Darwin Initiative – Final Report

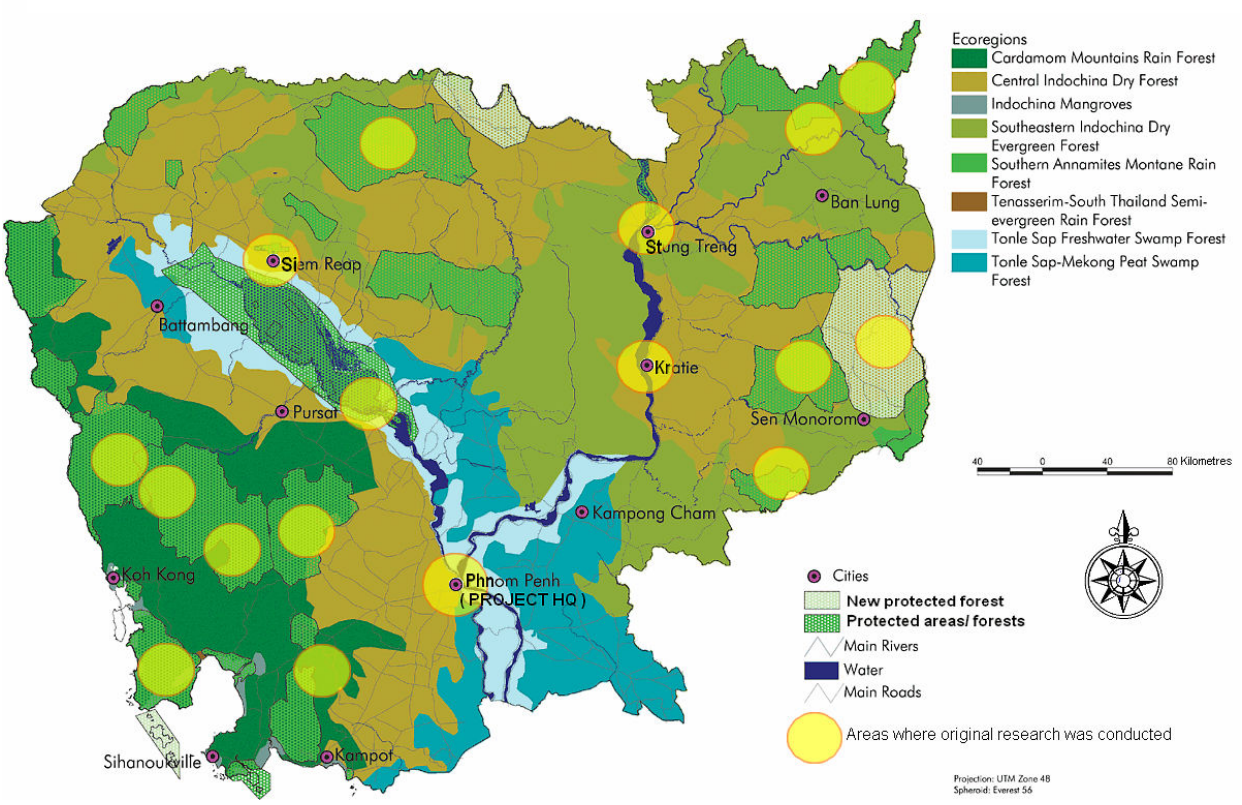
*(To be completed with reference to the Reporting Guidance Notes for Project Leaders (http://darwin.defra.gov.uk/resources/reporting/) - it is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin project information

Project Reference	14-037
Project Title	Building University Capacity to Train Future Cambodian Conservationists
Host country(ies)	Cambodia
UK Contract Holder Institution	Fauna & Flora International
UK Partner Institution(s)	The Harrison Institute, The Natural History Museum, Frontier, Cambridge University, and Royal Botanic Gardens, Edinburgh collaborated on specific training and research activities.
Host Country Partner Institution(s)	Royal University of Phnom Penh (RUPP), Ministry of Environment (MoE) and Ministry of Agriculture, Forestry & Fisheries (MAFF).
Darwin Grant Value	£ 154,484
Start/End dates of Project	1 June 2005 to 1 October 2008
Project Leader Name	Jenny Daltry, PhD
Project Website	http://www.conservationcambodia.org http://www.fauna-flora.org/cambodiauniversity.php
Report Author(s) and date	Jenny Daltry, PhD (Project Leader) and Callum McCulloch (Project Coordinator), 30 December, 2008

1 Project Background

Project 14-037 worked to build Cambodia's capacity in biodiversity conservation and applied research, following the loss of nearly of its scientists and teachers during the Pol Pot Regime. The project successfully established Cambodia's first MSc course and trained 108 Cambodians (more than 60% 'in service' national government and NGO employees) in advanced biodiversity conservation. The project also constructed the national zoological reference museum and herbarium, and launched Cambodia's first scientific journal. It also developed a much-needed networking role, actively engaging 50 organisations in learning, training and research and completing more than 30 collaborative studies on key conservation issues.



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

Cambodia harbours many of the best remaining forests, wetlands and wildlife populations in Indochina, including a host of endemic and globally threatened species. Even though its biological data are incomplete, international priority-setting exercises have confirmed Cambodia to be a major part of the Indo-Burma Biodiversity Hotspot and contain a major Global 200 Ecoregion (the Cardamom Mountains) and 40 Important Bird Areas.

This project has significantly enhanced the capacity of key Cambodian institutions to meet this important country's commitments to the biodiversity conventions, both now and in the future. In particular, the ***Ministry of Environment*** (Convention on Biological Diversity Focal Point) and the ***Ministry of Agriculture, Forestry and Fisheries*** (the National Management Authority for CITES, with the Scientific Authorities being the Forestry Administration and Fisheries Administration[1]). Both ministries were intimately involved with the Darwin Project from the start (see Section 3.1 below).

The project especially addressed CBD Article 12, Research and Training, with both ministries directly benefiting from the training of dozens of staff (as postgraduate students and Darwin Scholars) in the principles of conservation biology and how to obtain, analyse and act on scientific data. The new MSc curriculum covers the CBD ecosystem themes of Forest Biodiversity, Inland Waters Biodiversity, and Mountain Biodiversity, and touches on many cross-cutting issues to a lesser or greater extent, including Alien Species, Governance Law and Policy, Identification, Monitoring and Indicators, Public Awareness and Education, Protected Areas and In-Situ Conservation, Sustainable Use of Biodiversity, and Biological Diversity and Tourism. The ministries and other important conservation actors and stakeholders have also gained unprecedented access to essential tools for biodiversity assessment and planning, including a conservation reference library, national zoological reference collection, national herbarium, and an identification guide to the

[1] Cambodia is not yet a Party of the Convention on Migratory Species, but it is a signatory of the Indian Ocean-South East Asian Marine Turtle MoU, with the Fisheries Administration (within MAFF) being the Temporary National Focal Point.

Cambodia's amphibians. These resources are freely available to all individuals and organisations interested in Cambodian biodiversity.

When the new generation of conservation scientists and learning tools are combined with the networking and dissemination facilities that the Darwin Project has established, there is almost no limit to the species, habitats and conservation issues that Cambodians can study and address. Indeed, this project enabled postgraduate students and Darwin Scholars to devise and implement some 30 research studies throughout the country (see map above and Section 4.5), all of which were fully relevant to CBD Article 7 (Identification and Monitoring), with several also focusing on CITES appendix-listed species (e.g., the management of Appendix I Siamese crocodiles and Asiatic Elephants, and an original analysis of the illegal trade of bears and bear products in Cambodia). Building on the findings from these studies, CBD Article 17 (Exchange of Information) was also advanced through the project website, guest lecture series and especially the creation of a new scientific journal, the *Cambodian Journal of Natural History*, which has been disseminated to more than 20 countries to date.

For a broad measurement of this project's contribution to articles 7, 12 and 17, please see Annex 3. It should be noted that the new MSc curriculum was also designed to strengthen the capacity of Cambodian trainees to implement CBD Articles 6, 8, 10, and 13.

This project was very timely, because mounting pressures are being exerted on Cambodia's natural resources, both inside and outside of protected areas, from escalating population growth and regional economic development. Native biodiversity is being hammered by widespread illegal land clearance, logging, poaching, wildlife trade, the emergence of alien invasive species, and the collapse of traditional natural resource management practices. While it seems unlikely that Cambodia will achieve the 2010 biodiversity target, this project has enabled a better-informed and more professional approach to biodiversity conservation through training key technicians, planners and decision makers. Key national institutions now have a much better ability to understand and address Cambodia's urgent biodiversity problems.

3 Project Partnerships

3.1 Principle National Partners

Royal University of Phnom Penh: Fauna & Flora International's principal host country partner for this Darwin Project is the Royal University of Phnom Penh (RUPP), which had a central role in identifying the need for this project and participated in its development from the earliest stages. The FFI-RUPP Steering Committee has met every month to ensure smooth implementation and joint ownership of the project. Day-to-day activities on the ground were handled by two coordinators - Callum McCulloch representing FFI, and Rath Sethik representing RUPP – who reported to their parent organisations every week or as often as needed. The objectives of this partnership, and delegation of responsibilities, were formalised in a MoU from the start of the project.

The content of the new Masters of Science curriculum (Output 1) was largely directed by FFI, with input from expert trainers from a wide range of institutions (sections 3.3 and 3.4). The integration of the students and curriculum into the university system was under the direction of RUPP: for example, the Masters students gained official university student cards, giving them access to the main library and other facilities, and many aspects of student administration were moved from the project office to the appropriate departments within the university. However, FFI introduced precautionary measures to ensure that students would be awarded degrees on merit alone (section 5). For example, decisions on which students qualify to enter the Masters programme were made jointly by the FFI-RUPP Steering Committee, not by one individual, and based on their academic prowess alone. Students were anonymously denoted by reference numbers to avoid risk of nepotism.

The development of office rooms and the reference collection rooms (quarantine area, herbarium and zoological collection, ref. Output 2) were a joint effort, with RUPP staff selecting the rooms and approving structural changes. The project office, together with affiliated rooms at the university, has become known as the "Centre for Biodiversity Conservation", and there has been a proposal from

within RUPP to upgrade this to a separate unit within the Faculty of Science. University staff clearly regard the Darwin project as the beginning of a long-term programme, which we hope to follow through with a Darwin Post Project ("*Phase II - Building University Capacity to Train and Support Cambodian Conservationists*").

The Ministry of Environment and the Ministry of Agriculture, Forestry and Fisheries: The two ministries responsible for biodiversity management in Cambodia were also closely involved in the project's development and implementation. FFI has a long standing working relationship with both ministries (dating back to the late 1990s) and the idea of developing this project emerged from mutual recognition that ministry staff at all levels have inadequate understanding of their country's biodiversity or conservation principles. Their chronic shortage of skilled human resources became even more apparent during *The Capacity Needs Assessment of the Natural Resource Sector in Cambodia,* conducted by FFI in 2005 on behalf of the Forestry Administration, and involving interviews with numerous staff from both ministries, RUPP and other key actors. (The needs analysis was conducted by our Chief Lecturer Dr Carl Traeholt and Team Leader Dr Jenny Daltry, and the findings helped to guide our design of the Bridging Course and MSc curriculum).

Throughout this project, FFI held MoUs with both the Ministry of Environment (specifically the General Department for Administration of Nature Conservation and Protection, GDANCP) and with the Ministry of Agriculture, Forestry and Fisheries (specifically the Forestry Administration) and many trainees, plus several trainers, were enrolled from both ministries. The Ministry of Agriculture, Forestry and Fisheries contributed the use of the Phnom Thmao Wildlife Rescue Centre for students to learn about Cambodian wildlife (many of our students conducted short research topics at the Centre). The Director of Forestry Administration granted permission to establish the herbarium and zoological reference collection, and the Forestry Administration provided supervision to ensure the new collection met national rules and requirements.

