

# Darwin Initiative – Final Report

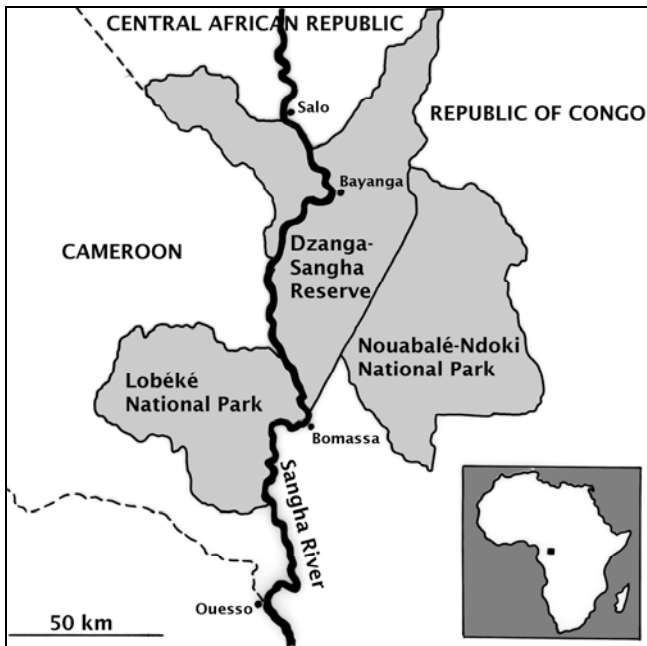
## Darwin project information

Project Reference	15-011
Project Title	Building capacity for forest inventory in the Republic of Congo.
Host country(ies)	Republic of Congo
UK Contract Holder Institution	Royal Botanic Garden Edinburgh
Host Country Partner Institution(s)	Institut Développement Rural, Marien Ngouabi University (IDR) ; Wildlife Conservation Society-Congo (WCS-Congo) ; National Herbarium, Centre d'Etudes sur les Ressources Végétales (CERVE) and Centre National d'Inventaire et d'Aménagements des Ressources Forestières et Fauniques.
Darwin Grant Value	£184,500
Start/End dates of Project	1 June 2006 - 31 March 2009.
Project Leader Name	David Harris
Project Website	<a href="http://dps.plants.ox.ac.uk/bol/congo">http://dps.plants.ox.ac.uk/bol/congo</a>
Report Author(s) and date	Harris, D.J., Moutsamboté, J.-M. & Wortley, A.H. 30 June 2009

## 1 Project Background

The original discussions between Moutsamboté and Harris which formed the basis for this project started in 1992. At that time it was obvious to both of us that there was a significant lack of capacity to identify plants in northern Congo and the Sangha Tri-national area which was hampering conservation effort in the region.

The problem which the project set out to solve was the lack of capacity to identify plants in northern Congo. The project concentrated on improving this capacity by providing training, literature and reference herbarium specimens. The main achievements were an identification manual covering 522 species; successful training courses; permanent plots and ten thousand herbarium specimens.



Map. The Sangha Trinational Landscape including its three constituent protected areas

## 2 Project support to the Convention on Biological Diversity (CBD)

By providing capacity for Congo to conserve and manage plant biodiversity in a sustainable manner, this project supported the country in achieving the objectives of the CBD. This project addressed the following articles: 6 (General Measures for Conservation and Sustainable Use), 7 (Identification and Monitoring); 8 (In-situ Conservation); 10 (Sustainable Use of Components of Biological Diversity); 12 (Research and Training); 17 (Exchange of Information); 18 (Technical and Scientific Cooperation). It also involved the following cross cutting themes: Ecosystem Approach; Global Strategy for Plant Conservation; Global Taxonomy Initiative; Identification, Monitoring, Indicators and Assessments. The content of the project is under the thematic programme of Forest Biodiversity.

The host country partners of Marien Ngouabi University; the National Herbarium and WCS-Congo all increased their capacity to help the Republic of Congo meet its commitment to the CBD. This increased capacity can be seen in the number of personnel receiving training, the publications which are required for identification and monitoring; the material and reference specimens collected during the project and the establishment of 30 one hectare permanent forest plots.

The project partners (Dr Kami and Dr Mokoko) kept the CBD focal point in Congo informed of the project and made available the appropriate reports.

The project was not involved in supporting other biological conventions such as CMS and CITES.

## 3 Project Partnerships

At the beginning of the project the main partnership with the RBGE were with Marien Ngouabi University and WCS-Congo. A few other institutions were written into the project proposal to allow for the development of new partnerships. The main new partnership which developed from this project was that with the National Herbarium at CERVE. The partnerships with Marien Ngouabi University and WCS-Congo have continued to develop and strengthen. The partnerships between these institutions within Congo have also been strengthened by joint activities with and without the direct involvement of the UK partner.

One of the main reasons for the success of the project was that the partnerships were based on clearly defined needs from the host country. All the partners who worked on the project were involved in project planning and decision making. This was done by discussions with the partners in Congo and followed up by emails afterwards. The direction of the project depended heavily on advice from the partnership with Marien Ngouabi University from the earliest conception of the project.

A draft MoU was proposed at the beginning of the project but not signed due to other administrative priorities. A MoU was considered a good idea by partners.

One of the strengths with the partnerships has been the trust and understanding built up over the time of the project. This has required considerable flexibility and investment in time spent listening and considering each partners position. One of the greatest challenges to this project has been language. This was overcome, to some degree, by paying for language training for both UK and Congolese staff, and for paying for translation of outputs. Cheaper solutions to the language problems included agreeing to protocols such that emails would be written in the language in which a sender was most fluent if the recipient could read that language. One important lesson for other Darwin Initiative projects with countries whose main language is not English is for proposals to have a realistic budget for language training and translation.

We have had very productive discussions with William Hawthorne (University of Oxford), Martin Cheek (RBG Kew), Gretchen Walters (Missouri Botanical Garden) and the late Chris Wilks (WCS, Gabon). We have received excellent advice, models to follow and ideas from these individuals. Denis Filer (University of Oxford) made available BRAHMS software and provided support and advice. Rosemary Wise (University of Oxford) made all the illustrations in Sangha Trees. Working with such a talented and experienced artist greatly contributed to the success of this book and she brought several characters to the attention of the authors through her drawings. We have also benefited from advice and discussion with Darwin Projects from other continents at the Royal Botanic Garden Edinburgh. Projects in Vietnam, Laos, Peru, Nepal and Chile have all provided ideas and models to follow. Other regional and international partners have received outputs from this project, these include, CARPE, National Herbarium of Gabon, the National Herbarium in Cameroon, WWF Central Africa.

The thematic reviews available on the DI website have been extremely useful in our assessment of how our project fitted into the broader global context.

## **4 Project Achievements**

### **4.1 Impact: achievement of positive impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits**

The goal of this DI projects is “to draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources”. This project has contributed to this goal by providing the means for botanical inventories which are a pre-requisite for any form of management plan for sustainable use or conservation strategy.

The individuals and institutions in Congo are now in a much better position to perform Conservation Assessments, measure and monitor species against the CBD 2010 targets and to contribute to conservation strategies and management plans which will reduce biodiversity loss through protected area and sustainable use.

The main element of biodiversity which this project will contribute to conserving is trees of the Congo Basin. However because of the key roles that trees provide in ecosystem functions, the logging industry and habitat structure, a much wider spectrum of biodiversity of the region will be protected if the threats to the trees are reduced.

The main social impact of the project has been to show local communities in northern Congo, that plant biodiversity concerns Congolese biologists and the government. Continuing to integrating these biologists into the international scientific community was reported as an important measure of success of this project at the Legacy work shop.

#### **4.2 Outcomes: achievement of the project purpose and outcomes**

The purpose of this project was to strengthen capacity to assess, monitor, conserve and manage forest biodiversity in the northern Republic of Congo and surrounding area. At the global, institutional and individual level, there has clearly been an increase in capacity to carry out these activities in northern Congo

This has been done by training staff for forest inventory and conservation: and allowing biologists access to the international scientific community through knowledge exchange. The project concentrated on working with some of the existing trainers in Congo and facilitating the access to recent advances. This was done by working together on shared research projects, and teaching together on courses. In addition, the relatively low-cost initiative of buying modern systematic university text books in French and giving them to all the senior botanists in Congo could be seen to having an influence. At postgraduate level one Congolese student is receiving training at MSc level in UK. At the more junior level, biologists with degrees received most of the direct training in Congo. The main achievement from the training is that the level of botanical skill is significantly higher than before the project started.

The training of staff alone would not have been enough to increase capacity substantially. What was also needed to achieve this purpose is the tools to allow the trained personnel to take forward inventory without significant outside help. This was done by producing an identification and training illustrated manual to the 522 tree species occurring in the area. This resource is unusual in several ways. Firstly it is aimed at making identifications in the absence of flowers and fruits which is typically what is needed during inventory work. Secondly the manual is bilingual and aimed at encouraging users to add their own data. It is designed to be photocopied, printed and is available as a pdf for free download on the internet. In addition all the data of the herbarium specimens collected on this project are available at the project website. This includes some 5000 digital photographs taken of the plants before they were made into herbarium specimens. This, database of digital images in effect is the beginning of a virtual herbarium, which is a powerful new tool to help people to identify plants. The ten thousand herbarium specimens collected during the period of this project are a huge data set which will be available for reference for many years to come in herbaria.

The data on the species collected contribute to the global understanding of species distributions and will facilitate conservation assessments of species. The data gathered from the 30 one-hectare permanent plots has been provided to the Congolese government for assessment of the amount of carbon held by forests of northern Congo. Reports produced by this project are being used in support of the application for the Sangha Trinational area to become a World Heritage Site.

The main outcome from this project can be described as a change in access to these assets which are required for botanical inventory. Most of these assets were created by this project and access to other assets was facilitated by the training.

#### **4.3 Outputs (and activities)**

The project achieved the outputs as laid out in the logical framework. In some cases, such as the number of people to be trained, the number of specimens collected and the number of digital images collected, the outputs were exceeded.

In addition to the reporting of the outputs in Annex 1 considerable effort has been made to ensure that the outputs are made available in the most appropriate manner to support the purpose of this project. An example of strategic dissemination of the book Sangha Trees is given under section 5 of this report.

The main problem encountered by the project was the difficulties in getting the MSc candidate from Congo up to the required level of English. This was resolved by asking the DI for permission to postpone the start of the MSc and for the project to rearrange other activities to minimise the amount of money which was requested to be moved from one year to the next.

#### **4.4 Project standard measures and publications**

It is still too early to fully assess the impact of Sangha Trees on botany of central Africa, however, the first two reviews are favourable and they have both mentioned some of the novelties in the presentation of the information.

In addition to the publications listed in Annex 5 other publications are in preparation which are based on data collected during this project. The DI and this project will be acknowledged in these publications.

#### **4.5 Technical and Scientific achievements and co-operation**

The project has contributed to technical and scientific cooperation. The importance of the fundamental nature of the biological research carried out for this project should not be underestimated. The 522 species character descriptions in Sangha Trees were created by the authors Harris & Wortley by direct examination of the living trees and of herbarium specimens. About twenty species are not yet fully identified and may represent new species. Other species are described and illustrated for the first time since they were described in the first half of the twentieth century. Several species are illustrated for the first time ever.

In the paper "A preliminary checklist to the trees and shrubs of Nouable Ndoki National Park and Kabo UFA" the authors Harris, Wortley, Moutsamboté and Kami report 40 new records for the Republic of Congo. Each of these new records is supported by fully documented herbarium specimens.

Harris, Wortley and Moutsamboté between them wrote two papers describing the writing of "Sangha Trees" and the para-taxonomy teaching courses. All three of these papers were subject to peer review.

#### **4.6 Capacity building**

The capacity for the host country partners has been increased for further biodiversity in a series of ways.

The people who were involved in the project have all benefited from transfer of knowledge and ability to carry out botanical inventory. The evidence of this is the re-writing of undergraduate lectures for the University in Brazzaville after trainers were given new textbooks; the increased ability of trainees to identify plants, as shown on herbarium label determinations. One of the most poignant examples of capacity building came in the second year of the project when Moutsamboté and Harris were due to start the second course on inventory and identification. Due to travel difficulties they were not able to reach the training site in northern Congo for two days. When they arrived on the third day, they found that the trainees from the previous year had shown the new trainees how to collect specimens, record the appropriate data and start the identification process.

The materials made available to the partners in Congo have increased their capacity to carry out botanical inventory. These have included materials produced by the project, bought by the project or recommended by the project. The project has supported the building up of two nuclei of materials and reference works in northern Congo. Evidence of this is in the list of botanical reference works in the library at the headquarters of Nouable Ndoki National Park in Bomassa.

Capacity has been increased by strengthening networks between partners in the host country and the international scientific community. Evidence of this was a joint botanical inventory mission between two of the project partners in the second year, without the presence of the UK lead partner; and the successful *ibid* to the Sud Expertes Plantes programme run by the French government.

The profile of institutions in Congo involved in botanical inventory were raised by the printing of posters, publishing of newspaper articles and the preparation of a documentary film.

The UK lead institution has built its own capacity to by an effective project partner. This is through the development of project management skills, training of staff, developing taxonomic tools and building up reference collections.

#### **4.7 Sustainability and Legacy**

The training of future trainers is likely to have an enduring effect as each generation passes on the knowledge and skills they have gained. The taxonomic publications will probably be used for the next twenty to forty years. Herbarium specimens collected during this project will last for hundreds of years.

Project staff have been employed by partners doing in northern Congo. Project resources have been handed over to project partners to continue to carry out botanical inventory in northern Congo.

Project partners plan to keep in touch by continuing to carry out botanical inventories in northern Congo

### **5 Lessons learned, dissemination and communication**

The key lessons from this project are:

1. The success of the project is based on designing the project to fulfil needs experienced by host country partners.
2. Advice from in country partners before and during the project is crucial to the delivery of the project.
3. Language training and translation costs are crucial and should be budgeted for in projects based in areas where languages other than English are important.

The target audience for most of the project achievements is graduate biologists in Congo. This has been disseminated by a variety of digital and hardcopy means. The reports for the decision makers in Government in the Republic of Congo were disseminated by the project partners. Outside Congo, the target audience has been post-graduate biologists. Dissemination has included a range of methods from published hard copy, email attachment, presentation at conferences, informal networks of collaborators and availability on the project website.

Considerable effort has been made to ensure that the outputs are made available in the most appropriate manner to support the purpose of this project. For example, the book *Sangha Trees* has been made available as a downloadable pdf file, is available to purchase from Amazon the online bookseller, is available to buy from the RBGE website and a network of colleagues in Congo, Belgium, France and the UK have been asked to keep copies to give to appropriate visitors from countries in the region. Review copies were sent to 3 journals and two reviews have already been seen. A website specially dedicated to the book is being developed and when stocks run low, a "print on demand" facility will be arranged. This extra effort is aimed at getting the book available to the people who need it now and after the project is finished.

#### **5.1 Darwin identity**

Efforts were made to publicise the Darwin Initiative in press releases, interviews with the media, in conference presentations and at talks and seminars. The DI logo was used on all printed outputs of the projects, on all presentations and websites.

The DI support was recognised as a distinct project with a clear identity. When there was overlap in acknowledgements due to leveraged funding the Darwin Initiative was clearly identified as major component.

There is only probably only a limited understanding of the Darwin Initiative project in the Republic of Congo outside the partner institutions. The senior staff and those directly affected by training in the partner institutions are probably the most familiar with the DI. It was noted that internationally, outside Congo and the UK, there was good recognition of the DI at presentations and in discussions.

## 6 Monitoring and evaluation

The main change in the logframe during the course of the project was the removal of the undergraduate training with permission from the Darwin Secretariat. During the first year of the project it became clear that the most appropriate level of training was at graduate level and above. In addition the DI reviewer suggested tightening the wording of the purpose and using the three items under the purpose in the original logframe as purpose level indicators. These three items are presented in the table below which is taken from the logframe in the original proposal

### **Purpose**

1. To train staff for forest inventory and conservation.
2. To develop novel ways of organising and presenting botanical data.
3. To provide crucial data & advice for management.

The logframe was used as a project management tool in UK. It was used by the two members of staff in the UK to plan, modify their activities, to ensure outputs were delivered at the right time and to report. Baseline data was collected on this project but has not yet been remeasured. That will happen in the next year. The baseline data was the name and size of ten thousand trees in permanent plots. The logframe indicators developed during the project design were extremely useful. The project leader had a bit of trouble grasping the appropriate level for certain parts but he was helped by project manager (Alexandra Wortley) and the reviewer. The worked example in the DI Application Form was quite useful but some obligatory training by Project leaders might be useful. Perhaps this could be done as a web-based tutorial. The logframe was very useful in general including feedback to partners and stakeholders.

Apart from the DI review process, and the RBGE internal staff appraisal there has been no formal evaluation of the work. The review process provided by DI was of a very high standard and was extremely helpful to the project leader in keeping this first Darwin Initiative project on track.

### **6.1 Actions taken in response to annual report reviews**

Outstanding issues in the reviews of annual reports have all been responded to in subsequent half year and annual reports.

Reviews have been discussed with project partners and other collaborators.

## 7 Finance and administration

### 7.1 Project expenditure

The following table shows expenditure against the budget in the original grant application.

Item	Budget (original)	Expenditure	Balance
Staff costs (Dr Wortley)			
Rent, rates, heating, lighting, cleaning			
Postage, telephone, stationary			
Travel and subsistence			
Printing			
Conferences, seminars etc			
Capital items			
Other Costs (shipping, MSC course fees & materials, bank charges )			
<b>Total</b>			

The table below shows the revised budget after changes authorised by Darwin Secretariat on 10 September 2007 and 20 March 2008, see Annex 7 for copies of authorisation.

Item	Budget (revised)	Expenditure	Balance
Salary costs (Dr Wortley)			
Rent, rates, heating, lighting, cleaning			
Postage, telephone, stationary			
Travel and subsistence			
Printing			
Conferences, seminars etc			
Capital items			
Other Costs (shipping, MSC course fees & materials, bank charges )			
<b>Total</b>			

Capital items were herbarium supplies for mounting specimens, GPS handset, hand lenses, laptop computer, printers and cartridges, memory disks, digital camera, secateurs, clipper poles, specimen drying equipment, binoculars, books.

### 7.2 Additional funds or in-kind contributions secured

Extra funds, over and above those confirmed in the original proposa were £15,000 from the Sibbald Trust at the RBGE to employ Dr Wortley on the production of the book Sangha Trees; c.£15,000 from Sud Expertes Plantes for the National Herbarium, Marien Ngouabi University and RBGE to carry out an inventory of Lac Télé Community Reserve in northern Congo; £ 2000 from Synthesys for a visit to the National Botanic Garden of Belgium to identify Rubiaceae herbarium specimens.



Extra in-kind contributions of staff time were contributed by RBGE and WCS-Congo. The RBGE staff time (Dr Harris) was to write the book, Sangha Trees and WCS-Congo staff time was spent in managing the establishment of the permanent plots.

### **7.3 Value of DI funding**

The DI funding allowed us to provide the means to carry out botanical inventories in northern Republic of Congo and to build strong relationships between institutions. Before the start of this project there was a severe lack of information, means of identification, materials and reference herbarium specimens; and only a small group of people in the world who could identify plant species from northern Congo. Due to this project those impediments have been significantly reduced. Biologists in Congo can now carry out much better botanical inventories which are necessary to support management plans for sustainable use of the forests of this region. Without DI funding we would not have been able to achieve this and we would not have been able to leverage the additional funds.

## Annex 1 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Progress and Achievements June 2006 - March 2009	Actions required/planned for next period
<p><b>Goal:</b> To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</p> <ul style="list-style-type: none"> <li>• The conservation of biological diversity,</li> <li>• The sustainable use of its components, and</li> <li>• The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</li> </ul>		(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)	(do not fill not applicable)
<p><b>Purpose</b> <i>To strengthen capacity to assess, monitor, conserve and manage forest biodiversity in the northern Republic of Congo and surrounding area.</i></p>	<p>To train staff for forest inventory and conservation: at least one trained plant taxonomist (MSc), eight para-taxonomists and knowledge transfer to senior scientists.</p> <p>To develop novel ways of organising and presenting botanical data: virtual herbarium developed, distributed and made available online, personnel trained to maintain it.</p> <p>To provide crucial data and advice for management: papers, reports and recommendations on sustainable forest management.</p>	<p>The UK project leader carried out research and training alongside senior botanists in Congo and knowledge was transferred in both directions. One Congolese biologist will complete an MSc in UK in Sept. 2009. 17 biologists (almost all of them graduates) were trained as parataxonomists.</p> <p>New ways of presenting training and identification manuals, virtual herbaria and databases of images were generated. These were distributed in a variety of media.</p> <p>Large quantities of data of species abundance and distribution were gathered and made available to decision makers in the forms of reports.</p>	
<p><b>Output 1.</b> Checklist of tree species.</p>	<p>Checklist made available in electronic form.</p>	<p>Checklist published, distributed (as agreed with DI copies made available electronically rather than printed). Indicator after modification appear to be appropriate as several recipients asked specifically for electronic copies. 20 hard copies were printed and distributed.</p>	
<p><b>Output 2.</b> Species checklists for two protected areas.</p>	<p>Two manuscripts drafted Year 2; published in peer-reviewed journal Year 3; made available in electronic form.</p>	<p>Two protected area species lists were published. Hard copies and electronic copies were distributed. The two lists were combined in one paper and have been submitted to the Edinburgh Journal of Botany for peer review. The indicator seems to be appropriate because one partner has taken the two published lists (not peer-reviewed) and used them as supporting documentation for World Heritage Status for 3 National Parks.</p>	

		Another partner expressed preference for the combined list to be submitted for peer-review publication.
<b>Output 3.</b> 1 Ha permanent plots.	Thirty plots established by end of Year 2.	The plots were all established at the end of Year 2. Over 10,000 voucher specimens were collected from the trees. All these voucher specimens have been identified by Harris & Wortley. This indicator was appropriate because it provided a large number of herbarium specimens, it provided data on tree species abundance necessary for species conservation assessments and is part of the long term legacy of this project. Carbon sequestration studies were not written into the original project proposal but these plots will provide data which will be very useful for any analysis of this issue for conservation.
<b>Output 4</b> Herbarium collection.	4,000 specimens representing 500 species by end of Year 3.	Over 10,000 specimens were collected representing more than 500 species. This indicator is appropriate because it is necessary from such a botanically poorly know area to have voucher specimens. In particular the value of the species identifications in the permanent plots is much higher as they are supported by a voucher specimen. In addition the herbarium specimens are part of the long-term legacy of this project.
<b>Output 5.</b> Virtual herbarium.	5,000 images of 500 species by end of Year 3	Over 5,000 digital images of plants, each supported by herbarium vouchers have been captured. These images have been made available on the project website and on a boxed DVD set. This is a new form of product which is being tried around the world as a way of delivering identification tools to people with access to a computer. Observations and feedback, so far from project partners and the target audience is that this is a very appropriate indicator.
<b>Output 6.</b> Tree identification and training manual,	Drafted Year 1; reviewed Year 2; published Year 3; 300 copies distributed	“Sangha Trees, An illustrated Identification Manual” was published in 2008. This covers the 522 tree species known to occur in the Sangha Tri-national area of Cameroon, CAR and Congo. The book was designed to be more appropriate than any existing literature for botanical inventory. Feedback has been generally positive, including two published reviews. One of the partners in Congo would have preferred the book to have been restricted to tree in Congo. Two other colleagues expressed a desire for more illustrations of fruit and flowers in the book although it was explicitly designed for inventory when fruits and flowers are rarely encountered. Keys were not provided in the book because it was not possible to write useful dichotomous keys to so many species using vegetative characters. It is appropriate to produce a computer based multi-access key and this is being developed in 2009 at RBGE.

<p><b>Output 7.</b> Papers and reports on forest management and conservation.</p>	<p>At least two peer-reviewed papers and four reports published, sent to managers and policy-makers by end of Year 3</p>	<p>Three papers have already been submitted for peer review. Four reports have been sent to managers and policy makers. Project partners have indicated that these papers and reports were appropriate.</p>
<p><b>Output 8.</b> Publicity material.</p>	<p>200 copies of two posters, three press articles, two radio/TV broadcasts.</p>	<p>A poster was presented at two international conferences. 50 copies each of 4 different posters were printed and distributed to partners. Three press articles were written in the UK. One radio interview was conducted in UK. A film documentary (c. 15 minutes long), a TV news item and a press article are being prepared in Congo. The posters were appreciated by project partners, one of whom commented favourably on the quality of the French translation. Each press release and interview included reference to the Darwin Initiative. The publicity in Congo was produced in French.</p>

## Annex 2 Project's final logframe, including criteria and indicators

Project Summary	Measurable Indicators	Means of Verification	Important Assumptions
<p><b>Goal:</b> <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve:</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.</i></p>			
<p><b>Purpose.</b></p> <p><i>To strengthen capacity to assess, monitor, conserve and manage forest biodiversity in the northern Republic of Congo and surrounding area.</i></p>	<p>To train staff for forest inventory and conservation: at least one trained plant taxonomist (MSc), eight para-taxonomists and knowledge transfer to senior scientists.</p> <p>To develop novel ways of organising and presenting botanical data: virtual herbarium developed, distributed and made available online, personnel trained to maintain it.</p> <p>To provide crucial data and advice for management: papers, reports and recommendations on sustainable forest management.</p>	<p>Training reports, payroll records, university exam records, reports.</p> <p>Distribution list and website.</p> <p>Copies of papers, reports and recommendations with distribution lists.</p>	<p>Continued support for conservation and sustainable use of forest resources by Congo government, NGOs and other stakeholders.</p>
<p><b>Output 1.</b> Checklist of tree species.</p>	<p>Checklist made available in electronic form.</p>	<p>Copy submitted with annual report.</p>	
<p><b>Output 2.</b> Species checklists for two protected areas.</p>	<p>Two manuscripts drafted Year 2; published in peer-reviewed journal Year 3; made available in electronic form.</p>	<p>Drafts and copies of papers sent with annual reports.</p>	
<p><b>Output 3.</b> 1 Ha permanent plots.</p>	<p>Thirty plots established by end of Year 2.</p>	<p>Plot data sent with annual reports.</p>	

<b>Output 4.</b> Herbarium collections.	4,000 specimens representing 500 species by end of Year 3.	Specimen lists sent with annual reports.	
<b>Output 5.</b> Virtual herbarium.	5,000 images of 500 species by end of Year 3.	Image lists and CD sent with annual reports.	Partners continue to have access to electronic media.
<b>Output 6.</b> Tree identification and training manual.	Drafted Year 1; reviewed Year 2; published Year 3; 300 copies distributed.	Copy of manual and distribution list sent with reports.	
<b>Output 7.</b> Papers and reports on forest management and conservation.	At least two peer-reviewed papers and four reports published, sent to managers and policy-makers by end of Year 3.	Copies of manuscripts, reviewers' comments and reports sent with final report.	Recommendations incorporated into management. Management plans continue to be prepared.
<b>Output 8.</b> Publicity material.	200 copies of two posters, three press articles, two radio/TV broadcasts.	Copies of all outputs sent with annual reports.	Conservation messages understood and acted upon.

## Annex 3 Project contribution to Articles under the CBD

### Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
7. Identification and Monitoring	30	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
12. Research and Training	30	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
17. Exchange of Information	30	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
Other Contribution	10	Article 6, 9, 10, 13,
Total %	100%	Check % = total 100

## Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
<b>Training Measures</b>		
2	MSc in Biodiversity and Taxonomy of Plants, University of Edinburgh	1 (due September 2009, Congolese)
4c	Postgraduates trained in botanical inventory and identification	17 (16 Congolese, 1 from Central African Republic).
4d	Number of training weeks for postgraduate students	14.5
6a	Tuition in Academic English	1 (Congolese)
6b	Tuition in Academic English, weeks	34
7	Reports based on project training courses; 4 different posters on trees (total of 200 copies).	2
<b>Research Measures</b>		
8	Number of weeks spent by UK project staff on project work in host country(s)	34.5
9	Reports produced on species conservation assessments and including habitat information. (Data gathered from this project went into several other reports on forestry management submitted by partners).	2
10	1 Identification and training manual for 522 species of tree 1 published DVD set with 5800 digital images of named plants	2
11a	Number of papers accepted for publication in peer reviewed conference proceedings	2
12a	One database of specimens, species and genera containing more than 10,000 specimens and 2000 species with 6000 images, making up a virtual herbarium.	1
13a	Herbarium collections totalling 10,000 sheets contributed to herbaria in Brazzaville (IEC) and Bomassa	2
13b	Enhanced collection in herbarium in Brazzaville	1
<b>Dissemination Measures</b>		
14a	1 legacy workshop, 2 dissemination seminars	3
14b	Number of conferences: AETFAT congress 2007; Systematics Association Conference 2007	2
15a	Publicity article in Congolese press (in preparation by journalist - interviews already carried out)	1
15c	1 national press release, 1 article in Current Biology	2



<b>Code</b>	<b>Description</b>	<b>Totals (plus additional detail as required)</b>
15d	2 articles in local press in UK (Edinburgh Evening News, Herald and Post)	2
18a	1 TV programmes in Congo (in preparation, filming completed)	1
19b	Radio Scotland interview	1
<b>Physical Measures</b>		
20	Herbarium supplies for mounting specimens, GPS handset, hand lenses, laptop computer, printers and cartridges, memory disks, digital camera, secateurs, clipper poles, specimen drying equipment, binoculars, tree tags, books.	£12000
22	Number of permanent field plots established	30
23	Contributions in-kind: rent, rates, heating and overheads, £40,000; office costs £10,000; travel and subsistence £35,000; insurance £2000; national park entry fees £3,000; salaries £75,000. Grant from Sibbald Trust £15,000; Synthesys grant £15,000	£195,000
<b>Other Measures used by the project and not currently including in DI standard measures</b>		
	Website to provide access to virtual herbarium with over 10,000 specimen records and 6,000 images.	1
	Book reviews of project outputs	2

## Annex 5 Publications

Type *	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
Report * Annex 10	Liste des arbres du Parc National de Nouabalé-Ndoki, République du Congo. Authors: David J. Harris, Alexandra H. Wortley, Jean-Marie Moutsamboté, Emile Kami & Connie J. Clark. 2009	Publisher: Royal Botanic Garden Edinburgh.	David Harris, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, UK  Available as a download from <a href="http://dps.plants.ox.ac.uk/bol/congo">http://dps.plants.ox.ac.uk/bol/congo</a>	Free
Report * Annex 11	Liste des arbres de l'UFA de Kabo, République du Congo. Authors: David J. Harris, Alexandra H. Wortley, Jean-Marie Moutsamboté, Emile Kami & Connie J. Clark. 2009	Publisher: Royal Botanic Garden Edinburgh.	David Harris, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, UK  Available as a download from <a href="http://dps.plants.ox.ac.uk/bol/congo">http://dps.plants.ox.ac.uk/bol/congo</a>	Free
Book * Annex 13	Sangha Trees, Harris, Authors: David J. Harris, Alexandra H. Wortley. 2008.	Publisher: Royal Botanic Garden Edinburgh.	David Harris, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, UK  Available as a download from <a href="http://dps.plants.ox.ac.uk/bol/congo">http://dps.plants.ox.ac.uk/bol/congo</a>	Hard copies £25, pdf free.
DVD set * Annex 14	Plantes d'Afrique Centrale – la Collection de Référence en Images. Authors David J. Harris, Jean-Marie Moutsamboté, Kate Armstrong, Emile Kami, Jean-Claude Mouandza, Raoul Niangadouma, Gretchen Walters & Alexandra H. Wortley	Publisher Royal Botanic Garden Edinburgh	David Harris, Royal Botanic Garden Edinburgh, 20A Inverleith Row, Edinburgh, EH3 5LR, UK	£10

## Annex 6 Darwin Contacts

<b>Ref No</b>	15-011
<b>Project Title</b>	Building capacity for forest inventory in the Republic of Congo.
<b>UK Leader Details</b>	
Name	Dr. D. Harris
Role within Darwin Project	Project leader, PI and taxonomist.
Address	Royal Botanic Garden 20A Inverleith Row Edinburgh EH3 5LR, UK
Phone	
Fax	
Email	
<b>Other UK Contact (if relevant)</b>	
Name	Dr A. Wortley
Role within Darwin Project	Project manager and taxonomist.
Address	Royal Botanic Garden 20A Inverleith Row Edinburgh EH3 5LR, UK
Phone	
Fax	
Email	
<b>Partner 1</b>	
Name	Dr J. Mokoko
Organisation	Wildlife Conservation Society Congo
Role within Darwin Project	Main contact with government and supporting project through WCS management structure.
Address	Wildlife Conservation Society Congo, BP 14537, Brazzaville, Republic of Congo
Email	
<b>Partner 2</b>	
Name	Dr J.-M. Moutsamboté
Organisation	Institut Développement Rural, Marien Ngouabi University
Role within Darwin Project	Senior trainer, researcher, taxonomist.
Address	Institut Développement Rural, Marien Ngouabi University, BP 13502, Brazzaville, Republic of Congo.
Email	

## **Annex 7 Correspondence from Darwin Initiative Secretariat agreeing changes to project timetable and budgets**

A. From Margaret Okot, Darwin Secretariat, 10 September 2007, agreeing to timetable and budget changes as a result of delay to student achieving required level of English language proficiency to take up a place on the Edinburgh University MSc in Biodiversity and Taxonomy of Plants:

B. From Lisa Spencer, Darwin Secretariat, 20 March 2008, agreeing to viring of funds between budget-lines:

C. From Lisa Spencer, Darwin Secretariat, 28 March 2008, agreeing to sale of training manual:

## Annex 8 Distribution list of Sangha Trees

Name	Organisation	Date	# copies	Payment?	Running total
Stephen Blackmore	RBGE	23/07/08	1	-	1
Mary Gibby	RBGE	23/07/08	1	-	2
David Rae	RBGE	23/07/08	1	-	3
Alisdair McNab	RBGE	23/07/08	1	-	4
Library	RBGE	23/07/08	1	-	5
British Library	British Library	23/07/08	1	-	6
National Library of Scotland	National Library of Scotland	23/07/08	1	-	7
Bodleian Library	University of Oxford	23/07/08	1	-	8
University Library	University of Cambridge	23/07/08	1	-	9
Library	Trinity College Dublin	23/07/08	1	-	10
National Library of Wales	National Library of Wales	23/07/08	1	-	11
Natacha Frachon	RBGE	24/07/08	1	-	12
Rosemary Wise	University of Oxford	24/07/08	1	-	13
William Hawthorne	University of Oxford	24/07/08	1	-	14
David Harris	RBGE	24/07/08	2	-	16
Alex Wortley	RBGE	24/07/08	3	-	19
Xinjie Du	RBGE	24/07/08	1	-	20
Mireille Breuer-Ndoundou Hockemba	RBGE	12/09/08	1	-	21
Robert Scotland	University of Oxford	24/07/08	1	-	22
Denis Filer	University of Oxford	24/07/08	1	-	23
Ian Hedge	RBGE/Sibbald Trust	24/07/08	1	-	24
David Middleton	RBGE/EJB	24/07/08	1	-	25
Peter Raven	Missouri Botanical Garden	24/07/08	1	-	26
Hong De-Yuan	IBCAS	24/07/08	1	-	27
Barbara Mackinder	RBGE	24/07/08	1	-	28
David Simpson	RBG Kew/Kew Bulletin	24/07/08	1	-	29
Elmar Robbrecht	National Botanic Garden of Belgium/Systematics and Geography of Plants	24/07/08	1	-	30
Elmar Robbrecht	National Botanic Garden of Belgium (personal copy)	24/07/08	1	-	31
Jefferson Hall	STRI, Panama	19/08/08 (DJH)	1	-	32
John Poulsen	University of Florida	24/07/08	1	-	33
Connie Clark	University of Florida	24/07/08	1	-	34
Hamer Dodds	-	24/07/08	1	-	35
Jan Wieringa	Wageningen UR	24/07/08	1	-	36
Marc Sosef	Wageningen UR	24/07/08	1	-	37

Chris Wilks	WCS Gabon	24/07/08	1	-	38
Patrick	WCS Congo	12/08/08	1	-	39
Lac Tele Project	WCS Congo	12/08/08	1 (via Patrick)	-	40
Jean-Marie Moutsamboté	University of Brazzaville	12/08/08	1 (via Patrick)	-	41
Goualougo Project	WCS Congo	28/08/08	2 (via Patrick)		43
Bomassa HQ (Hannah Thomas)	WCS Congo	12/08/08	1 (via Patrick at St Andrews)	-	44
Peter Wilkie (for display cabinet)	RBGE	07/10/08	1	-	45
Martin Cheek	RBGK	10/10/08	1	-	46
n/k (via Gretchen Walters)	ENEF Forestry School library, Cap Esterias, Gabon	03/11/08	1	-	47
n/k (via Gretchen Walters)	Missouri Botanical Garden programme in Gabon	03/11/08	1	-	48
n/k (via Gretchen Walters)	Makoko Research Station, Gabon	03/11/08	1	-	49
n/k (via Gretchen Walters)	Lope Research Station, Gabon	03/11/08	1	-	50
n/k (via Gretchen Walters)	Gamba Smithsonian Research Centre, Gabon	03/11/08	1	-	51
Paul Latham	-	04/11/08	1	-	52
n/k	Kisantu Botanic Garden, DRC	04/11/08	1	-	53
n/k	Forest Resources Management	27/11/08	2	Yes. £50	55
Mireille Ndoundou-Hockemba	Mbeli Bai Study	08/12/08	1	-	56
Mike Fay	National Geographic Society	09/12/08	1	-	57
Tim Rollinson (RBGE trustee)	Forestry Commission UK	06/03/09	1	-	58
	IDR Library	2/11/2009	1		59
	CERVE Library	11/2009	1		60
Emile Kami	CERVE	11/2009	1		61
Jean Diamoungana		11/2009	1		62
John Flynn	CARPE	11/2009	1		63
	STRI	11/2009	2		65
	IDR library	24/11/2009	2		67
Via Mokoko	DG of Eaux et Foret, Scientific Research, Republic of Congo	11/2009	2		69
Clement Inkamba Nkulu	WCS Congo	5/2009	1		70
Tomo Nishihara	WCS Gabon	5/2009	1		71
	Projet DzangaSangha	5/2009	1		72
Andrea Turkalo	Projet Dzanga-Sangha	5/2009	1		73
	Mbeli Bai projet	5/2009	1		74
	Lac Tele projet	5/2009	1		75

	IDR	5/2009	4		79
	CERVE	5/2009	3		84
Stuart Cable	Kew	6/2009	1		85
Luc Pauwels	National Botanic Garden of Belgium	6/2009	1		86
O. Lachenaud	National Botanic Garden of Belgium	6/2009	1		87
S. Nore	National Botanic Garden of Belgium	6/2009	1		88
T. Stêvart	For distribution	6/2009	6		94

## Annex 9 UK newspaper article.

From: <http://edinburghnews.scotsman.com/edinburgh/lt39s-a-jungle-out-there.4389840.jp>



### It's a jungle out there for adventurous city botanists

**Published Date:** 14 August 2008

**By** GARETH EDWARDS

INTREPID Edinburgh botanists have braved the jungles of the Congo in their quest for some of the rarest trees on the planet.

Dr David Harris and Dr Alexandra Wortley, who both work at the Royal Botanic Garden Edinburgh, have recently returned from their latest trip to the African country.

During their stay they trekked for up to two weeks at a time into some of the remotest parts of the rainforest, to find and record rare species of trees.

As well as dealing with raging floodwaters, swarms of insects and the ever-present threat of attack from the larger inhabitants of the jungle, they also had to dine on some unusual local delicacies, such as caterpillar.

Their research, which identified and described more than 500 species of tree, is now being published as an illustrated manual, *Sangha Trees*, which will be distributed in the Congo to help conservation efforts there.

The book is the result of a project started by Dr Harris, 45, the herbarium curator at RBGE, and his Congolese colleague Dr Jean-Marie Moutsambote.

Funded by the Darwin initiative, it attempts to address the scarcity of scientific information on plants in Central Africa, and can be used as both an identification guide and a training manual.

"It has been a long project, and I had to stop going out to the Congo during the civil war there in the mid-90s," Dr Harris said.

"I have had malaria on a number of occasions, which is a big risk out there and was quite bad, but it is all worth it.

"On this last trip alone, we collected over 20 species that have never been recorded in the Congo before."

On that trip, Dr Harris and Dr Wortley found themselves at one point cut off from their camp due to flash flooding, and there were other problems to face.

"The biggest difficult is the sweat bee, which is very much like a midge, except it doesn't bite. Instead it swarms everywhere, getting in your eyes and ears, up your nose, and it can quickly become unbearable. Insect repellent doesn't work, and we did what the locals do – roll up leaves and put them in your ears."

Food in the jungle included local delicacies such as dried fish and caterpillars, which Dr Harris said were "chewy, with a spine which grinds on your teeth", before adding that different species had different flavours.

The result of their hard work is aimed at biologists in need of accurate identifications and scientific names for trees, and Patrick Boundja, a biologist from the Congo, said it would be an invaluable tool for their research.

"We are studying the behaviour of the Congo's larger animals, and for years we have seen the different plants they eat, but have had no way of identifying them," he said. "This will be a huge help."

The full article contains 486 words and appears in Edinburgh Evening News newspaper.

Page 1 of 1

- **Last Updated:** 14 August 2008 10:44 AM
- **Source:** Edinburgh Evening News
- **Location:** Edinburgh



## **Annex 10**

**Checklist report, NNNP, attached pdf file.**

## **Annex 11**

**Checklist report, Kabo UFA attached as a pdf file.**

## **Annex 12**

**Interview on Radio Scotland, attached as a mp3 file.**

## **Annex 13**

**Hard copy of Sangha Trees an illustrated identification manual, sent by post.**

## **Annex 14**

**Boxed set of DVDs, Plantes d’Afrique Centrale – la Collection de Référence en Images, sent by post.**

## **Annex 15**

**Published book review, attached as a pdf file.**

## **Annex 16**

**Posters, attached as a powerpoint file.**

## **Annex 17**

**Article in Current Biology, attached as a pdf file.**