The Rufford Small Grants Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Pierre Ngangoumoun
Project title	Spatial evaluation of deforestation and degradation at the western periphery of the Dja Biosphere Reserve and piloting community involvement in carbon assessment and monitoring, Republic of Cameroon
RSG reference	06.08.09
Reporting period	January 2010 – March 2011
Amount of grant	£5997
Your email address	acdef.cameroon@acdef.org
Date of this report	20 August 2011

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Ascertain the current scale of anthropogenic damages to some forest blocks on the western side of the Dja reserve as well as the trends in deforestation and degradation.			X	The assessment of the scale of the current anthropogenic damages was undertaken using the method of White and Edwards (2000). Using this method, transects were established at 1 km interval from the main road Nkoldja-Bengbis to the western border of the Dja reserve following almost an azimuth of 90°. Signs of human disturbance were recorded every 200 m along these transects in real time using the Personal Digital Assistant (PDA) loaded with the Arcpad software. These included farms, current or abandoned, tree felling, wood burning for the production of charcoal, etc. The trends in deforestation were ascertained using Landsat satellite images. Using the most recent and relatively cloud-free image sets of 2001 and 1987, it was possible to detect changes in land cover using ENVI software. This technique consists in selecting on a set of multiple dated and superimposed satellite images, a set of similar features which will be used as benchmarks for change detection. Six of these points were selected on the set of 1987 and 2001 Landsat images for the project area and helped in identified on a large scale, the areas which have undergone considerable changes in forest cover as a result mainly of agriculture expansion, tree felling and other forms of human activities in the project area.
Test out the recent methods and technology used by the University of Twente "Kyoto: Think Global Act Local" (http://www.communitycarbonforestry.org) or K: TGAL on community participation in the assessment of the carbon stocks in a forest and its sequestration potential.			X	This method consists in training members from the local community in the techniques and use of appropriate instruments to collect and analyse data in the field on the stock of carbon in their forests. It uses conventional forest inventory approaches and appropriate coefficient to convert the forest biomass into carbon stock. Due to the duration and limited resources available for this study, only the above ground woody biomass was estimated.

				Members from each community in the project area were selected including women and men. In addition to general labour in the forest, the selected members were trained in the use of field equipment and trained in the collection of data in the field. This included the use of Global Positioning System or GPS, PDA loaded with the Arcpad software or Mobile Geographical Information System, clinometer and compass.
Estimate the woody biomass and carbon sequestration potential of some forest blocks at the western side of the reserve under different ownership and management regimes (state vs. community).			X	Sample plots were established every 200 m along transects for above ground woody biomass assessment and carbon sequestration potential. Using the method developed by Twente University in Holland, plots of 2, 5, 10 and 15 m radius were established allowing data to be collected on tree species of different diameter sizes. In addition to the total tree height and the vernacular name, the diameter of each tree was taken in relation to the size of the sampling plot. These were trees with a diameter below cm in the sampling plots with a 2 m radius; trees with the diameter greater than 2 cm, but less than 5 cm in the plots of 5 m radius; trees with diameter greater than 5 cm, but less than 10 cm in the plots of 10 m radius and finally, the tree with a diameter greater than equal to 10 cm were recorded in the plots of 15 m radius.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

- The initial plan to ascertain the carbon value of other forest type outside community forests (e.g. logging concession) was altered as the logging companies were sceptical about the research and the long-term implications of their operations.
- The communities misunderstood the research agenda and thought that quantifying the carbon potential in their forests would result in the immediate release of cash. This expectation has resulted from the nationwide campaigns about the whole concept of carbon marketing from standing forests (as opposed to logged or destroyed forests) through the Reduced Emissions from Deforestation and Degradation scheme.
- The vernacular names of tree species were not easily translatable to scientific or botanical names as some vernacular names are generic names meaning a set of species rather than individual names. The implication of this situation was the need to bring in an experience tree spotter or botanist which was not included in the initial budget. ACDEF Cameroon organised for this verification and validation trip and bore all the costs.

- Project duration longer than anticipated due to high rainfall at the time of fieldwork. The only solution was to wait until the rain capsized from end of October 2010 when it was possible to complete all the field operations, carry out the preliminary data screening and travel to Morocco for the finalisation data analysis, writing up of the dissertation, submission, defence and correction. This did not happen until December 2010.