The Ministry of Environment's Deputy Director for Environmental Impact Assessments personally developed and delivered the Environmental Impacts Assessment module of the Masters programme, while GDANCP staff Khou Eang Hourt and Neang Thy had a major input into the design of the national herbarium and collection of botanical and zoological specimens. Botanist Khou Eang Hourt MSc from GDANCP became one of the first Darwin Scholars: he gave a guest lecture on his research on the taxonomy of Cambodian rattans, and taught the botanical component of the Ecological Survey Techniques module. Another FFI-trained Darwin Scholar, Neang Thy MSc, led the Ecological Survey Techniques module in Year 3, gave a guest lecture about his research on reptiles and amphibians, and supervised field research by postgraduate students from RUPP and undergraduates from the Royal University of Agriculture.

3.2 Other national collaborations

FFI and RUPP also collaborated with the following national institutions:

- ***Royal Government of Cambodia Senate:*** Delivered the annual Environmental Law module.
- ***Ministry of Education, Youth and Sports:*** Granted permission to establish the new MSc course and contributed regularly to monitoring student performance.
- ***Mlup Baitong:*** Hosted annual field trips for students to study community-based ecotourism.
- ***Fisheries Administration:*** Mr Phay Somany gave a guest lecture on Irrawaddy Dolphin conservation in Cambodia.

Around 20 Cambodian government agencies, NGOs and private institutions have also benefited from enrolling Cambodian staff on the MSc course: ***Department of Fisheries***, ***Forestry Administration***; ***Ministry of Environment***; ***Department of Education***; ***Royal University of Agriculture***; ***Royal University of Phnom Penh***; ***CI Cambodia Program***; ***Inland Fisheries Research and Development Institute***; ***Save Cambodia's Wildlife***; ***Turtle Conservation Project***; ***Centre for the Study and Development of Agriculture in Cambodia (CEDAC)***; ***SBK Research and Development***; ***GTZ Cambodia***; ***CBNRM Learning Institute***; ***WWF Cambodia***; ***FFI Cambodia***; ***PACT Cambodia***; ***Men Sarun Flour Factory***, ***Apsara Authority***, and ***British American Tobacco (Cambodia)***.

3.3 UK collaborating partners

Although no UK partners were specified on the original proposal, several links rapidly developed with British organisations with a common interest in Cambodian biodiversity:

- ***Harrison Institute:*** Supported and supervised bat research in Thailand and Cambodia for students of our programme. Dr Paul Bates also provided a guest lecture on "*The Bats of South East Asia*" and our staff facilitated field research visits by Dr Bates and colleagues.
- ***Cambridge University:*** Richard Paley taught the modules on Protected Area Management and Project Cycle Management in Years 2 and 3, and served as a peer reviewer for the *Cambodian Journal of Natural History*. FFI facilitated field research by Richard Paley.
- ***Frontier (UK):*** supported and supervised student research in Year 2. (The Project Leader assisted Frontier to develop a MoU with the Ministry of Environment).
- ***The Natural History Museum, London***: Dr Simon Loader trained curators and established protocols for handling and storage of specimens at the new National Zoological Reference facility.
- ***Royal Botanic Gardens, Edinburgh:*** Joint planning on botanical surveys and training.
- ***St Peter's College, Oxford University:*** Dr Dan Bebber gave a guest lecture on "*The Science of Climate Change*" in 2008 and conducted a field trip with project staff to identify permanent sampling plots.

Other British nationals involved in project delivery were ***Mike Appleton*** (delivered the module on Protected Area Management and Project Cycle Management in Year 1 and served as a peer reviewer for the *Cam.J.Nat.Hist.*); ***Dr Will Duckworth*** and ***Rob Timmins*** (peer reviewers); ***David Emmett*** (tutored the museum curator and supplied specimens to the museum facility, supervised student research on freshwater turtles); ***Jeremy Holden*** (co-researched, co-authored and illustrated the amphibian field guide and served as a peer reviewer for the *Cam.J.Nat.Hist.*); and several British scientists – ***Dr Stephen Browne***, ***Dr Martin Fisher***, ***Dr Andy Maxwell*** and ***Dr Campbell Webb*** – also served on the International Editorial Board of the *Cambodian Journal of Natural History*.

3.4 Other international collaborations

Experts from other countries also delivered course modules (at no cost to the project), mentored some of the Darwin Scholars and postgraduates, especially those conducting their final year theses, or contributed to the *Cambodian Journal of Natural History*: ***Centre ValBio (Madagascar):*** Dr Frank Princee developed and ran the Species Conservation module in Year 1; ***Copenhagen University and Nykøbing Falster Zoo (Denmark):*** Dr Knod Hellar lectured on Data Recording and Applied Statistics module in Years 1-4, and served on the International Editorial Board of the *Cam.J.Nat.Hist.*; ***Conservation International – Cambodia Program:*** Ben Rawson and Annette Olson supervised student research on mammals, Dr Jodi Rowley ran a training course on amphibian biology and conservation from the project offices for 20 participants, including MSc students; ***German Primate Centre:*** geneticist Dr Christian Roos contributed a short paper to the *Cam.J.Nat.Hist.*; ***GTZ (Cambodia office):*** legal expert Arnold Dunai contributed a full paper; ***La Sierra University (USA):*** Dr Lee Grismer delivered the module on Ecological Survey Techniques in Year 2 and conducted field research with Darwin Scholars, leading to several published papers. Dr Grismer also served on the International Editorial Board; ***Murdoch University (Australia):*** Dr Brad Pettit ran the module on Integrated Natural Resource Management in Years 1-4 and served on the International Editorial Board; ***Muséum National d'Histoire Naturelle (France)/ Sud Expert Plantes:*** Mr Loic Cecilio supervised botanical research and trained curator staff on herbarium management techniques, and Dr Sovanmoly Hul served on the International Editorial Board; ***North Carolina Museum of Natural Sciences (USA):*** Dr Bryan Stuart collaborated on amphibian research and served as a peer reviewer for the *Cam.J.Nat.Hist.*; ***Odense University (Denmark):*** hosted a visit by student Kannitha Lim and provided her with advanced training in analysing Yellow-cheeked Crested Gibbon vocalizations; ***Prince of Songkla University (Thailand):*** Hosted and trained five students on bat research; ***University of Queensland (Australia):*** doctoral student Ms

Carly Starr (studying the ecology of Slow Loris in Cambodia) helped to mentor to the students of the programme in Years 1 and 2 and set up the library database; ***US Fish & Wildlife Service (USA):*** Provided co-funding and Dr Fred Bagley lectured students on great ape conservation and USFWS grant schemes; ***University of Bonn:*** Dr Jörg Menzel served on the International Editorial Board; ***University of Colorado (USA):*** Dr Herbert Covert served as a peer reviewer for the *Cam.J.Nat.Hist.*; ***Villanova University (USA):*** herpetologist Jesse Grismer contributed a full paper; ***Wildlife Alliance:*** Dr Ulrike Streicher gave a guest lecture on "*The Conservation Status of Lorises in Cambodia*" and Julian Colmer lectured on "*The Educational Benefits of the "Kouprey Express*" Programme"; ***Wildlife Conservation Society - Cambodia Program:*** Mr Tom Gray gave a guest lecture on "*People, Grasslands and Conservation: Conserving the Bengal Florican in the Tonle Sap Flood Plain*" and Hannah O'Kelly supervised student researchers in Year 3; ***WWF Cambodia:*** Provided annual GIS module; and ***Zoological Parks and Gardens Board of Victoria (Australia):*** provided co-funding and reference materials.

4 Project Achievements

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

Being essentially a capacity-building project, the main impacts of this initiative are best described in terms of the number of Cambodian men and women (>108) and national organisations (>20) with increased skills, knowledge, tools and motivation to identify and address biodiversity information gaps and conservation needs. Our major training and research Outcomes are described below. As long as these trained individuals remain in the environmental and education sectors – and it appears that nearly 100% of them will for the foreseeable future – the project's impact on national capacity will last throughout their working lives. This will have corresponding positive impacts for biodiversity management in Cambodia for decades to come.

Positive impacts on biodiversity, sustainable use and equitable sharing of biodiversity benefits are already being detected through the work of people and organisations trained and connected by this project. As our last reviewer commented, "There has been some direct impact from the information gathered in student theses and from the reference material and publications [see Section 4.5 and Annex 5]. There is also gain from the raised profile of biodiversity conservation, the acceptance of the importance of sound academic standards in education and from the much-improved networking amongst institutions."

To give one of many examples of this, postgraduate student Oum Sony's final-year thesis on "*The Effectiveness of Incentive Programmes on Community Conservation Efforts in the Cardamom Mountains*" has been used to evaluate and strengthen the community-based co-management policies of the Forestry Administration in the Central Cardamom Mountains, whereby indigenous families receive exclusive rights to harvest renewable natural resources in return for proactively conserving endangered wildlife and habitats. This arrangement, and Oum Sony's recommendations, have measurably both the people concerned and the two largest remaining populations of the critically endangered (and CITES Appendix I listed) Siamese Crocodile, with the creation of two community-managed sanctuaries covering over 500 hectares. Poaching has stopped and the sanctuaries successfully produced over 100% of the entire known reproductive output of wild Siamese Crocodiles in 2008!

4.2 Outcomes: achievement of the project purpose and outcomes

The Darwin project officially ended on 1 October 2008, with all of the planned targets achieved and, in most cases, greatly exceeded. The 3.5-year project has unequivocally fulfilled its original purpose 'to build capacity in conservation and applied research at Cambodia's premier universities, chiefly by establishing new teaching modules and diploma in conservation biology, supported with practical field experience.' While there is still more work to be done before biodiversity conservation in Cambodia no longer depends on external technical support, the country has gained significantly improved human resources, physical resources, knowledge and social networks, as summarised below:

Human resources: A new generation of conservation scientists created: Over 120 Cambodians from more than 20 national organisations gained advanced training in Biodiversity Conservation. All of the Masters candidates, graduates and Darwin Scholars have exhibited striking improvements in their understanding, capacity and enthusiasm for conservation, demonstrated by the increased quality of their written work, examination grades, and voluntary organisation of additional field trips. This new generation has also gained confidence in their ability to analyse questions and solve problems, and have learned how to critically analyse, challenge dogma, and read around their subjects. This marks a tremendous step forward for science in Cambodia (where the education system traditionally centres on rote-learning, limited reading or practical exercises, and unquestioning acceptance of facts given by the teachers). Because more than 60% of the trainees already hold posts with the government or NGOs in Cambodia, they have been well placed to apply their new skills, knowledge and experience to improving the conservation policies and actions of their institutions. Importantly, the Royal University of Phnom Penh is dedicated to continuing the new MSc in Biodiversity Conservation programme to train even more people over the coming years.

Physical Resources: Access to new biodiversity learning and dissemination resources: In creating the MSc curriculum, the project also renovated classrooms and laboratories, established a biodiversity library with over 230 titles, and built up a stock of essential field research equipment. These assets are valued at over £80,000 and are in almost daily use by students, university staff and visiting scientists. The Darwin project also constructed the country's first national zoological reference museum and national herbarium in Phnom Penh, with trained curators and facilities to accommodate specimens for years to come. In addition, the project has successfully encouraged and enabled more Cambodian scientists to disseminate their knowledge by launching the country's first scientific journal.

Knowledge: New biodiversity research and conservation projects developed: The Masters candidates and 20 Darwin Scholars have conducted dozens of original research projects covering numerous subjects pertaining to biodiversity management, from pure taxonomy to community use of natural resources (see Section 4.5). By the project's end, six full research theses had been submitted, and dozens more are in progress, providing new and important information on the status, needs and management of Cambodian biodiversity. A number of these studies are ongoing or form the basis of new conservation projects under the auspices of various government agencies and NGOs. For example, Darwin Scholar Chav Thou initiated an ongoing project in 2007 to monitor populations of Banteng, Gaur, Asian Elephants, and other threatened large mammals in Phnom Samkos Wildlife Sanctuary, the findings of which are being used by GDANCP and its partners to evaluate and improve the management of this protected area.

Social Networks: New partnerships to support conservation science: National capacity has been further enhanced through networking and enlisting the involvement of more Cambodian and international institutions in the Darwin Project. More than 40 national and international organisations became involved in this project by contributing teachers or learning resources, contributing to the new open forum lecture series (also established by this project), or hosting students and Darwin Scholars while they conduct field research. Even more organisations have participated in the new scientific journal and have met our trainees through regional conferences. In developing this unique networking role, the project has helped to draw many national and international agencies together to communicate and collaborate on biodiversity research and conservation for the first time. Though this outcome was not fully anticipated at the start of this project, it has powerful repercussions for the advancement of biodiversity science and management in Cambodia.

4.3 Outputs (and activities)

As detailed further in Annex 1, the project achieved and exceeded the planned activities and outputs. Although achieving such a large number of diverse outputs with multiple partners and stakeholders was rarely easy, our team was able to overcome obstacles by using an adaptive management approach and drawing on FFI's long experience of working in Cambodia.

Output 1: 12-week Bridging Course developed and delivered every year. Two-year MSc curriculum developed and delivered to students who pass the Bridging Course. 20 students selected to be junior research officers ('Darwin Scholars').

The upgrading of the project course from a conservation Diploma (as planned in our original proposal) to an MSc programme was agreed with the Darwin Secretariat in 2005 and resulted in the number of training weeks per student rising significantly from 15 (original proposal) to more than 70. These comprise a 12-week Bridging Course, approximately 30 weeks of taught course work in two terms, and 12 months of supervised thesis research. Six modules were devised for the Bridging Course, while the Masters course has 13 modules covering a wide range of contemporary biodiversity management issues, skills and approaches that are relevant to Cambodia. The courses have been running annually for the duration of the project, allowing the training materials to be further refined based on experience and feedback.

A rolling intake of students was accepted every year, resulting in a total of 108 nationals trained on the Bridging Course and 57 on MSc modules. 24 have reached the thesis stage of the MSc degree to date (see Annex 7). The first six have graduated and 18 are currently finalising their theses in readiness for graduating in 2009. Practical field experience has been incorporated into many stages of the course. In their final-year theses, most students have conducted fieldwork in remote areas, including many of Cambodia's protected areas (see Map in Section 1).

Being the first full MSc curriculum at RUPP or indeed any university in Cambodia, the project team encountered a lack of institutional guidance on how to proceed, and had to draw heavily on experiences and procedures used in other countries. One of the greatest challenges was to instigate a strictly merit-based approach to the MSc curriculum, because this was a novel concept to many university staff and trainees (see also Section 5). Unsurprisingly, we met with initial resistance to the idea of ejecting students who fail to pass the necessary examinations, but our insistence on rigorously maintaining high standards proved instrumental in ensuring the new MSc qualification would be credible and well respected. The successful graduates are now highly sought after by employers because they are known to earned their degree through intelligence, self-discipline and hard work.

During this project, 20 of the most outstanding young Cambodian scientists were chosen as Darwin Scholars, affiliated to RUPP: Hourt, Thy, Thou, Sethik, Saveng, Keavuth, Samkeat, Serevathanakreasey, Saravuth, Norong, Vichheka, Horn, Han, Vattana, Channa, Vuthy, Kannitha, Sothea, Sony and Elyan. All have a Masters degree or will soon graduate from our MSc programme. They have assisted with teaching and conducted original research in the fields of taxonomy, sustainable use and conservation biology, to both strengthen their experience and increase national understanding of Cambodian biodiversity.

Output 2: The Royal University obtains essential field equipment, research facilities and hardware to conduct conservation research projects. Cambodia's first zoological and botanical reference collections and basic library facilities initiated, with databases and trained curators.

When the project started, the university had almost no resources for biological field research. A wide range of field equipment was purchased for use by the students and Darwin Scholars at RUPP, including various navigational and survey equipment (e.g., GPS units, dissecting kits, compasses, thermohygrometers, and binoculars) and camping gear (e.g., hammocks, backpacks and tarpaulins). Students have learned how to use these tools as part of the Ecological Survey Techniques module on the MSc curriculum, and applied them during their final year research for their theses. The Darwin Scholars have also conducted various lines of research during this project.

The National Zoological Reference Collection, National Herbarium, quarantine room (Activity 2.1) and library (Activity 2.2) have been fully established in the Faculty of Science, and are in active use by students, Darwin Scholars, university staff and other projects. An increasing number of foreign scientists are choosing to deposit most of their specimens at these national collections instead of taking all of them overseas. The national collections are available for use by all scholars with an interest in Cambodian biodiversity.

As expected, one of the greatest challenges of establishing a new national reference collection in Cambodia is accurately identifying the specimens. There are several root problems: the lack of identification guides, the fact that most specimens collected from Cambodia in the past are held in collections far away in Europe or USA, and a high proportion of Cambodian species, especially lower animals and plants, are endemic and have never been seen or described before. Before this project started, FFI had sent duplicate specimens to Kew, the Natural History Museum and other major collections overseas in the hope that they would be identified, but received minimal feedback, probably because the taxonomists at these collections are few and overstretched. To overcome this problem, the project team has therefore depended heavily on voluntary support from a number of visiting taxonomists, including Dr Simon Loader, Dr Lee Grismer, and Dr Campbell Webb, to examine the collection, identify known species and prepare formal descriptions of new species. Through our new partnership with the Sud Expert Plantes programme, botanist Loic Cecilio has been recruited to process the plant collection. We have also purchased all available identification guides for the reference library, and developed and published the first guide to Cambodian amphibians. More specimens are being deposited every month, not all of which can be identified by the new curators, but they have been suitably preserved and will be processed as and when other visiting experts pass through Phnom Penh.

In addition, the project has renovated classrooms at RUPP and, during the last twelve months of the project, established a Research Laboratory in the Department of Biology for use by the Masters students and other faculty staff. These activities were additional to those planned, but proved necessary for supporting the MSc curriculum and the work of the Darwin Scholars.

Output 3: The development of new inter-institutional partnerships to implement conservation-oriented research and education projects in Cambodia.

Having started from the position of almost zero interaction between the universities, NGOs and ministries in Cambodia, there has been striking progress in this output during the course of this Darwin Project. The long list of collaborating institutions shown in Section 3 includes all of the most prominent groups involved in environmental education and biodiversity management in Cambodia, as well as a growing network of British and other international organisations. Generally, we have found organisations to be very willing to cooperate, probably because all of them recognise the urgent need to boost Cambodia's capacity to conduct research and improve the management of its biodiversity.

At least 30 distinct research projects were completed during Years 2 and 3, including 20 by MSc candidates (as part of their final year theses) and 10 by Darwin Scholars (Activity 3.1). See section 4.5 for more details. Most of these projects were conducted in collaboration with two or more organisations: typically one government agency and one NGO. This has led to some minor problems concerning which organisations claim credit for this work, and several publications from this research failed to acknowledge FFI or this project! We are addressing this problem through constructive dialogue, but it is not necessarily a bad thing that a number of other organisations feel a sense of pride and ownership of this work. Their stake will make them more likely to help to disseminate and act on the research findings.

By raising and maintaining high standards, the Masters course has gained genuine credibility, and many organisations have offered placements to the students. In fact, all six students that have formally graduated have immediately found full time employment with environmental or conservation organisations. The remaining 12 soon-to-be-graduates are anticipated to follow suit, as many organisations are enquiring about their status and their completion date.

Project students, staff and Darwin Scholars also participated in a number of multi-stakeholder workshops, both within Cambodia and overseas, as summarized in Annex 1.

Output 4: Publication of newsletter and field guides to disseminate original research and lessons learned. The first issue of the* Cambodian Journal of Natural History *launched, published and distributed (final year of project).

The project developed a number of publications to disseminate research findings and techniques, as listed in Annex 5.

The most complicated publication was the *Cambodian Journal of Natural History*, which involved the formation of an Editorial Team, an International Editorial Board, an additional circle of peer reviewers, and detailed protocols for authors and reviewers. The new journal has been designed to publish original research by Cambodian or foreign scientists on any aspect of Cambodian natural history, including fauna, flora, habitats, management policy and use of natural resources, and Cambodian scientists on studies of natural history in any part of the world. It especially encourages material that enhances understanding of conservation needs, and has the potential to improve conservation management in Cambodia. The first issue was published in September 2008 and has been widely distributed in Cambodia (including all government agencies, NGOs and universities) and to more than 20 countries overseas.

One of the main challenges in developing this new journal was getting enough submissions for the first issue. After all, Cambodia has not had a scientific journal before, most Cambodians have never written a scientific paper for any journal before, and most authors understandably wanted to see what the quality of the journal would be like before submitting their work. We need not have worried, however, because even though relatively few manuscripts were received, all of them were excellent, and were further improved through the peer-review process. This resulted in a high quality first issue that has set the standard for the rest. We can therefore expect a greater number of submissions to the next issue.

4.4 Project standard measures and publications

Please see Annexes 4 and 5 for details. Of particular significance is the new peer-reviewed *Cambodian Journal of Natural History*, the first scientific journal in Cambodia. The first issue was published in September 2008 and has been very warmly received by scientists in Cambodia and overseas. The journal features the Darwin Initiative logo and describes the Darwin Initiative scheme. We hope this will become a regular, biannual publication.

Another high profile publication was *A Field Guide to the Amphibians of Cambodia*, authored in English and Khmer by FFI-trained Darwin Scholar Neang Thy and peer-reviewed by three independent international herpetologists before being edited by the project Team Leader. This is the first field guide to Cambodia's amphibians, and is the culmination of more than two years of field research and collaborative taxonomic studies. The guide contains 62 species, including over 50 new species records for Cambodia, with 12 endemics new to science. This benchmark volume is already proving invaluable for amending the national protected species list and IUCN red list, identifying priority areas for amphibian conservation, and stimulating more surveys. The book credits support from Darwin Initiative and has triggered a large number of press articles, blogs and radio interviews in the UK, Cambodia and elsewhere.

4.5 Technical and Scientific achievements and co-operation

This project has had a very strong focus on developing national capacity to conduct quality biological research, through building the skills and experience of individuals and fostering collaborative ties among the organisations working in conservation science in Cambodia. At least 30 research projects[2] were carried out under the auspices of this Darwin Project, some of which are ongoing.

20 projects were carried out by MSc students. Every student on the Biodiversity Conservation curriculum is required to conduct an extensive research project for his or her final year thesis (Table 1). Most of the students have spent a full year designing, implementing and writing up their thesis. In accordance with Output 3 of this project, the majority of these studies were conceived and developed in collaboration with one or two government agencies and NGOs from the environmental sector (collaborating organisations are listed in section 3).

[2] This figure does not include all of the short-term research assignments that students are required to carry out during their first and second terms of the MSc course.

Table 1: Research studies undertaken by students enrolled in the MSc Biodiversity Conservation curriculum for their final year theses (* denotes the first six students to graduate).

No.	Student	Thesis Title	Collaborating Organisations
1	Channa Phan *	*Activity Patterns in Yellow-Cheeked Gibbons at Veun Sai, Ratanakiri Province.*	Forestry Administration, FFI Cambodia and CI Cambodia
2	Chinda Heng *	*The PCI framework in Community Forestry in Kampong Thom, Cambodia – Impacts and Effectiveness*	Community Based Natural Resource Management Learning Institute
3	Ith Saveng *	*The Taxonomic Review of the Bat* Rhinolophus coelophllus *and* Rhinolophus shameli *(Chiroptera: Rhinolophidae) in S.E. Asia*	Harrison Institute and Wildlife Conservation Society Cambodia
4	Navy Nop *	*The Effect of Otters on Local People in Tonle Sap Area, Boeung Chhmar.*	Forestry Administration and CI Cambodia
5	Sony Oum *	*The Effectiveness of Incentive Programmes on Community Conservation Efforts in the Cardamom Mountains.*	Ministry of Environment, Forestry Administration, FFI Cambodia and CI Cambodia
6	Vuthy Va *	*Bat Species Diversity and Habitat Preference in Keo Seima, Mondulkiri Province.*	Harrison Institute and Wildlife Conservation Society Cambodia
7	Chan Aun Tob	*Stock Assessment and Conservation Values of the Asian Arawana in the Cardamom Mountains.*	Dept of Fisheries and CI Cambodia
8	Sophak Pheng	*Seasonal Flooding and the Effects on the Nest Sites of the Siamese Crocodile in the Cardamom Mountains.*	Forestry Administration and FFI Cambodia
9	Chanrithy Heng	*Community Perceptions and Involvement in the Planning Processes for Hydropower Development in the Cardamom Mountains.*	FFI Cambodia and CI Cambodia
10	Chansorphea Srey	*The Demography and Life Histories of Domesticated Elephants in Mondulkiri, Cambodia.*	Forestry Administration and FFI Cambodia
11	Narin Srei	*The Presence of the Parasitic Chytrid Fungus in Frog Species in Cambodia.*	Forestry Administration and CI Cambodia
12	Horn Leang	*Ecotourism Development and Changes in Community Perceptions of Conservation in Preah Vihear.*	Forestry Administration and WCS Cambodia.
13	Pheakadey Kong	*Habitat utilisation of the Siamese Crocodile in a Permanent Wetland, Veal Veng, Cambodia.*	Forestry Administration and FFI Cambodia
14	Ratha Kea	*Survivorship and Habitat Preference of Released Juvenile Royal Turtles in the Mekong River.*	CI Cambodia
15	Sokrith Heng	*Habitat Preference of the Impressed Tortoise in Cambodia.*	Forestry Administration and CI Cambodia
16	Soputhy Ny	*Community Use of the Protected Forests Around Angkor Wat and Nearby Flooded Forests of the Tonle Sap.*	Independent, with logistical support from FFI
17	Vannara Ses	*Wildlife Trade in the Asiatic Black Bear and Malayan Sun bear in Cambodia: Sources and Destinations.*	Free the Bears and Wildlife Conservation Society
18	Vichheka Vorn	*Ecological Importance of Water Bodies for Bats in Urban Areas.*	Harrison Institute

No.	Student	Thesis Title	Collaborating Organisations
19	Kannitha Lim	*Variation of Vocalisation Patterns Between Different Populations of the Yellow-Cheeked Gibbon.*	FFI Cambodia and CI Cambodia
20	Koulang Chey	*Distribution and Abundance of the Impressed Tortoise In Cambodia*	Forestry Administration and CI Cambodia

To meet the academic requirements of RUPP, every thesis must be assessed by a committee of peers within the university. As noted previously, however, there is a shortage of experienced scientists on the university staff. This project has therefore added external independent scientists to the committee to provide a more robust evaluation of the theses and provide comments and feedback to student and other committee members. This has aided the faculty at RUPP with an important aspect of academic examination, and made university staff more aware of the importance of raising scientific standards.

The project's 20 Darwin Scholars have also been dynamic in completing at least 10 research studies (arguably more, because most projects contain more than one major line of research). For example, Khou Eang Hourt MSc conducted research on rattan taxonomy and completed an analysis of the economic importance and sustainability of the wild bamboo trade in Kampong Speu province. Chav Thou developed a project to monitor large mammals using camera traps and standardized counts of tracks along forest transects in protected areas in Pursat province. Neang Thy MSc conducted a series of biodiversity surveys throughout Southwest Cambodia and discovered five species of amphibians and reptiles that are new to science. Sam Han MSc is leading an ongoing nationwide study on the status and ecology of Siamese crocodiles, and mentored two of the final year MSc students working on this critically endangered species. The Darwin Scholars themselves received mentoring from a number of international scientists from FFI and collaborating organisations listed in sections 3.3 and 3.4 to improve the quality of their research and writing.

While this project has generated too many research projects to describe all their methods and findings in detail here, these studies have been, and continue to be, disseminated in student theses, conferences and peer-reviewed journals, including the *Cambodian Journal of Natural History* (Output 4). Darwin Scholar Neang Thy has been especially prolific, co-authoring papers in four scientific journals as well as the peer-reviewed *A Field Guide to the Amphibians of Cambodia*, which has set the standard for Cambodian wildlife guides. A copy of this was forwarded to the Darwin Secretariat in November 2008.

4.6 Capacity building

The project's main Purpose was "to build capacity in conservation and applied research at Cambodia's premier university, chiefly by establishing new teaching modules and MSc in conservation biology, supported with practical field experience" (see Annex 2).

The capacity of the main host country partners (Royal University of Phnom Penh, Ministry of Environment and Ministry of Agriculture, Forestry and Fisheries - see section 3.1) to conduct research and manage biodiversity has been increased very significantly, largely through training their personnel (Output 1) and the development of vital resources for studying and learning about biodiversity (Output 2), the formation of new collaborative partnerships (Output 3) and new means of sharing information and lessons learned (Output 4). In addition to the three main partners, at least a further 20 Cambodian organisations have benefited from training and resources developed by this project (section 3.2). Every organisation in Cambodia has been welcomed to enrol students on the new MSc course, participate in the guest lecture series, or access resources from the new reference library and specimen reference collections, all created by this project.

Direct evidence of Cambodia's growing capacity can be seen in the rising quality of work being carried out by students on the MSc in Biodiversity Conservation curriculum, 60% of whom are in-service employees from Cambodian organisations. While their new skills and knowledge have been

quantified from their performance in examinations, graded course work and theses, we are also receiving glowing responses from the organisations that the students have worked with, genuinely impressed by their abilities and enthusiasm. Even students who have progressed no further than the Bridging Course have gained important new knowledge and skills, including a greater capacity to read and learn. Most students have found the work to be challenging, but feedback on the courses to date indicate a high level of satisfaction with the subjects and standard of teaching. They have been especially appreciative of the merit-based approach of this course, which is lacking in most other education programmes in Cambodia.

The 20 Darwin Scholars have also made good progress, with several of them authoring benchmark technical reports, participating in international conferences and submitting scientific papers to peer-reviewed journals for the first time. Almost all are employees of our host partner organisations and are now ranked among their foremost scientists. For example, Neang Thy was sent by the Ministry of Environment to represent Cambodia at a regional conference on the management of important trees used in timber trade, held in Malaysia in 2007, while Sam Han represented the Forestry Administration at the last international meetings of the IUCN Crocodile Specialist Group, held in France. Such staff have gained an important role in advising on the policies of their parent organisations and mentoring their less experienced colleagues, extending the impacts of our project even further. Several are also helping to teach certain modules on the MSc curriculum.

The formation of the Centre for Biodiversity Conservation within the Department of Biology has been important not only in delivering the MSc and supporting research, but also has enabled RUPP staff to improve aspects of the undergraduate (BSc) Biology course, notably increasing the opportunities for practical laboratory work and fieldwork. In fact, various aspects of examination, candidate selection and administration procedures that were developed by the Darwin Project now being practiced across many departments in the university, which will enable the university to continue to strengthen Cambodia's technical capacity across many fields. If the Centre for Biodiversity Conservation can become a permanent fixture in the RUPP (as is the main purpose of the intended Post Project), it will continue to provide training and foster research for many years to come.

Fauna & Flora International has also gained increased capacity through this project, because our staff have gained important new skills and experience, and learned from our many partners. Because the project is well respected and has become widely known in Cambodia, FFI has also earned the reputation of being the leading organisation to build conservation capacity in Cambodia. Not only has our relationship with the three main host country partners become stronger over time, this project has encouraged and required FFI to form working relationships with a huge number of scientists and organisations in Cambodia, UK and globally (see Section 3). This new and extensive network of collaborators and supporters provide FFI and our partners with an excellent foundation for the intended Darwin Post Project, not to mention aid our other biodiversity conservation projects in this region.

4.7 Sustainability and Legacy

Our last reviewer observed "This project will have a solid legacy. It has demonstrated what can be achieved with limited funding in terms of both numbers and academic standards. The improved networking amongst institutions should be maintained and the legacy will be refreshed by the careers of the people trained under the project as well as by their successors. This legacy is likely to be evident for many years".

Some of the most important lasting achievements of the Darwin Project are:-

- ***108 Cambodians have received advanced training in Biodiversity Conservation***, more than 60% of whom are already employed by relevant government agencies and NGOs. Graduates have immediately found good jobs in the environmental sector, and, because local demand for environmental scientists exceeds supply, there will clearly be minimal leakage of trainees to unrelated careers.

- ***The Bridging Course and MSc in Biodiversity Conservation curriculum, established by the Darwin Project, are ongoing***. 30 students were still enrolled by project end, and a fourth group of students was admitted in October 2008, with a view to graduating in 2010/11.[3]
- ***20 Cambodians have received additional mentoring and support as Darwin Scholars***. Most of them are employees of our host country partners and have earned recognition as experts and trainers in their fields (see above).
- ***Cambodia has gained a permanent reference library, a National Herbarium and a National Zoological Reference Collection***, which are lasting assets for all Cambodians interested in biodiversity. With the recent arrival of the Sud Expert Plantes project to expand the herbarium, plus the steady flow of researchers using both collections, these facilities have excellent prospects of continuing to be used and enlarged.
- ***Cambodia's first scientific journal launched.*** The entirely peer-reviewed *Cambodian Journal of Natural History* was launched in 2008. It will continue to be produced as long as quality manuscripts are received. If printing costs cannot be sustained through grants or subscriptions, future editions of the journal may be exclusively online.
- ***The Royal University of Phnom Penh has also gained a renovated classroom, research laboratory, a diverse range of biodiversity research equipment, and a number of staff who have participated in and learned from this project.*** These assets will remain part of the Department of Biology to the benefit of undergraduates (BSc Biology), postgraduates (MSc Biodiversity Conservation) and faculty staff.
- ***Important new lines of communication and working relationships have been developed*** among many national and international organisations working in the fields of biodiversity management in Cambodia. Staff who have met and worked with fellow students on the Bridging Course and MSc course have formed lasting friendships, which will continue to enhance the flow of information and cooperation between their parent organisations.

Although the Darwin Project has ended, the work has continued. FFI has secured another small grant and is still working with all its local, British and other partners to sustain the ongoing teaching and research at the Royal University of Phnom Penh, including running the MSc curriculum, disseminating research findings and enlarging the reference collections. All of the equipment and other resources purchased by the Darwin Project are thus in almost daily use and will always remain at RUPP.

To further consolidate and maximise the impact of this project and ensure an even greater level of sustainability, FFI has applied to the Darwin Initiative for a Post Project grant with the purpose of consolidating the Centre for Biodiversity Conservation as a permanent hub for biodiversity research, postgraduate education, information dissemination and inter-agency collaboration. Under the planned Post Project, offices and other resources developed under the first project would become a registered body within, and co-funded, by RUPP. In addition to running the MSc course every year, the Centre would enable scientists and organisations nationwide to access learning resources, collaborate on joint projects and disseminate their findings (including continuing to publish the *Cambodian Journal of Natural History*, Cambodia's first and only scientific journal). Importantly, outstanding Masters graduates from the first project will be offered placements at the Centre as permanent, sustainably funded Darwin Research Officers. These will be the first full-time academic scientists in Cambodia, with unprecedented opportunities to build up their experience and develop new lines of research to support Cambodia's commitments to the Conventions. The planned Post Project would thus greatly add to the legacy of the first project.

[3] Some of the modules developed under the Darwin Project are now being delivered by trained Cambodian lecturers, but not all of the international trainers can be replaced yet. Under the university's rules, teachers at MSc level must have a PhD, but fewer than 4% of university staff have a PhD (many of whom are nearing retirement!). It will inevitably take several more years to train a sufficient number of national trainers to PhD level. FFI and our partners hope to continue this process under the planned Post Project. In the meantime, the MSc course is supported by student fees and funds secured by FFI.

5 Lessons learned, dissemination and communication

Probably the most important lesson from this project has been the value of maintaining high academic standards and taking a firm stance against nepotism and corruption. Students who enrol on most college or university courses in Cambodia can commonly expect to pass even if they skip classes or fail their examinations repeatedly (it is considered normal practice for schoolchildren and students to bribe their teachers and examiners). This Masters programme established under the Darwin Project is very different in that the students must work hard to pass every course. It is pleasing that RUPP accepted the precautionary measures introduced by FFI, despite the university's obvious reluctance to see any student fail. Though this has sometimes put pressure on project staff to cope with disappointed and disgruntled students, this strictly merit-based approach has helped to push the students into becoming genuinely capable scholars, who can take pride in the knowledge that their results have been earned. Students are given one chance to re-take examinations or re-submit an assignment, and those who fail a term can re-apply the following year (to date, six people have repeated a term). In almost all cases, failure to pass is due to the student not putting enough time into his or her studies.

However, the fact that course has a reputation for being "difficult" in comparison to other courses in Cambodia has given real credibility to the new MSc in Biodiversity Conservation qualification, to the advantage of students who been on the course. Many prospective employers have been impressed with their contact with the students through their thesis research, and our graduates have found immediate employment in the environmental sector. These excellent career prospects should serve to re-enforce the university's interest in delivering this and other courses to a respectable standard. We would therefore recommend any other organisations seeking to build capacity in Cambodia or similar countries to be equally firm on ensuring firm on ensuring qualifications are earned through merit alone.

This Darwin Project, and especially the MSc course it has created, has become well known among the small but diverse conservation community in Cambodia. Project activities and achievements have been disseminated through group meetings and consultations by the project team with collaborating organisations, and extended more widely through press articles, the project newsletter and websites and scientific publications, including the new biannual *Cambodian Journal of Natural History* (see Annex 5). A number of scientific publications are in the pipeline and will be accompanied with press releases. The students and Darwin Scholars have also been excellent ambassadors for the project, as they have developed a wide range of topics for assignments and theses in collaboration with a wide range of organisations all over the country (section 3). Continuing efforts will be made to engage these organisations in follow up activities in the future, including the planned Post Project, aided by the fact that many of our graduates are now employed by them.

5.1 Darwin identity

The Darwin Initiative has been the largest and most consistent supporter throughout the first 3.5 years of this project, and its name (and, where possible, logo) have been prominently displayed on almost every project email, press article, training document, guest lecture announcement, thesis, and other publications. In addition to the many outputs to date, there are still further press releases, scientific papers and other publications in the pipeline that will also credit Darwin Initiative's support. For example, the Team Leader is currently in discussions with *Oryx – The International Conservation Journal* to publish a paper documenting this project's methods and lessons learned as part of the planned Darwin Initiative Twentieth Anniversary issue.

Though the Darwin Initiative was not the only sponsor of this programme (see section 7.2), it was identified with every component (whereas the other sponsors tended to contribute to only one or a few parts). The Darwin Initiative's role was notably reflected in the titles of the "Darwin Scholars" - the 20 research officers supported by this project - even though the project team successfully secured support from other sources for much of their work.

Consequently, the name of the Darwin Initiative has become familiar to the hundreds of individuals and organisations (both government and non-government) in the environmental and academic sector that have been directly involved in this project, as well as the wider audience who have come

to guest lectures or read the various press articles and publications. While not all of them will know what the Darwin Initiative does outside of Cambodia, we like to think that this project has been quite a good example of what the scheme stands for!

It should be noted that the timing of or project coincided with at least six Darwin Projects in or involving Cambodia (including 14-011, which our project especially closely with). This should have further helped to raise and reinforce awareness of the Darwin Initiative's (and UK Government's) investment in biodiversity conservation in Cambodia.

6 Monitoring and evaluation

The only major change to the original project design was to upgrade the planned short-term diploma course to a 2-year MSc in Biodiversity Conservation. This was requested by our host country partners and approved by Darwin Initiative before the project commenced in 2005. This necessitated starting the project in June 2005, a few months earlier than planned but at no extra cost. The change to start date was also approved by the Darwin Initiative in writing.

Largely due to this significant upgrade, the logical framework underwent several minor changes, all at the request of reviewers, especially the reviewer of our annual report for Year 2 (2006-07). As explained in our Year 3 annual report (dated April 2008), the main changes to the log frame were: (i) The indicators for the Purpose have been refined to emphasise the important steps taken to provide quality assurance; (ii) Output 1 has been reframed to cover the development of teaching materials with delivery of the bridging course and each year of the MSc as separate activities (indicators are the students successfully meeting defined standards); (iii) The original Outputs 2 and 4 have been combined under one output (Output 2); (iv) All key publications have been assigned to the final output (Output 4); and (v) All key activities have been outline numbered to show which outputs they contribute to." The duly revised logical framework was presented in our last annual report and can also be seen in Annex 2.

Methods of monitoring and evaluation included monthly FFI meetings in Phnom Penh (where progress was discussed and peer-reviewed by other FFI staff in Cambodia), monthly RUPP Steering Committee meetings involving selected panel of senior university staff and FFI project leaders, quarterly activity reports in English and Khmer to the Cambodian Ministry of Foreign Affairs, graded student assignments and examinations, student feedback questionnaires, debriefings by lecturers on their perception of progress made and lessons learned, and the establishment of databases to record specimens in the new reference collection and book titles in the conservation reference library.

The project team has regularly assessed the project's progress against the activity milestones and measurable indicators on the log frame, as shown in all of our annual reports to Darwin Initiative. We have also tracked our progress against the original target list of standard measures (Annex 4). This approach has been useful, but had to be supplemented with more detailed indicators during the course of the project. In particular, the development of the MSc curriculum warranted a much more sophisticated system for compiling and analysing statistics on the students and the course, including the grades achieved in multiple examinations and assignments. The FFI Project Coordinator, Callum McCulloch, was responsible for maintaining this database. Having this wealth of data to hand proved invaluable for meetings with the RUPP Steering Committee to determine objectively which students to admit to the course, and which students pass or fail.

The project has also received visits by staff from organisations that provide matched funding, notably Dr Fred Bagley from USFWS and Lisa Genasci from ADM Capital Foundation, to conduct their own appraisals (we received positive verbal reports from these staff, but unfortunately no reports in writing). No other independent evaluations have been carried out.

Besides monitoring the progress of persons enrolled on the Bridging Course, MSc curriculum or Darwin Scholarship scheme at the university, it would be useful to continue to monitor the careers of students after they leave, to determine whether they remain in the environmental sector, which parts of their training have proved most or least useful to them, and what impacts they have on biodiversity management (e.g., research or conservation projects they have undertaken). The project office has maintained contact details of all the students so this is something we could

develop as part of the planned Post Project. The rising capacity of people and organisations supported though this project can also be compared against the baseline date in the original needs analysis conducted by FFI in 2005: The *Capacity Needs Assessment of the Natural Resource Sector in Cambodia.* This study revealed widespread deficiencies in the knowledge and skills of many staff in Cambodia's environmental and education sectors, and provided the stimulus for developing this Darwin Project. In the near future, it would be interesting to repeat the original needs analysis questionnaires with persons who have been students or Darwin Scholars with this project - they would undoubtedly perform significantly better.

6.1 Actions taken in response to annual report reviews

All comments and requests from the previous annual reports were addressed in a timely manner, with explanations detailed in the subsequent half year and annual reports. The reviews were shared with our partners and co-sponsors, including US Fish & Wildlife Service and ADM Capital Foundation. As mentioned above, the project log frame was amended in response to reviewer comments in Year 2, and the Final Log Frame shown in Annex 2 is the same as shown in our last annual report (April 2008).

The reviewer of our last annual report had three comments in his/her report, dated 4 June 2008. As we have not had the opportunity to address them before now, these are answered in turn below.

Reviewer comment 1 - Investigate why certain courses seem to be problematic for some students and take remedial action if required.

The reviewer correctly noted that Research Analysis in semester 1 of the MSc curriculum has proved particularly challenging for some students, as has Behavioural Ecology in semester 2. Both modules are led by the project's Chief Lecturer, Dr Carl Traeholt, and have a strong emphasis on critical thinking and logical reasoning. Many of our students find this particularly challenging because, to be frank, they are not taught or encouraged to think for themselves in Cambodian schools. Even undergraduate courses in Cambodia centre on learning by rote, and the unquestioning acceptance of facts given by the teachers, without testing facts through logic or practical exercises. We have therefore found all our new students to be exceptionally skilled at listening to verbal information and reciting facts parrot-fashion, but often poor at forming summaries, drawing conclusions or correctly rejecting unsupported statements. Some students grasp the principles of critical thinking quickly, but it seems that others must undertake the course and examinations more than once for this to sink in (and a minority fail even after the second attempt).

Another challenging aspect of both courses is the requirement the students to undertake further reading and read around the subjects, which is again something they are not accustomed to doing in either English or Khmer.

Critical thinking and further reading are therefore difficult for many of our students, but they are essential skills for all modern scientists. The students have to learn them in order to pass other scientific modules in the curriculum and successfully design and complete their own thesis research in the second year. While Dr Traeholt has done his best to make these modules as clear and straightforward as he can, we believe it would be a mistake to omit these courses or permit students to pass them without having grasped the fundamental principles.

Reviewer comment 2 - Investigate option of offering single courses from the programme for continuing education

This is something that the project team have discussed extensively. It would indeed be a welcome and useful strategy for students who are interested only in specific modules or in-service employees who cannot enough time to attend the entire 2.5-year curriculum. The project leader and other members of the team have encountered strong interest from a number of individuals and their employers, especially if the courses can be held in evenings.

The main drawback of this approach is that some of the present modules are too difficult for students if taken in isolation. As noted above, most Cambodians enter this course ill equipped by their own national education system to think like scientists and read around the subjects. The modules are deliberately interlinked in to build these skills, and it often takes several modules to

raise their learning and critical reasoning skills to the level of a western student. Consequently, students who enrol for a single module on a one-off basis are likely to struggle and fail, or would require considerable additional attention from the trainer (potentially at the expense of the full-term students in the class).

To conclude, the idea of short-term courses is not without merit and would be welcomed by many potential trainees, but we believe it would require changes to the design and delivery of the current modules. For the sake of the full-term MSc candidates, and to maintain the high scientific standard of the MSc curriculum, most short term courses would need to run separately, which would incur additional trainers and other costs. It was clearly not possible to implement such changes during the final four months of the project (the reviewer's comments were received in June 2008 and the Darwin Project ended on 1 October 2008), but this is something we would try to explore further under the planned Post Project.

Reviewer comment 3 - Clarify the reason for the lower expenditure on Darwin Scholars.

As the reviewer correctly guessed, the reduced expenditure on Darwin Scholars is because the project team succeeded in finding other grants and contributions in-kind to support the work of 18 of the 20 Darwin Scholars. Funds thus saved were used to increase the range of lecturers and supervisors (as proved necessary when the short diploma course in the original proposal was upgraded with Darwin Initiative's consent into a 2.5-year MSc curriculum, which some students have taken three years to complete).

7 Finance and administration

7.1 Project expenditure

The project spent the agreed total amount of £154,484 with only minor deviations in the eight major budget lines.

Under 'Others', there was a significant under-spend (£229) on bank transfer charges, due largely to FFI adopting a new, cheaper method of transferring towards the end of this project. The savings on bank transfer charges were transferred to other project budget lines, notably accommodation (which the costs of which have risen in Cambodia).

Under 'Staff Costs', there was a very minor overspend (£18) on total salaries and stipends, but the table below shows some greater discrepancies within the budget lines for individual staff. As noted above, the significantly reduced expenditure on Darwin Scholars is because the project team succeeded in finding other grants and contributions in-kind to support the work of 18 of the 20 Darwin Scholars.

Item	Budget	Expenditure	Balance
Rent, rates, heating, overheads etc			
Office costs (e.g. postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment			
Equipment for reference collection			
Library: journal acquisitions etc			
Computer			
Office furniture			

Item	Budget	Expenditure	Balance
Emergency medical supplies			
Others:			
Audit			
Accommodation			
Bank transfer			
Salaries (specify)			
Team leader: overall project management i.e. financial and reporting (Dr Jennifer Daltry)			
Project Coordinator: on-site management, teaching and mentoring (Mr Callum McCulloch)			
Chief lecturer: responsible for developing course curriculum, conducting most lecturers, supervise "Darwin Scholars" (Dr Carl Traeholt)			
Co-lecturers: assist and support international Chief Lecturer in developing course curriculum, information dissemination and students liaison			
Curators: manage and maintain zoological reference collection			
20 "Darwin scholars": conduct research in Cambodian conservation topics, lecture new students, publish academic papers			
Secretary: accounting support and daily operation support			
TOTAL	**154,484**	**154,484**	**0**

7.2 Additional funds or in-kind contributions secured

£121,816 additional funds were secured to support the Darwin Project:-

Year	Duration of grant	Contributing Agency	Amount Secured £
1	Oct 2005 – Sept 2006	Association for Cultural Exchange (Cambridge, UK)	3,000
1	2005	DANIDA Cambodia	1,000
2	Sept 2006 – Aug 2007	USFWS Tiger and Rhino Fund	28,571
3 & 4	April 2007 – Jan 2009	ADM Capital Foundation	58,823
4	Oct 2008 – April 2010	USFWS Great Apes Fund	30,422
		Total	**121,816**

Substantial in kind support was secured from a wide range of sources, to an estimated value of over £425,000, including the in-kind contributions anticipated in the original proposal. (The values below are estimated from the approximate cost of renting or purchasing these services or resources from equivalent suppliers):

- The ***Royal University of Phnom Penh*** provided rooms and electricity for the project office, specimen collection, classroom, laboratory and library, lecturing support and the salary of a national counterpart (total value of at least £70,000).

- The ***Ministry of Environment*** and ***Ministry of Agriculture, Forestry and Fisheries*** contributed research facilities, research permits and staff time (trainers and Darwin Scholars) to the value of £25,000.
- ***Fauna & Flora International*** provided additional mentoring, contributed staff costs for four Darwin Scholars and travel, accommodation, subsistence, office space and equipment for Darwin Scholars and students conducting their final year theses hosted by other FFI field projects in Cambodia, including the Cambodia Primate Conservation Project, Cambodian Crocodile Conservation Programme, and Cardamom Mountains Wildlife Sanctuaries Project (worth over £100,000 to the Darwin Project).
- ***Conservation International, Wildlife Conservation Society, WWF and other projects and organisations*** in Cambodia also provided additional mentoring and staff costs for Darwin Scholars, and contributed travel, accommodation, subsistence, office space and equipment for Darwin Scholars and students (worth over £150,000).
- ***The Maryknoll Organisation*** contributed half the salary of the Project Coordinator for the first 12 months of the project
- ***British and other international trainers*** generously donated their time to deliver MSc modules and mentor Darwin Scholars and students, notably Dr Simon Loader, Dr Brad Pettitt, Dr Lee Grismer and Richard Paley. Their contribution saved the project approximately £
- The British ***Natural History Book Service*** and ***Zoos Victoria*** donated course books to the Conservation Reference Library. Additional books were donated from the personal library of the Project Leader and other trainers (valued at £400).

In addition, many experts contributed their time as peer reviewers for student theses and project publications, or served on the International Editorial Board of the *Cambodian Journal of Natural History*. (Such services are commonly provided by scientists free of charge to scientific journals so we have not attempted to place a price on this contribution).

7.3 Value of DI funding

More than half of the cash funding for this project came from Darwin Initiative, and the Darwin Initiative grant successfully levered additional small grants (£121,816) and substantial in-kind contributions from a wide range of individuals and organisations (valued at over £400,000).

What was particularly important about the Darwin Initiative grant is that it was over a long period – 3.5 years – that allowed the project team to plan ahead, confident in the knowledge that the core operating costs would be covered. (Most conservation grant schemes, on the other hand, provide grants for only a single year, resulting in chronic uncertainty about whether activities can be continued, or staff contracts renewed the following year). Because a good education in conservation science takes several years (our MSc curriculum is 2-2.5 years), this project is unlikely to have got off the ground without Darwin Initiative's support.

Another major advantage of the Darwin Initiative scheme was that it covered many of the necessary staff costs, including the British trainers. In our experience, most conservation grant schemes are reluctant to fund salaries, especially those of international staff. Nevertheless, a major capacity building project like this demands a considerable amount of time from qualified and experienced teachers and trainers, who did not exist in Cambodia when this project started. The success of this project therefore owes much to the fact that the Darwin Initiative covered a substantial portion of the costs of the British trainers, enabling us to devote enough time to coaching the trainees and ensuring the outputs would be of high and lasting quality.

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 2005 – October 2008	Actions required/planned for next period
Goal: 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		Cambodia's capacity to conserve and sustainably use biodiversity has been greatly enhanced from training and new tools provided by the Darwin Project. This is translating into better biodiversity management (some specific examples of which are given in the main text).	
Purpose To build capacity in conservation and applied research at Cambodia's premier university, chiefly by establishing new teaching modules and MSc in conservation biology, supported with practical field experience.	Number of active research projects and conservation biology courses at the Royal Universities, Number of new students, Protocols in place to ensure quality control and merit-based qualifications.	30 research projects have been carried out by final year Masters students and Darwin Scholars in collaboration with a wide range of governmental, academic and non-governmental organisations, Many of these studies are ongoing, and more are under development. 19 modules (6 Bridging Course and 13 MSc modules) were developed and delivered at the Royal University of Phnom Penh (RUPP). 108 students have undertaken training and the first 6 completed their MSc degrees in 2008. Safeguards were introduced by the Darwin Project to ensure the qualifications were based on merit alone, many of which have been incorporated into RUPP's new regulations on *all* its postgraduate degrees.	More students will graduate in 2009 and this important milestone is to be widely publicised.
Output 1. 12-week Bridging Course developed and delivered every year. Two-year MSc curriculum developed and delivered to students who pass the Bridging Course. 20 students selected to be junior research	Courses and exams conducted every semester, The number of students trained and attaining the required standard, The number of active junior research officers increased at the Royal	The upgrading from a conservation Diploma (as planned in our original proposal) to MSc programme was agreed with the Darwin Secretariat in 2005 and resulted in the number of training weeks per student rising significantly from 15 (original proposal) to more than 70. These comprise a 12-week Bridging Course, c. 30 weeks of taught course work in two terms, and 1 year of supervised thesis research. A rolling intake of students was accepted every year, resulting in 108 nationals trained on the Bridging Course and 57 on MSc modules. 24 have reached the thesis	

officers ('Darwin Scholars').	University.	stage of the MSc degree to date. The first six have graduated and 18 are currently finalising their thesis in readiness for graduating in 2009. 20 outstanding young Cambodian scientists were selected as Darwin Scholars, based at or affiliated to RUPP: Hourt, Thy, Thou, Sethik, Saveng, Keavuth, Samkeat, Serevathanakreasey, Saravuth, Norong, Vichheka, Horn, Han, Vattana, Channa, Vuthy, Kannitha, Sothea, Sony and Elyan. All have a Masters degree or will soon graduate from our MSc programme. They have been assisting with teaching and conducting original research in the fields of taxonomy, sustainable use and conservation biology.
Activity 1.1 Develop Bridging Course and MSc level module curriculum and exams, and conduct lectures in applied research, conservation biology and natural research management.		The Bridging Course and Masters of Science programme in Biodiversity Conservation was developed at the Royal University of Phnom Penh and launched in Year 1. Six new modules were devised for the Bridging Course: English for Academic Purposes, Introduction to Ecology, Biology and Genetics, Ecology and Evolution, Statistics for Biologists, and Computer Applications. The Masters course comprises 13 new modules: Integrated Natural Resource Management, Environmental Impact Assessments, Environmental Law, GIS, Research Analysis, Scientific Report Writing, Data Presentation; Species Conservation, Ecological Field Techniques, Behavioural Ecology, Research Methods & Applied Statistics, Project Cycle Management and Introduction to Protected Areas Management. These modules cover a wide range of contemporary biodiversity management issues, skills and approaches that are relevant to Cambodia. The courses have been running annually for the duration of the project, allowing the training materials to be further refined based on experience and feedback.
Output 2. The Royal University obtains essential field equipment, research facilities and hardware to conduct conservation research projects. Cambodia's first zoological and botanical reference collections and basic library facilities initiated, with databases and trained curators.	Conservation research projects at the Royal University have adequate equipment and other resources; Active reference collections and library set up, specimens remain in Cambodia for general use.	A wide range of field equipment has been purchased for use by the students and Darwin Scholars at RUPP, including various navigational and survey equipment (e.g., GPS units, dissecting kits, compasses, thermohygrometers, and binoculars) and camping gear (e.g., hammocks, backpacks and tarpaulins). Students have learned how to use these tools as part of the Ecological Survey Techniques module on the MSc curriculum, and applied them during their final year research for their theses. The Darwin Scholars have also conducted many lines of research during this project (below). The National Zoological Reference Collection, National Herbarium, quarantine room (Activity 2.1) and library (Activity 2.2) have been fully established in the Faculty of Science, and are in active use by students, Darwin Scholars, university staff and other projects. An increasing number of foreign scientists are choosing to deposit most of their specimens at these national collections instead of taking all of them

		overseas. The national collections are available for use by all scholars with an interest in Cambodian biodiversity. In addition, the project has renovated classrooms at RUPP and, during the last year of the project, established a Research Laboratory in the Department of Biology for use by the Masters students and other faculty staff.
Activity 2.1. Prepare reference collection facilities, including designing and initiating a database system, procure necessary storage and preservation equipment and materials, train curators and collect and identify specimens collected during fieldwork by the students and Darwin Scholars.		The National Zoological Reference Collection room has been constructed, together with the National Herbarium and its quarantine room in the Faculty of Science (on the same floor as the project office). The three rooms are fitted with air conditioners and cabinets, and have been sealed from the elements to ensure proper storage of wet and dry specimens. Shelving, jars, and other hardware were purchased, and a specimen database and protocols developed under guidance from Dr Simon Loader (The Natural History Museum, London). Darwin Scholar Ith Saveng was appointed as the Head Curator for the museum and he and three other persons received training in taxonomy and curation. During Years 2 and 3, the Muséum National d'Histoire Naturelle (Paris) and the French Government launched the programme "*Sud Expert Plantes: Flore du Cambodge, du Laos et du Viêtnam*". Following consultation with our project team, this programme has enabled a full time botanist, Loic Cecilio, to work in the new Herbarium since 2008, in collaboration with the Darwin Project, Ms Yok Lin (Head of Botany at RUPP) and Dr Eric Chenin (Sud Expert Plantes). Over 2,000 plant specimens in Paris will be repatriated to Cambodia and placed in the Darwin Project herbarium. The collections currently contains well over 200 animal specimens and several hundred plant specimens, principally donated by FFI, the Ministry of Environment, Conservation International, and the Forestry Administration. More specimens are being deposited by visiting scientists and students conducted their thesis research.
Activity 2.2. Initiate a small library of books, papers and reports relevant to the study and conservation of Cambodian biodiversity (linked to the database system).		A Biodiversity Conservation Reference Library was initiated in Year 1 and is fully operational at the Royal University of Phnom Penh. It comprises books and journals on the themes of biodiversity conservation, biological research and sustainable development. More than 230 titles have been obtained during the project and a library database had been established and populated. Importantly, the project library has also given students and Darwin Scholars access to computers and the Internet, enabling them to access a large number of online journals to aid in their research.

Output 3. The development of new inter-institutional partnerships to implement conservation-oriented research and education projects in Cambodia.	University staff and students work alongside staff from local NGOs and government agencies in at least 20 conservation-oriented research and education projects, including 3-5 joint workshops.	There has been striking progress in this output during the course of this Darwin Project. The long list of over 50 collaborating institutions shown in Section 3 includes all the most prominent groups involved in environmental education and biodiversity management in Cambodia, as well as a growing network of British and other international organisations. At least 30 distinct research projects were completed during Years 2 and 3, including 20 by MSc candidates (as part of their final year theses) and ten by Darwin Scholars (Activity 3.1). Most of these were conducted in collaboration with two or more organisations, typically one government agency and one NGO. By raising and maintaining high standards, the Masters course has gained genuine credibility, and many organisations have offered placements to the students. In fact, all six that have formally graduated have found full time employment with environmental or conservation organisations. The remaining 12 soon to be graduates are anticipated to follow this lead, as many organisations are enquiring about their status and their completion date. Project students, staff and Darwin Scholars also participated in a number of multi-stakeholder workshops, both within Cambodia and overseas. For example, five MSc students took part in two conferences in Thailand in Year 2 ("*Sustainable Development: Issues and Prospects for the Greater Mekong Subregion*" and "*Primate Ecology and Conservation*"), introducing them to more members of the conservation community in Southeast Asia. Darwin Scholars Neang Thy and Chav Thou were technical advisers to a series of workshops to develop management plans for protected areas in the Cardamom Mountains in Years 1 and 2, involving local community members, district, provincial and national government agencies, and other stakeholders. Neang Thy subsequently represented Cambodia at a South East Asia workshop in Kuala Lumpur to develop a "*Strategy for the Sustainable Use and Management of 115 Timber Tree Species Subject to International Trade*".
Activity 3.1 Develop applied research projects that are integrated with existing FFI and government conservation projects		The MSc class of 2006 have completed or are completing 12 collaborative research projects as part of their final year theses. The class of 2007 is conducting eight collaborative research projects. All 20 projects focus on contemporary conservation issues and are hosted by a number of national and international organisations and projects (see Table 1 for final year thesis titles). The 20 designated Darwin Scholars have undertaken a further 10 projects on environmental topics. For example, Khou Eang Hourt has conducted research on rattan taxonomy and the economic importance and sustainability of the wild bamboo trade, and Chav Thou has devised a project to monitor large mammals using camera

		traps and standardized counts of tracks along transects. The results of these studies are being disseminated in student theses, conferences, and the *Cambodian Journal of Natural History* (Activity 4.2).
Activity 3.2 Promote Cambodia and the Royal Universities for national researchers and students		In addition to advertising the Masters programme, the Darwin Project has organised many meetings to elicit to involvement of other national, regional and international organisations. This programme is now widely known in Cambodia, and more than 30 organisations were involved during the life of the project, including the UK's Harrison Institute, Cambridge University, Oxford University, Frontier, and Natural History Museum. The Harrison Institute, for example, supervised three of the Masters students in a student exchange and training programme affiliated to Darwin Project No. 14-011. In another example, in Year 4, faculty staff from St Peters College at Oxford visited FFI and the Royal University of Phnom Penh to view the potential of establishing a field research station in the Phnom Samkos Wildlife Sanctuary. With their support it is hoped that a permanent site will be established in 2009 for the use by Darwin Scholars, MSc students and Oxford faculty and students.
Output 4. Publication of newsletter and field guides to disseminate original research and lessons learned. The first issue of the Cambodian Journal of Natural History launched, published and distributed (final year of project).	Editors and review panel established, Journal available to NGO, GO and academic institutions, Field guides published in Khmer language.	The *Cambodian Journal of Natural History* was launched successfully, with an Editorial Team, an International Editorial Board, an additional circle of peer reviewers, and detailed protocols for authors and reviewers. The first issue was published in September 2008 and has been widely distributed in Cambodia (including all government agencies, NGOs and universities) and to more than 20 countries overseas. Other publications to disseminate research findings and techniques are summarised below and listed in Annex 5.
Activity 4.1 Produce and publish project newsletter and peer-reviewed field guides to Cambodian wildlife and contemporary biodiversity management issues.		A project newsletter was launched in Year 2. *A Field Guide to the Amphibians of Cambodia*, was authored by Darwin Scholar Neang Thy and FFI's Jeremy Holden, and published in both English and Khmer versions in 2008. This is the first reference to Cambodia's amphibians, many of which were discovered and photographed for the first time. More than 300 copies have been distributed. The manual *Green Development: Guidelines for Sustainable Development in Protected Areas* was authored by the Team Leader and published in Khmer by FFI and the Ministry of Environment in Year 2. Copies continue to be disseminated nationwide, and credit Darwin Initiative support. In addition, Darwin Scholars and project staff authored or co-authored 10 scientific

	papers, including describing four species new to science (discovered by Darwin Scholars during Years 2 and 3).
Activity 4.2 Found the *Cambodian Journal of Natural History* including creating an editorial committee, design lay-out and volume format, set up reviewer network and publish first round of papers.	The *Cambodian Journal of Natural History* began in Year 3 with the establishment of the Editorial Team (Dr Jennifer Daltry, Dr Carl Traeholt, Callum McCulloch) and an International Editorial Board in March 2008. The nine board members are: Dr Stephen J. Browne (Fauna & Flora International, Cambridge, UK); Dr Martin Fisher (Editor of *Oryx – The International Journal of Conservation*); Dr L. Lee Grismer (La Sierra University, California, USA); Dr Knud E. Heller (Nykøbing Falster Zoo, Denmark); Dr Sovanmoly Hul (Muséum National d'Histoire Naturelle, Paris, France); Dr Andy L. Maxwell (World Wide Fund for Nature, Cambodia); Dr Jörg Menzel (University of Bonn, Germany); Dr Bradley Pettitt (Murdoch University, Australia); and Dr Campbell O. Webb (Harvard University Herbaria, USA). The Editorial Team developed and disseminated instructions to contributors for the journal as well as instructions for all peer-reviewers, modelled on the UK-based *Oryx – International Conservation Journal*. The first call for papers was announced in March 2008, and all manuscripts were subjected to rigorous peer review by at least three independent reviewers. The first issue of the *Cambodian Journal of Natural History* was published in September 2008. It publishes original research by Cambodian or foreign scientists on any aspect of Cambodian natural history, including fauna, flora, habitats, management policy and use of natural resources, and Cambodian scientists on studies of natural history in any part of the world. The new Journal especially encourages material that enhances understanding of conservation needs, and has the potential to improve conservation management in Cambodia.

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Goal: **To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve** • **the conservation of biological diversity,** • **the sustainable use of its components, and** • **the fair and equitable sharing of benefits arising out of the utilisation of genetic resources**			
Purposes To build capacity in conservation and applied research at Cambodia's premier university, chiefly by establishing new teaching modules and MSc in conservation biology, supported with practical field experience.	Number of active research projects and conservation biology courses at the Royal Universities, number of new students, protocols in place to ensure quality control and merit-based qualifications.	Research publications, course modules, Masters in Biodiversity Conservation qualification, written project and university rules on grading and passing students.	Facilities, trainers and students available
Outputs 1) 12-week Bridging Course developed and delivered every year. Two-year MSc curriculum developed and delivered to students who pass the Bridging Course. 20 students selected to be junior research officers ('Darwin Scholars').	Courses and exams conducted every semester, the number of students trained and attaining the required standard, number of active junior research officers increased at the Royal University.	Course modules available, Darwin Scholars in place and active, researchers working on conservation projects.	Trainers available, sufficient number of students qualifying to become Darwin Scholars
2) The Royal University obtains essential field equipment, research facilities and hardware to conduct conservation research projects. Cambodia's first zoological and botanical reference collections and basic library facilities initiated, with databases and trained curators.	Conservation research projects at the Royal University have adequate equipment and other resources; active reference collections and library set up, specimens remain in Cambodia for general use.	Equipment purchased and in use, facilities available, reference collections and library set up and used by students and researchers, specimens are identified in-country not sent overseas	Sufficient funding. Staff for training and appropriate facilities available.
3) The development of new inter-	University staff and students work	FFI staff as supervisors, research	Cooperation from NGOs and ministries

institutional partnerships to implement conservation-oriented research and education projects in Cambodia. 4) Publication of newsletter and field guides to disseminate original research and lessons learned. The first issue of the *Cambodian Journal of Natural History* launched, published and distributed (final year of project).	alongside staff from local NGOs and government agencies in at least 20 conservation-oriented research and education projects, including 3-5 joint workshops. Editors and review panel established, journal available to NGO, GO and academic institutions, field guides published in Khmer language.	officers attached to MAFF/ MoE/ NGO research and conservation projects, abstracts, proceedings and reports printed Printed copies of Cambodian Journal of Natural History, newsletter and field guides.	 Sufficient contribution of papers, review panel members active

Activities 1.1 Develop Bridging Course and MSc level module curriculum and exams, and conduct lectures in applied research, conservation biology and natural research management	**Activity Milestones** Year 1 Q1&2: Develop teaching modules; Conduct lectures (largely led by British trainers); Initiate specimen collection and library facilities; Train curators and librarians. Q3&4: Exams and identification of junior research officers ('Darwin Scholars'); Develop research programme with GO and Intl. NGOs; Begin research projects and specimen collection. Year 2 Q1&2: Conduct 2nd round of lectures (input from Darwin Scholars); Continue research projects and supervision of research officers. Q3&4: Exams; Continue research projects; Facilitate international university collaboration; Initiate Cambodian Journal of Natural History (CJNH). Year 3 Q1&2: Conduct 3rd round of lectures (chiefly by Darwin Scholars); Continue research projects; Promote student exchange programmes. Q3&4: Exams; Continue research activities. Publish 1st issue of CJNH.
2.1 Prepare reference collection facilities, including designing and initiating a database system, procure necessary storage and preservation equipment and materials, train curators and collect and identify specimens collected during fieldwork by the students and Darwin Scholars. 2.2 Initiate a small library of books, papers and reports relevant to the study and conservation of Cambodian biodiversity (linked to the database system). 3.1 Develop applied research projects that are integrated with existing FFI and government conservation projects, other international NGOs, and international development projects (thereby sharing costs and expertise). 3.2 Promote Cambodia and the Royal Universities for national researchers and students, and encourage other British institutions to develop student exchange programme. 4.1. Produce and publish project newsletter and peer-reviewed field guides to Cambodian wildlife and contemporary biodiversity management issues. 4.2 Found the Cambodian Journal of Natural History including creating an editorial committee, design lay-out and volume format, set up reviewer network and publish first round of papers.	

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
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	20	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.
8. In-situ Conservation		Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	70	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).
13. Public Education and Awareness		Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses

Article No./Title	Project %	Article Description
		on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information	10	Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution		Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
2	Number of Masters qualifications obtained	**6** (more students are nearing graduation – see 4c)
4c	Number of postgraduate students receiving training (not 1-3 above)	Not including the six above, **102** have conducted Bridging Course [cf 90-120 planned], of which **51** have received training on the MSc curriculum.
4d	Number of training weeks for postgraduate students	**>70** training weeks provided to every successful student, from the Bridging Course to the end of the MSc curriculum.
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	**4** Cambodians trained in animal and plant taxonomy and specimen collection and preservation techniques, including the curators of the National Zoological Reference Collection.
7	Number of types of training materials produced for use by host country(s)	**>20**. 1 manual published on sustainable development in Cambodian protected areas, with 1,000 copies disseminated. 19 new training modules developed and delivered [cf 5 planned], all with supporting materials: (*Bridging Course modules*) English for Academic Purposes, Introduction to Ecology, Biology and Genetics, Ecology and Evolution, Statistics for Biologists, Computer Applications; (*MSc modules*) Integrated Natural Resource Management, Environmental Impact Assessments, Environmental Law, Geographical Information Systems (GIS), Research Analysis, Scientific Report Writing, Data Presentation; Species Conservation, Ecological Field Techniques, Behavioural Ecology, Research Methods and Applied Statistics, Project Cycle Management, and Introduction to Protected Areas Management.
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	**240** weeks spent by FFI staff and other British experts, including Callum McCulloch, Dr Jenny Daltry, Zoe Dind, Dr Carl Traeholt, Dr Simon Loader, Emily Woodfield, Richard Paley, Mike Appleton, David Emmett. (These figures do not include time spent in the country by British members of the journal editorial board or

Code	Description	Totals (plus additional detail as required)
		peer reviewers).
10	Number of formal documents produced to assist work related to species identification, classification and recording.	**1** field guide published on Cambodian amphibians, with 300 copies disseminated.
11a	Number of papers published or accepted for publication in peer reviewed journals	**10** scientific papers published by Darwin Scholars and project staff and partners in peer reviewer journals. A further 11 manuscripts have been prepared for or submitted to peer-reviewed journals by Darwin Scholars and students.
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	**2** databases [as planned] established by the project and handed over to the host country (1 database for the Biodiversity Conservation Library, and 1 for the National Zoological Reference Collection and Herbarium)
13a	Number of species reference collections established and handed over to host country(s)	**2** collections established [cf 1 planned]: the National Zoological Reference Collection and National Herbarium. Both collections are permanently housed by the RUPP Faculty of Science.
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	**3** organised [cf 3-4 planned]
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	**5** conferences and workshops attended by students and Darwin Scholars at which they presented findings from their research [cf 3-4 planned]
15a	Number of national press releases or publicity articles in host country(s)	**13**: 12 newspaper articles in Cambodia, plus 1 article in *The Globe* (national magazine) about the work of Darwin Scholar Neang Thy. [cf 12-16 planned].
15c	Number of national press releases or publicity articles in UK	**2** (1 magazine article about the project in *Fauna & Flora News* magazine, and 1 press release from Fauna & Flora International to announce the amphibian field guide published in 2008. The latter resulted in an article in *The Times* towards the end of the year and at least a dozen websites/ blogs worldwide)
16a	Number of issues of newsletters produced in the host country(s)	**1** newsletter produced ('The Missing Link').
16b	Estimated circulation of each newsletter in the host country(s)	**100**
17a	Number of dissemination networks established	**2** formal networks established (Steering Committee to oversee and disseminate lessons learned from MSc course, and

Code	Description	Totals (plus additional detail as required)
		International Editorial Board to oversee and disseminate the *Cambodian Journal of Natural History*).
19a	Number of national radio interviews/features in host country(s)	**1** interview with Darwin Scholar Neang Thy on national radio in September 2008.
19d	Number of local radio interviews/features in the UK	**1** interview with J. Daltry on BBC Radio Cambridge in December 2008 (*after the Darwin Project ended)*.
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	**£81,000** [cf £75,000 planned]
21	Number of permanent educational/training/research facilities or organisation established	**1** Centre for Biodiversity Conservation established at the RUPP Faculty of Science as a vehicle for delivering the MSc curriculum and hosting research facilities. This physically comprises the project office, a fully renovated and equipped classroom, research laboratory, library/ computer room, equipment storage space and the two reference collections.
22	Number of permanent field plots established	**18** permanent tree plots and mammal monitoring transects established in the Cardamom Mountains [cf 10-12 planned].
23	Value of additional resources raised for project	**Approximately £545,000** (£121,816 from Association for Cultural Exchange, USFWS, ADM Capital Foundation and DANIDA, plus £425,000 support in kind from RUPP, FFI, and others – see Section 7.2) [cf £268,763 planned].
Other Measures used by the project and not currently including in DI standard measures		
	Number of websites	**1** project website created in Cambodia (plus 1 project web page established on the FFI website)
	Number of scientific journals	**1** scientific, peer-reviewed journal launched (*Cambodian Journal of Natural History*), disseminated to over 20 countries.

Annex 5 Publications

Type *	Detail	Publishers	Available from	Cost £
Newsletter (standard measure code 16a)	McCulloch, C. (2007) *The Missing Link.* [In English].	"The Centre for Biodiversity Conservation" (FFI and RUPP), Phnom Penh	Callum McCulloch (contact details in Annex 6)	n/a
Manual (standard measure code 7)	Daltry, J.C., Fox, M., & Appleton, M.R. (2006) *Green Development: Guidelines for Sustainable Development in Protected Areas*. [In Khmer].	FFI and the Ministry of Environment, Phnom Penh	Jenny Daltry (contact details in Annex 6) * *Copies were mailed to Darwin Initiative in 2006.*	£10 / Free to Cambodians
Field Guide (standard measure code 10)	Neang T & Holden, J. (2008) *A Field Guide to the Amphibians of Cambodia.* [In English and Khmer].	FFI	Jenny Daltry * *Copies were mailed to Darwin Initiative in October 2008*	£27 / Free to Cambodians
Peer-reviewed paper (by Darwin Scholars and Project Leader)	Grismer, L.L., Neang T., Chav T., Grismer, J.L., Wood, P.L., Youmans, T.M., Ponce, A., Daltry, J.C., & Kaiser, H. (2007) The herpetofauna of the Phnom Aural Wildlife Sanctuary and checklist of the herpetofauna of the Cardamom Mountains, Cambodia. *Hamadryad* 31: 216-241.	Centre for Herpetology, India	Jenny Daltry	n/a
Peer-reviewed paper (by Darwin Scholars)	Grismer, L.L., Neang T., Chav T., *et al.* (2007) A new species of *Chiromantis* Peters 1854 (Anura: Rhacophoridae) from Phnom Samkos in the northwestern Cardamom Mountains, Cambodia. *Herpetologica* 63: 392-400.	The Herpetologists' League	Jenny Daltry	n/a
Peer-reviewed paper (by Darwin Scholars)	Thomas, P., Khamphone S., Vichith L & Khou Eanghourt (2007) New records of conifers in Cambodia and Laos. *Edinburgh Journal of Botany* 64: 37-44.	Royal Botanic Garden Edinburgh	Jenny Daltry	n/a
Peer-reviewed paper (by Darwin Scholars)	Grismer, L.L., Neang T., Chav T., *et al.* (2008) Additional amphibians and reptiles from the Phnom Samkos Wildlife Sanctuary in Northern Cardamom Mountains, Cambodia, with comments on their taxonomy and the discovery of three new species. *Raffles Bulletin of Zoology* 56: 161-175.	National University of Singapore.	Jenny Daltry	n/a

Peer reviewed scientific journal	*The Cambodian Journal of Natural History*. Volume 2008, Issue 1. (Contains the papers listed below)	"The Centre for Biodiversity Conservation" (FFI and RUPP)	PDF available from www.conservationcambodia.org Printed copies available from Jenny Daltry and Callum McCulloch * *Copies were mailed to Darwin Initiative in October 2008*	n/a
Peer-reviewed paper (by Project Leader)	Daltry, J.C. (2008) Editorial - Cambodia's biodiversity revealed. *Cam.J.Nat.Hist.* 2008, 3-5.	as above	as above	n/a
Peer-reviewed paper (by partners)	Goes, F. (2008) Ongoing publication project: an annotated checklist of the birds of Cambodia. *Cam.J.Nat.Hist.* 2008, 6.	as above	as above	n/a
Peer-reviewed paper (by partners)	Rawson, B., & Roos, C. (2008) A new primate species record for Cambodia: *Pygathrix nemaeus. Cam.J.Nat.Hist.* 2008, 7-11.	as above	as above	n/a
Peer-reviewed paper (by Darwin Scholars)	Grismer, L.L. Neang T., Chav T. & Grismer, J.L. (2008) Checklist of the amphibians and reptiles of the Cardamom region of southwestern Cambodia. *Cam.J.Nat.Hist.* 2008, 12-28.	as above	as above	n/a
Peer-reviewed paper (by partners)	Dunai, A. (2008) The Protected Area Law of Cambodia: a legal evaluation. *Cam.J.Nat.Hist.* 2008, 29-41.	as above	as above	n/a
Peer-reviewed paper (by Project Leader)	Daltry, J.C. (2008) Bridging the gap between development aid and environmental conservation in post-conflict Cambodia. *Proceedings of the Co-operation On Health And Biodiversity (COHAB) conference, 2008*. (In press).	Co-operation On Health And Biodiversity (COHAB), Galway, Ireland.	Jenny Daltry	n/a

Annex 6 Darwin Contacts

Ref No	14-037
Project Title	Building University Capacity to Train Future Cambodian Conservationists
UK Leader Details	
Name	Dr Jenny Daltry
Role within Darwin Project	Project Leader
Address	Fauna & Flora International, Jupiter House, Station Road, Cambridge CB 1 2JD FFI Cambodia, 59, Street 306, PO Box 1380, Boeung Keng Kang 1, Phnom Penh, Cambodia. (New office address since 25 November 2008)
Phone	
Fax	
Email	
Other UK Contact (if relevant)	
Name	Mr Callum McCulloch
Role within Darwin Project	Project Co-ordinator (FFI)
Address	FFI Cambodia, 59, Street 306, PO Box 1380, Boeung Keng Kang 1, Phnom Penh, Cambodia. (*New office address since 25 November 2008*) Centre for Biodiversity Conservation, Room 415, Main Campus, Royal University of Phnom Penh, Confederation of Russia Boulevard, Phnom Penh (*Project office*).
Phone	
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Partner 1	
Name	Mr Sethik Rath
Organisation	The Royal University of Phnom Penh
Role within Darwin Project	Project Co-ordinator (RUPP)
Address	Centre for Biodiversity Conservation, Room 415, Main Campus, Royal University of Phnom Penh, Confederation of Russia Boulevard, Phnom Penh (*Project office*).
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Annex 7 Supplementary Material

Below are further details of the students participating in the training programme since the start of the project, as requested by a previous reviewer. Please note that this annex contains confidential personal data and should be removed before posting this report on the Darwin Initiative website.

i) Number of students participating in the training programme since start of project

ii) Names and origins of students participating in training since start of project (CONFIDENTIAL)

Tables show Masters level students only. Pie charts summarise the origin and first degrees of all students who enrolled on the Bridging Course during that year.

Class of 2007 – Masters candidates

Class of 2008 – