livelihoods of the people. The potentially conflicting interests of conserving biodiversity and of alleviating local poverty were to be achieved by appropriate spatial planning arrangements at a landscape scale and through local development initiatives within the landscapes. Twelve landscapes were initially identified where the countries of the region and international conservation NGOs would focus their efforts

and the donor countries allocate their funds. The conservation and development programme in one of these landscapes – the Sangha Tri-National landscape, Figure 1 – an area of 43,936 km<sup>2</sup> lying astride the borders of Cameroon, the Republic of Congo and the Central African Republic, was led by World Wide Fund for Nature (WWF) with support from the Wildlife Conservation Society (WCS), German Agency for Technical Cooperation (GTZ), the forestry and national parks services of the three countries and a number of local NGOs.

Many authors have commented on the difficulties of demonstrating the links between measures to alleviate poverty and achieve conservation (Andam *et al.* 2010, Persha *et al.* 2011, Sayer and Campbell 2005). In an attempt to contribute to this debate the Center for International Forestry Research (CIFOR), WWF and the International Union for Conservation of Nature (IUCN) convened a meeting in 2004

FIGURE 1 Map of the Sangha Tri-National landscape showing the Cameroon sector which was the focus of this study



to put in place a participatory programme to monitor both local livelihoods and environmental values in the TNS. The participants in the meeting agreed to establish a shared set of indicators against which to track changes in the livelihoods of local people and the condition of the forests and their biodiversity. We adopted a participatory approach widely used in the monitoring of sustainability. We facilitated a process whereby local stakeholders identified indicators and made annual assessments of their values. It was expected that conservation and development organisations would adapt their programmes on the basis of the lessons learned from this monitoring programme. We also hoped to test the assumptions underlying the landscape approach of the CBFP and particularly to establish the links, if any, between conservation and development outcomes. A stakeholder group now meets annually and has adopted the name of the Sangha Group after the main river that runs through the landscape. An account of this process and a description of the initial indicators selected are given in Sayer *et al.* 2006. Some adjustment of the indicators was made in the first two years and a final set of 31 indicators was agreed upon and monitoring began in 2006. It proved difficult to get consistent data on some of the indicators in the Congo and CAR sectors. Endamana *et al.* (2010) present the results of the first four years of monitoring in the three countries. This paper reports upon the latest changes in the Cameroon sector, emphasizing those that occurred during and after the global financial crisis in 2008.

The Sangha Tri-National landscape has a population of 191,000 people about 10% of whom are from Baka and related pygmy groups (de Wasseige *et al.* 2009). The rest of the people are Bantu who are long-term residents of the area, in addition a smaller number of Bantu immigrants have been attracted by employment in forest industries. 97% of the landscape was still covered with forest in 2010 and approximately 19% of this was allocated to protected areas, 10% to local agroforestry and the rest to industrial timber concessions (de Wasseige *et al.* 2009).

Most people live in villages with populations of 100 – 500 people. The Baka frequently live in small communities on the fringes of the Bantu villages. The majority of the people practice subsistence agriculture and grow maize, manioc, bananas and small quantities of vegetables and fruit. Hunting and gathering is important to people's livelihoods, especially for the Baka. Cash incomes come almost exclusively from employment in logging companies, conservation and development NGOs and government. Some community forests have been established recently within the agroforestry zone.

The area is very remote and access is difficult, the people are amongst the poorest in their respective countries and within the landscape the Baka are the poorest of all. Official data on household income levels is of doubtful validity but both government figures and studies carried out by the Sangha group suggest that the inhabitants of the landscape survive on an average of less than \$1.00 per day (de Wasseige *et al.* 2009; Sandker *et al.* 2009; Economist Intelligence Unit 2010). Incomes of employees of government agencies, conservation organisations and logging companies are higher but the cash

incomes of the rural inhabitants, especially the forest dwelling Baka, are very low and many of these people suffer severe deprivation.

The extreme human poverty contrasts with an extraordinary wealth of animal and plant species. This is extensively documented in de Wasseige *et al.* (2009) and CBFP (2010). The landscape contains large populations of forest elephants (*Loxodonta cyclotis*), lowland gorillas (*Gorilla gorilla*), 16 other species of primates, 250 species of birds and a highly diverse flora. The existence of small naturally occurring openings in the forests known as "Bais" provides unique opportunities for this wealth of species to be observed.

The principle activities of the CBFP in the area have been to establish formal spatial plans, to enforce laws protecting natural resources and to promote better forestry practices notably through encouraging forest certification. In addition numerous small interventions have aimed to provide direct benefits to local people. These have included help in improving agriculture, fishing and livestock rearing practices, the organisation of community management of some forests and hunting areas and interventions at a political level to ensure that a proportion of the royalties from logging are reinvested in local social infrastructure. The combined project investment of the different international agencies supporting conservation in the Sangha landscape has been about US\$4 million per year during the period of this study with some decline from 2008 onwards. The investment is therefore about US\$0.10 per person per day or slightly more than 10% of the per capita product of the population. However much of the money is spent on institutional support for the international organisations and on studies by visiting scientists and does not actually contribute to the local economy.

### Combining methods to reach a common understanding

The indicators established for tracking livelihoods and environmental changes were based upon the capital assets framework (Bebbington 1999) and its application in the sustainable livelihoods framework (Carney 1998 and 1999). The 31 indicators (Sayer *et al.* 2006) were selected by the local stakeholders to cover the range of livelihood and environmental attributes of greatest concern to them. There is limited use of cash and it proved difficult to obtain information on people's incomes and savings so financial assets were not assessed. Local people and international conservation stakeholders had divergent views of the importance of natural assets. We therefore split these into local and global natural assets. The list of indicators was updated in 2010 as some were proving difficult to assess with adequate rigor. In order to make the six years time series comparable, this paper is based on the updated set of indicators (Table 1).

Human capital assessed health care, education and the skills and competencies of the people. Social capital measured the involvement of indigenous (pygmy) people in decision making, the strength of local NGOs, the effectiveness of community management groups, the reinvestment of taxes in social infrastructure and local peoples' perceptions of corruption. Physical capital assessed infrastructure, timber

TABLE 1 *List of indicators used in the study, grouped by asset category*

<b>Local Natural Asset</b>
Availability of Non-Timber Forest Products
Availability of bushmeat
Progress in certification
<b>Global Natural Asset</b>
Population of elephants
Population of Gorillas
<b>Physical Assets</b>
Number of cassava mills
Quality of housing
Number of water sources
Journey time to the capital by road
Number of tourist visits
Employment of local people in wood processing industries
Price of staple foods
<b>Social Assets</b>
Functioning of local NRM organisations
Extent of Community-based Natural Resources Management initiatives
Effectiveness of state institutions
Perception of corruption in public and private sectors
Level of activity of local NGOs
Involvement of indigenous people (Ba'aka, Baka) in Community-based Natural Resources Management
Participation of Baka in decision-making
Local reinvestment of forestry taxes in social infrastructure
<b>Human Assets</b>
Access to health care
Quality of education
Number of people with technical and professional employment

processing capacity, quality of housing and the existence of cassava mills. Natural capital was assessed in terms of values of global concern such as endangered species and extent of natural forests and those of local concern such as availability of forest products and quality of water supplies. The exact definitions of the indicators and the criteria for assessing them are detailed in Endamana *et al.* (2010).

The indicators were assessed annually during the period April to August by staff members of the participating organisations. Some indicators were scored using data readily available from local government such as the number of doctors and teachers. Data on environmental indicators were drawn from the routine survey work of conservation organisations in the area. Social and human capital were clearly of utmost importance to the local stakeholders but were more difficult to measure. Indicators of governance, corruption, community initiatives, availability of forest products etc were derived from focus group meetings in the villages. Although data were collected from all three national sectors the intensity of the sampling was much higher in Cameroon and

draw heavily on a very extensive programme of household surveys conducted by WWF. The data from Congo and CAR were incomplete hence the focus of this paper on Cameroon.

The Sangha Group met annually in August or September in the field in one of the three countries to complete the assessment of the indicators and review the changes that had occurred. The results of this process were used to influence the activities of the participant organisations and were provided to government decision makers in an attempt to influence policies. The 2010 meeting was held in Lomié (Cameroon) at the time of the global financial crisis. The impacts that the financial crisis was having in the landscape led us to focus our attention on this issue. The 2011 meeting was held in Lobéké National Park (also in Cameroon). This paper is a product of these two meetings.

### Different speeds for a dynamic landscape

The landscape tracking programme for Cameroon showed little change in environmental attributes during the period 2006 to 2008, (Figure 2). Livelihood indicators improved, possibly in response to the interventions of conservation organizations but more probably in response to a growth in the Cameroon national economy of around 3.5% for the triennium (Economist Intelligence Unit 2010).

The modest changes brought about by the conservation interventions were consistent with the results of the simulation models developed to explore conservation and development scenarios (Sandker *et al.* 2009, 2010). These models suggested that direct conservation interventions will have only minor impacts on livelihoods. The small scale agricultural innovations were not widely adopted because there was limited access to markets. The models suggested that any limited growth in economic activity that these micro-level interventions might have produced was offset by the rapid growth in the population. So the models indicated that externally funded small-scale development activities have low potential to contribute to per capita economic growth (Sandker *et al.* 2010).

The impacts of the international financial downturn were first felt in the area by mid 2008 when demand for construction timber in European markets declined abruptly. Forestry companies began to reduce their level of activity and lay off staff or reduce their hours of employment. Evidence for this reduced activity came initially from a 50% decrease in the number of logging trucks passing a forestry check point in SE Cameroon (Figure 3). The check point was located on the road used by logging companies in the Congo and the extreme SE Cameroon sectors of the landscape to access the ports in Cameroon from which they ship their timber.

Forestry companies provide a large proportion of the paid employment for the inhabitants of the Sangha landscape. However most of the locally employed staff members are paid on a daily basis and much of their income is made up of bonuses for volumes of timber harvested or processed. The Baka have difficulty accessing or retaining employment as they have less tradition of organized work. They may be

FIGURE 2 Trend of capital assets from Cameroon TNS segment (2006–2011). Aggregated scores for indicators of each capital asset category based upon annual assessments. Bars represent 0.5 of the coefficient of variation

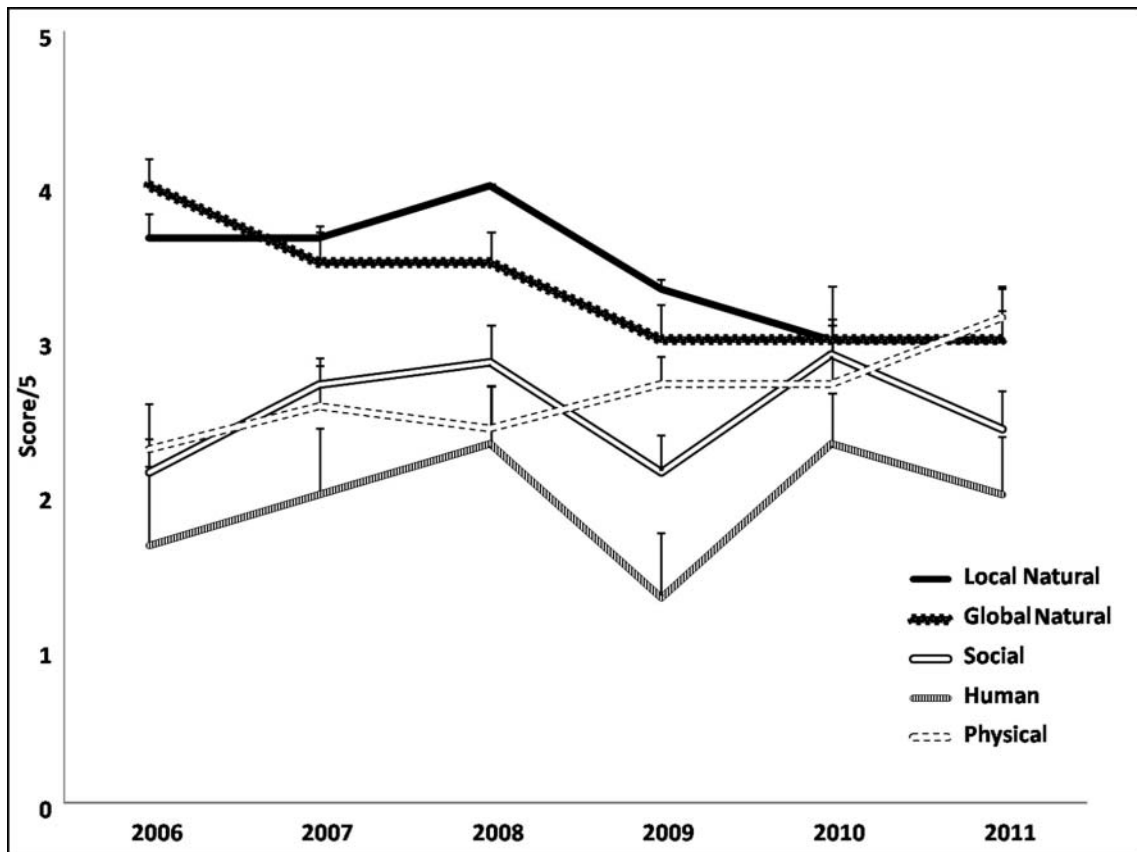
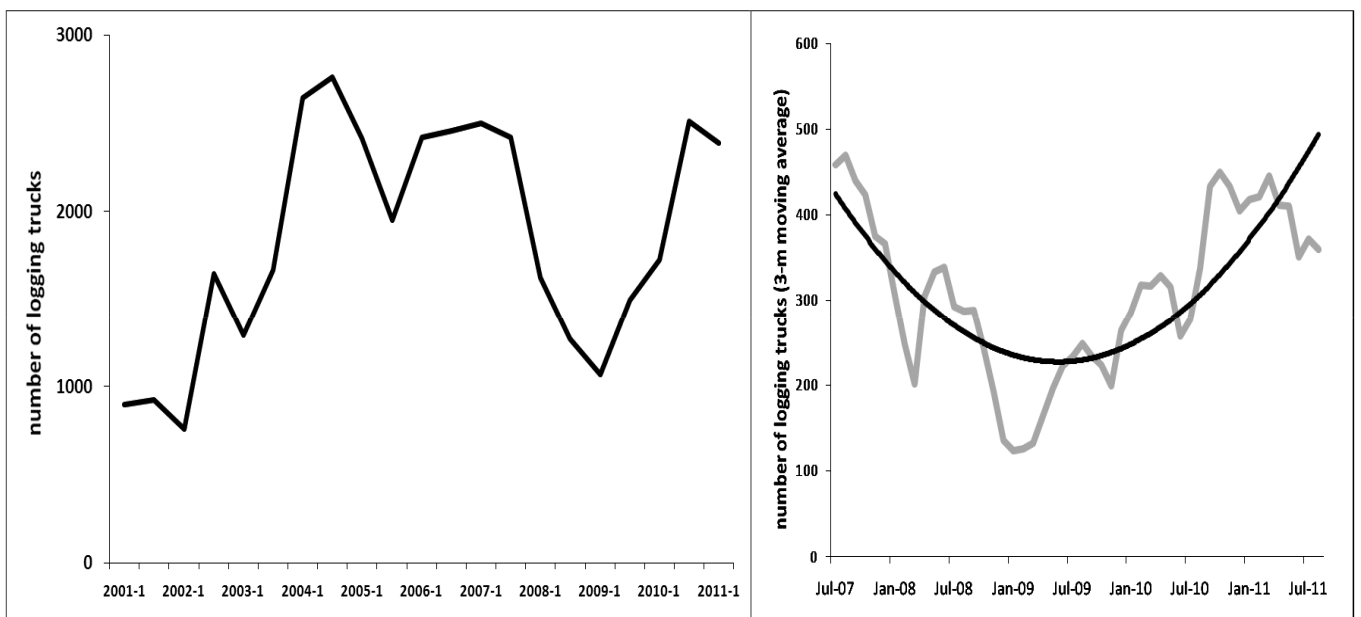


FIGURE 3 Trend of the number of logging trucks passing a forestry check point at Socambo in Cameroon. Left: first semester 2001 to first semester 2011; Right: 3 month moving average September 2007 to August 2011.  $y = 0.0004x^2 - 32.255x + 644501$ ;  $R^2 = 0.576$



discriminated against by Bantu supervisors and they frequently leave work to take advantage of the seasonal availability of forest products or to take part in traditional ceremonies. Most of the people whose income ceased or declined as a result of reduced logging activity were the local Bantu employees. Few of them left the area when they lost their jobs. Instead they returned to their villages within the landscape and cleared forest land to plant agricultural crops. Many of them engaged in hunting of wildlife to feed their families and in some cases for sale in local markets.

The decline in the livelihoods of the Baka was however more marked. Although few of the Baka were employed in the forest companies they did derive much of their income indirectly from the activities of these companies. They often worked as labourers for the Bantu and when the latter lost their jobs they no longer had the funds to employ the Baka on their farms. But a significant source of income for the Baka came from the sale of bushmeat, other forest products, bananas and cassava to the Bantu employees of the companies and particularly from sale to the drivers of logging trucks. A particular issue is that truck drivers augment their income by transporting bushmeat, hidden on their trucks, and reselling it in urban markets. Many Baka communities are now settled along the logging roads and are heavily dependent on sales of forest products to drivers of logging trucks. When this source of cash income declined the Baka suffered severe hardship. Their agriculture is rudimentary and the yields of their hunting and gathering activities do not meet their needs for staple carbohydrates. During much of 2009 and early 2010 many Baka communities were severely deprived of food. When we visited their camps they frequently claimed to be experiencing famine.

However impacts on livelihood and environmental indicators were only detected when the next annual assessment of the indicators was carried out in mid-2009 (Figure 2). At that point there was a downturn in both the environmental and livelihood indicators. The effect was clearer in local than in global natural assets. Scores for global and local natural capital were lower in 2009 with respondents reporting declines in availability of non-timber forest products and bushmeat. Independent studies by WWF in the same part of Cameroon showed a significant increase in poaching in 2009 (Nzoo 2009). The number of elephants in Lobéké National Park had been increasing from  $2091 \pm 212$  in 2002 to  $2445 \pm 425$  in 2006 but then declined to  $1715 \pm 174$  in 2009. An index of frequency of signs of poachers per linear kilometer of transect increased during this period from  $0.33 \pm 0.82$  to  $0.68 \pm 0.15$  in 2006 and then to  $0.86 \pm 0.24$  (Nzoo 2009).

Indicators showed lower scores for livelihoods in 2009. The exception was an improvement in physical assets resulting from the upgrading of a road by an externally funded multi-year infrastructure programme. Those for the effectiveness of community-based natural resource management (CBNRM), the use of traditional governance structures to resolve conflicts, local perceptions of government corruption, level of activity of local non-governmental organisations (NGOs), health care and education all showed negative tendencies. The number of sport hunting permits issued and

the number of people employed in logging companies also declined.

We attribute these declines partly to the reduced level of economic activity following the Global Financial Crisis. Non-Timber Forest Products and bushmeat became scarcer as more people resorted to hunting and gathering. Livelihood indicators declined as less funding was available for local NGOs and CBNRM activities. Government officials increased their practice of accepting bribes, local medical assistants and teachers abandoned their posts and global demand for sport hunting permits declined. The indicator for employment in logging companies clearly fell when local people lost their jobs. An increase in elephant poaching occurred at this time but was stimulated by gangs from outside the area. It began before the financial crisis and may not have been linked to the economic situation.

Some indicators did show an improvement in 2009. Although the indicator for Bantu involvement in CBNRM activities declined, the indicator for Baka involvement in CBNRM increased, probably because this became a priority for conservation groups. The travel time to the capital, Yaoundé, decreased as a result of the externally funded road project. This had a positive impact on quality of housing and prices of externally sourced staple foods as the costs of transporting food and materials from Yaoundé declined. All of these gains resulted from a major European Union investment in road improvement which was negotiated before the financial crisis.

During 2010 most of the forestry companies resumed their activities and re-engaged staff. This happened more quickly than might have been expected. One possible explanation is that their purchasers in Europe had over-reacted in depleting their timber stocks. A more probable explanation is that they began selling part of their production to Asian markets which were less impacted by the financial downturn. Managers of logging companies told us that they were increasing exports to China and this trend is reflected in statistics published by the International Tropical Timber Organisation (ITTO 2010). When the indicators were again assessed in 2010 and 2011 those for livelihoods showed that the economic recovery was beginning to make itself felt in the landscape.

A number of companies operating in the area are certified by the Forest Stewardship Council (FSC). These companies tended to maintain their operations at a reduced level during the period of the crisis and were slower to lay off staff. Our field observations showed that as the crisis ended they resumed normal levels of operations and staffing more rapidly than non-certified companies. Companies who seek FSC certification appear to be in business for the long haul in contrast to some newly arrived companies that are motivated by short term profits. FSC certification requires companies to provide good conditions for their employees and they often invest in social services for the communities surrounding their concessions.

The number of logging trucks which reached its minimum in early 2009 increased to pre-crisis levels by mid 2011 and this correlated with an immediate improvement in the livelihoods of the people. The increased level of economic activity

rapidly led to improvements, although with differences between sectors and population groups. The fluctuation in livelihood indicators between 2010 and 2011 suggests different recovery time lags between the private, market oriented, and the public sectors. The private sector (mainly logging) has a fast response both in decline but also in recovery. Public sector activities (including NGO-based support activities) tend to be based on previous year's budgets and hence there is a lag time before declines and recoveries are apparent. An example of this is the continuing loss of teachers and health workers in 2011 in spite of the incipient economic recovery. This contributed to the decline in social and human assets observed between 2010 and 2011.

However the environmental indicators had still not shown any improvement and some (like the availability of NTFPs) show a slight continuing decline. Elephant and gorilla poaching which is orchestrated by powerful interests in Yaoundé and abroad did not diminish as the economy picked-up. In fact, shortly after our September 2011 meeting, an encounter between National Park rangers (eco-guards) and gorilla poachers resulted in the death of one eco-guard and serious injury to another (New Scientist 2011).

## CONCLUSIONS

The paper illustrates some of the difficulties of measuring changes in conservation and development parameters in complex landscapes with weak infrastructure. There is a clear trade-off between indicators that reflect local perceptions of value and which tend to be somewhat subjective and indicators of biophysical attributes such as forest area or populations of large mammals which are easier to measure objectively. However the changes in the indicators do support the widely held view of local actors that the economic crisis impacted upon both conservation and development in the region. The decline in the environmental indicators resulted from the increase in forest clearing for agriculture and the increased hunting pressure on wildlife. The decline in livelihood indicators resulted from reduced household income and reduced ability to purchase basic supplies, pay for health care or school fees or maintain houses. Our data suggest that while livelihood indicators declined more abruptly, they also recovered faster. Environmental indicators are still lagging behind in their recovery, suggesting an insidious and pervasive process of deterioration that, once triggered, becomes very difficult to reverse.

The impact of the financial downturn in this very remote forest area confirmed our observations that change in both livelihoods and natural values in the landscape were much more strongly linked to external economic drivers than to the small scale interventions of conservation organisations. Numerous other observations supported this conclusion. When the US energy conglomerate Enron collapsed in December 2007 the activities of a planned cobalt mine in an area to the West of the Sangha landscape halted abruptly and many local people lost their jobs. Enron had been the major investor in this mining project. In 2005 a logging company

operating in the Central African Republic sector of the landscape was forced to close because the condition of the access roads deteriorated to such an extent that it was no longer possible to get timber to markets profitably. The employees remained in the area but survived by clearing forest for slash-and-burn agriculture and hunting.

These observations present a dilemma for conservation groups. The small-scale local sustainable initiatives that are their main point of interaction with local communities will only produce partial impacts in reducing poverty. Under the TNS conditions, poverty is alleviated when external investors, both international and domestic, create jobs and put money into the local economy thus creating markets for local labour, agricultural products and services. Improvements in roads bring immediate and significant positive benefits to local people. But these investments are also a threat to forests and biodiversity. When agriculture becomes more profitable it expands at the expense of forests (Ewers *et al.* 2009). Mines, logging and industrial agriculture bring undoubted economic benefits but also encourage populations to migrate into forest areas. The roads that service all of these investments make many other economic activities more profitable and thus encourage their expansion but they also fragment forests and facilitate access for hunting, logging and clearing. When all of these external drivers of change combine in conditions of weak governance then one has a perfect storm of negative change in the environment but also – at least in the short term- improvements in peoples' livelihoods.

The small-scale local development activities of conservation organisations will not solve the problems of poverty. But that does not mean that they should be abandoned. They provide for dialogue between the global conservation community and local stakeholders. They act as boundary processes in helping to break down the barriers to mutual understanding that often exist between conservationists and local people (Mollinga 2010). They can help negotiate better conditions for local communities in their relations with external investors and they can also help to improve the education, skills and competencies of local people. There is some evidence that people who have been involved with the activities of conservation NGOs may be better able to deal with the opportunities and threats that come with major outside investments (Sayer *et al.* 2008). Therefore, we believe that conservation organisations should continue to provide this direct assistance to local communities.

However it must be recognised that the real determinants of the future for both conservation and livelihoods in many remote forest areas are the external investments that now loom large in so many of the world's most important tropical forests. In the Sangha landscape one of the best conservation investments has been promotion of certification of logging operations. WWF studies of forest wildlife show that forests are well conserved in those concessions that have achieved FSC certification (Nzoo 2009). These companies provide better conditions for their staff and they invest in the application of wildlife protection laws. Significantly their response to the economic downturn was less extreme; they laid-off less staff and resumed operations more rapidly than non-certified operators in the same area.

Mineral exploitation and industrial agriculture are going to be the next challenges in the Sangha landscape. The area has rich reserves of diamonds, gold and iron and it has potential for oil palm production. It is investments in these sectors that will determine the future both for the people and the biodiversity of the landscape. The challenge for conservation is to resist the most pernicious changes whilst attempting to steer change towards better practices and locations when that change is inevitable.

Empowering people is a pre-condition for achieving this. In the longer term one would hope to see the local communities develop the capacity to control their own destinies. Attempts to shift control of some logging to local people have so far had limited success. The communities cannot afford the investments needed for log extraction and transport (Ezzine *et al* 2009). But in the longer term local rule-making and management should be the preferred option and in areas where forests have become scarce such local management does appear to lead to better outcomes both for the people and the biodiversity of their forests (Persha *et al* 2011). Logging, mining and industrial agriculture seem destined to be the main drivers of change in the area and serious challenges lie ahead in minimizing their negative conservation impacts whilst optimizing the potentially positive developmental impacts.

#### ACKNOWLEDGEMENTS

We thank the numerous representatives of local communities, especially the Baka peoples for their patience and cooperation in helping our field work in their landscape. We also thank numerous people from logging companies (SEFAC, ALPI-CAM), government agencies (Ministries in charge of Forest from Cameroon, CAR and Republic of Congo), research (ICRAF) and conservation organisations (WCS) who have participated in the work of the Sangha Group. We thank staff based in the field particularly Maurice Tadjuidje, Louis Ngono, Louis Defo, Alain Tsoheng, Olivier Mbani, Mouna Abana, Jeremy Sana, Mowawa Brice Saurimin, Yves Paul Nganga and Dos Santos Domingos who have helped with data collection and have contributed in many other ways to improving our understanding of the issues in the Sangha landscape. This study received financial support from the US Agency for International Development, GTZ, WWF and IUCN. The valuable suggestions made by anonymous referees are also gratefully acknowledged.

#### REFERENCES

- ANDAM, K.M., FERRARO, P.J., SIMS, K.R.E., HEALY, A. and HOLLAND, A.B. 2010. Protected areas reduced poverty in Costa Rica and Thailand. *PNAS* **107**: 9996–10001.
- BEBBINGTON, A. 1999. Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. *World Development* **27**(12): 2021–2044.
- CAMPBELL, B., SAYER, J.A., FROST, P., VERMEULEN, S., RUIZ-PEREZ, M., CUNNINGHAM, A. 2001. Assessing the performance of natural resource systems. *Conservation Ecology* **5**(2): 22. [online] URL: <http://www.consecol.org/vol5/iss2/art22/>.
- CARNEY, D. 1998. Sustainable rural livelihoods: what contribution can we make? Department for International Development, London.
- CARNEY, D., DRINKWATER M., RUSINOW, T. *et al.* 1999. Livelihood approaches compared: a brief comparison of the livelihoods approaches of DFID, CARE, Oxfam, and UNDP. Department for International Development, London, UK.
- CHOMITZ, K.M. 2007. At loggerheads? Agricultural expansion, poverty reduction and environment in the tropical forests. World Bank Policy Research Report. World Bank, Washington D.C., USA.
- CONGO BASIN FOREST PARTNERSHIP, web site accessed November 2009. <http://www.cbfp.org>
- De WASSEIGE, C., DEVERS, D., De MARCKEN, P., EBA' ATYI, R., NASI, R. and MAYAUX, P. (eds) 2009. The Forests of the Congo Basin - State of the Forest 2008. Luxembourg: Publications office of the European Union, ISBN 978-92-79-13210-0, doi: [10.2788/32259](https://doi.org/10.2788/32259).
- ECONOMIST INTELLIGENCE UNIT. 2010. Country reports for Cameroon, Central African Republic and Republic of Congo. Economist Intelligence Unit, London, UK.
- ENDAMANA, D., BOEDHIHARTONO, A.K., BOKOTO, B., DEFO, L., EYEBE, A., NDIKUMAGENGE, C., NZOOH, Z., RUIZ-PEREZ, M. and SAYER, J.A. 2010. Assessing conservation and development in a Congo Basin forest landscape. *Tropical Conservation Science* **3**(3): 262–281.
- EWERS, R., SCHARLEMANN, J.P.W., BALMFORD, A. and R.E. GREEN. 2009. Do increases in agricultural yield spare land for nature? *Global Change Biology* **15**: 1716–1726.
- EZZINE DE BLAS, D., RUIZ PEREZ, M., SAYER, J.A., LESCUYER, G., NASI, R. and KARSENTY, A. 2009. External influences on and conditions for community logging management in Cameroon. *World Development* **37**(2): 445–456.
- ITTO. 2010. Report from Central/West Africa. Log markets sustained by strong demand from China and India. Tropical Timber Market Report. 1 – 15<sup>th</sup> December 2010. International Tropical Timber Organisation, Yokohama, Japan.
- McSHANE, T.O., HIRSCH, P.D., TRAN CHI TRUNG *et al.* 2010. Hard choices: making trade-offs between biodiversity and human well-being. *Biol. Conserv.* 2010, doi: 10.1016/j.biocon.2010.04.038.
- MOLLINGA, P. 2010. Boundary work and the complexity of natural resources management. *Crop Sci.* 50: S-1-S-9. Doi: [10.2135/cropsci2009.10.0570](https://doi.org/10.2135/cropsci2009.10.0570).
- NEW SCIENTIST. 2011. Gorilla poachers kill forest ranger in Cameroon. New Scientist, 12 October 2011.



- NZOOH, Z. 2009. Summary of large mammal population trends and their spatial distribution in Lobéké National Park between 2002 and 2009. WWF Technical report, WWF Cameroon, Yaoundé, pp: 1–8.
- PERSHA, L., AGRAWAL, A. and CHHATRE, A. 2011. Social and ecological synergy: local rulemaking, forest livelihoods, and biodiversity conservation. *Science* vol. **331**: 1606–1608.
- SANDKER, M., CAMPBELL, B.M., NZOOH, Z., SUNDERLAND, T., AMOUGOU, V., DEFO, L. et al. 2009. Exploring the effectiveness of integrated conservation and development interventions in a Central African forest landscape. *Biodivers. Conserv.* DOI 10.1007/s10531-009-9613-7.
- SANDKER, M., CAMPBELL, B.M., RUIZ-PEREZ, M., SAYER, J.A., COWLING, R., KASSA, H. and KNIGHT, A.T. 2010. The role of participatory modelling in landscape approaches to reconcile conservation and development. *Ecology and Society* **15**(2): 13. [online] URL:<http://www.ecologyandsociety.org/vol15/iss2/art13/>.
- SAYER, J., BULL, G. and ELLIOT, C. 2008. Mediating forest transitions: ‘Grand Design’ or ‘Muddling Through’. *Conservation and Society* **6**(4): 320–327.
- SAYER, J.A. 2009. Reconciling conservation and development; Are landscapes the answer? *Biotropica* **41**(6): 649–652.
- SAYER, J.A., CAMPBELL, B.M. 2004. The Science of Sustainable Development; local livelihoods and the global environment. Cambridge University Press, Cambridge, UK and New York, USA.
- SAYER, J.A., CAMPBELL, B., PETHERAM, L., ALDRICH, M., RUIZ-PEREZ, M., ENDAMANA, D., NZOOH, Z., DEFO, L., MARIKI, S., DOGGART, N. and BURGESS, N. 2006. Assessing environment and development outcomes in conservation landscapes. *Biodivers. and Conserv.* DOI 10.1007/s10531-006-9079-9.
- SAYER, J.A. and CAMPBELL, B. 2001. Research to integrate productivity enhancement, environmental protection, and human development. *Conservation Ecology* **5**(2): 32. [online] URL: <http://www.consecol.org/vol5/iss2/art32/>.