3. Briefly describe the three most important outcomes of your project

The three most important outcomes of this project include, but are not necessarily limited to:

3.1. Estimate of land use changes at the western periphery of the Dja Biosphere reserve

The western periphery of the Dja reserve, initially under the cover of pristine evergreen forest, is nowadays inhabited by a growing human population that puts increasing pressure on the natural resources and the global forest cover. With the changing economic and social context especially in recent years, the relative balance between the needs of the local population and the ecosystem functions is being seriously disturbed. The classical steps in the degradation of these pristine forests start with commercial logging using heavy machinery to open areas of pristine forests in order to extract valuable timbers for international market. Local farmers using slash and burn techniques mostly for subsistence agriculture succeed logging operations and establish farms and plantations of cash and food crops for domestic and national markets. Other threats to the ecological integrity of these ecosystems include hunting for and trade in bushmeat involving large and charismatic wildlife species including great apes and forest elephants with direct role in forest regeneration and the dynamics of forest ecosystems.

The analysis of spatial change in the course of this project using remote sensing indicated that the total surface area of secondary forest with farmlands has increased by approximately 20% between 1987 and 2001. In addition to the expansion of farmlands, the establishment of human settlements along the newly constructed roads has exacerbated the situation. Despite the presence of considerable amount of cloud on the 1987 and 2001 satellite images available, it is clear that there were relatively fewer villages in the area in 1987 than 2001. The subsequent increase in human population and the demand for more lands have put further pressure on pristine forests. This investigation estimates that there has been encroachment on 190 ha of pristine forests between 1987 and 2001 as outlined in the comparative diagrams below (Figure 1).

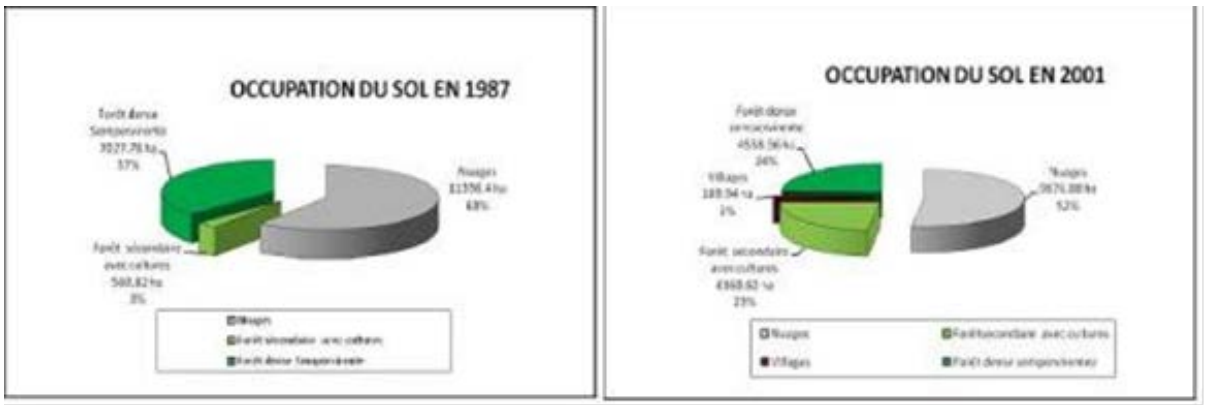

Figure 1: Change in land use between 1987 and 2001 at the Western periphery of the Dja Biosphere

3.2. Estimate of the above ground carbon stock of the western periphery of the Dja biosphere reserve.

The process led to the subdivision of this area of 18,944 ha of community forests into several forest categories including the evergreen forest category (4,558 ha) and the secondary disturbed forest category with farms (4,368 ha). The remaining 10,018 ha were forests under cloud cover on the satellite images and could not be classified, using remote sensing techniques, under evergreen or secondary forest disturbed forest category. A total number of 911 sampling plots (512 in the evergreen forest and 399 in the secondary disturbed forest category) were established and helped to generate the data used in calculating the total amount of above ground carbon (Figure 2).

The findings of this research suggest approximately 115,987 tons of woody biomass in the evergreen forest stratum. This corresponds to an estimated 357,051 tco_2 and 57,990 tons of carbon sequestrated per annum. In the secondary disturbed forest subjected to much degradation in recent years, these estimates dropped significantly and stood at 10,369 tons of woody biomass for 17,306 tco_2 and 4,731 tons of carbon sequestrated per annum for this stratum. Overall, the project concluded that for the 18,994 ha that made up the study area, 126,356 tons of woody biomass are available for 62,722 tons of carbon sequestrated per annum. This corresponded to an average of 6 t/ha/annum of woody biomass and 3 tC/ha/annum.

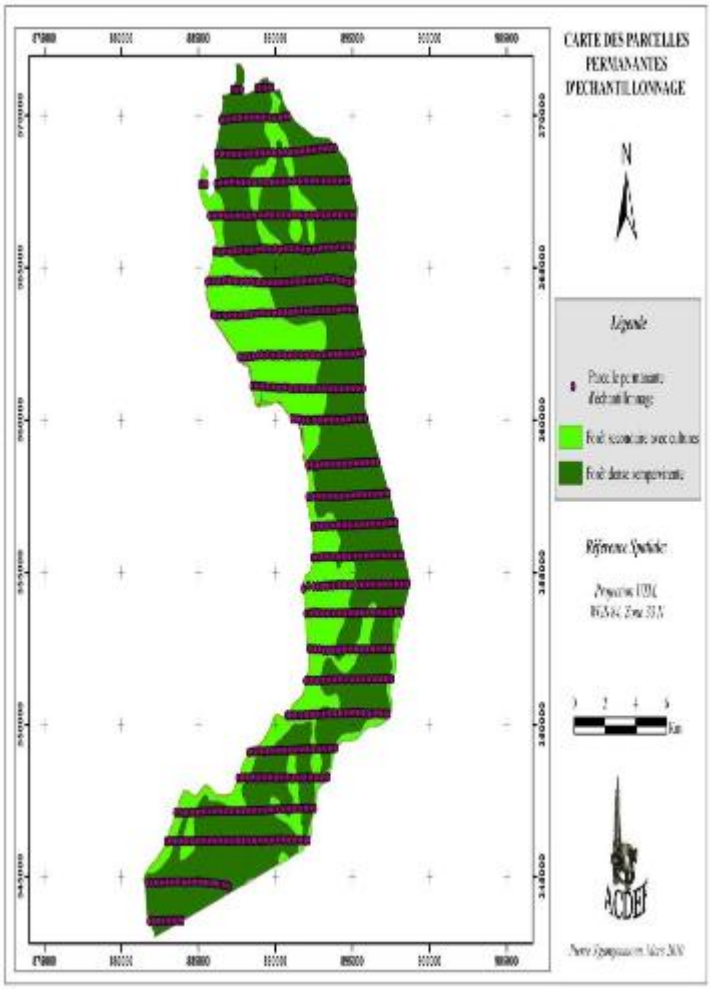

Figure 2: Location of carbon sampling plots at the western periphery of the Dja reserve

3.3. Increased awareness within the local communities about the changes taking place in their landscape

A number of changes have been taking place across the landscape, but this investigation has indicated that the local communities were not completely aware. By putting all the changes on the maps and discussing with the communities of the extent of the degradation, it was possible for them to acknowledge that something was definitely happening in relation to the past. The indirect corollaries of these changes identified during the study included the reduction in the quantity and quality of certain non timber forest products in the village, the scarcity of bushmeat and the increase in the hunting efforts. The local communities also acknowledged that there are changes in the rainfall patterns which in turn affect their farming practices and food securities.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant)

This project was designed with the overarching goal of including the local communities in the assessment of changes in their landscape and stock of forest biomass. The idea was to nurture and introduce to them the whole concept of non consumptive use of forest and forest resources building on the emerging concept of trade in forest carbon through the reduced emissions from deforestation and forest degradation scheme.

Figure 3: Community member measuring tree height in the forest

Using mostly the methodology developed and tested by the University of Twente (The Netherlands - http://www.communitycarbonforestry.org), the local communities at the western periphery of the Dja reserve were involved in the demarcation of the sampling plots and the collection of data in the field. Selected members of the communities were trained in the use of compass to take bearing, establish transects and demarcated sampling plots. Using the PDA provided loaded with the Arcpad software (or mobile GIS), it was possible for them to locate and ascertain forest disturbance in real time in the field. They were also trained and used clinometers for the measurement of slopes in the field as well as the height of the trees in sampling plots for the assessment of forest biomass. Simple measurements of the tree girth in the field were also undertaken to populate the stock assessment matrixes. The preliminary analysis of the data was undertaken in the field and the initial results shared with the local communities especially in relation to the level of forest degradation and the stock of forest biomass in undisturbed evergreen forest stratum against similar estimates in secondary disturbed forests with farmlands.

5. Are there any plans to continue this work?

Yes. This work is continuing and is being replicated elsewhere. In fact after the completion of my MSc in Remote Sensing and GIS at CRASTEL-LF in Morocco, ACDEF Cameroon and the Department of Forestry at the University of Dschang (Cameroon) entered into a strategic partnership whereby I hold the position of Remote Sensing and GIS Laboratory Manager at the Department of Forestry. In addition to training the future generations of Cameroonian forests and wildlife managers in remote sensing and GIS, I am currently leading the project on land use change assessment and monitoring in South West Cameroon. This project is built around the same methodology as the one used in the Dja reserve and has the added benefits of expanding on community perceptions of land use change assessment. With student trainees and the local communities, this project which started about only 2 months ago will establish a baseline data for the assessment of land use change in this important region subjected to conflicting land use practices including the looming development of large scale palm oil plantations which, if not adequately designed, will destroy critical buffer zones around the main protected areas in this region and the vital wildlife migratory corridors that connect them. This interesting project will be submitted shortly to the Rufford Small Grants Foundation as a second RSG.

6. How do you plan to share the results of your work with others?

The result of this work was written as an MSc thesis in Remote Sensing and GIS at CRASTE-LF in Morocco and a copy of the dissertation is available in the school library there (in French). Also, because part of this work was funded through a fellowship from the International Tropical Timber Organisation (ITTO), a copy of the dissertation was submitted to ITTO and might be posted online. In addition to this report being posted on the Rufford website, I envisage to write a paper for publication in a peer reviewed journal to be identified.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

The RSG was used for a period of 11 months from January 2010 when it was effectively disbursed to November 2010 when the fieldwork was completed. This is slightly shorter than the actual length of the project which started in September 2009 with the ITTO funding and extended to March 2011 with the MSc dissertation and defence in Morocco.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Computer	700	533.92	166.08	
Personal Digital Assistant	600	520.00	80.00	
Bluetooth GPS receiver	160	80.00	80.00	
Protective case	60	28.66	31.14	
SD Card	40	20.00	20.00	
Motorbike	733	888.74	-155.74	The Chinese model budgeted for was not available in the local market
Digital Camera	200	175.64	24.33	
Travels to project site	450	508.82	-58.82	
General labour for fieldwork	1000	1,248.30	-248.30	Increase due to work during the raining season
Running cost of motorbike	320	237.45	82.55	
Stipend community assistant	1200	1,180.46	19.54	
GIS Field Supervisor	267	339.21	-72.21	
Community Specialist	267	227.95	39.05	
Total	**5,997**	**5,989.39**	**+7.61**	

The exchange rate used was slightly less favourable than budgeted and stood at £1 = FCFA737.00

9. Looking ahead, what do you feel are the important next steps?

The whole idea of trade in forest carbon through reduced emissions from deforestation and forest degradation is relatively new in Cameroon. As a consequence, people are more interested in the final dollar value of the scheme rather than in the process leading to it. Furthermore, for the local communities to who this new concept has been introduced with little to know explanation, the local understanding is that if the any forest is left standing the community will receive financial payment in response. While this can be a short-term incentive to reduce the rate of forest degradation especially through shifting agriculture, the disenchantment that can also ensue when the communities finally realise that no direct payment is forthcoming can be a complete deterrent to any long term intervention in the region.
The next steps in this process can be outlined as follow:

- Increase awareness on the international trade in the carbon from standing forests focusing on the main challenges and opportunities, and perhaps more importantly, on the key steps towards establishing viable and long-term schemes. The target audience in this case should stretch from government officials most of whom have at best distorted knowledge of the scheme to the local communities for whom expectations are being unduly raised.
- Continue to work on the methodology to involve the communities not only in the assessment of the carbon stock, but also in regular and long-term monitoring with limited external technical support. As indicated in section 5, ACDEF Cameroon and the Department of Forestry at the University of Dschang are currently working on a similar project in SW Cameroon and will continue to refine the methodology.

- Carry out other pilot case studies in other parts of the country under different ecological and socio-economic settings. From this perspective, the involvement of the forestry students from the University of Dschang would be a worthwhile investment as they are the next generations of Cameroonian foresters and decision-makers.

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

The RSGF logo has not yet been used in any materials produced, but the support was gratefully acknowledged in the MSc thesis.

11. Any other comments?

We are grateful to RSG for the support and will be postulating in the nearest future for the second round to consolidate and replicate this work. Perhaps I would recommend to the management of RSG to invest in similar initiatives in other parts of the world as this appears to be the way forward in protecting the world biodiversity and critical ecosystems.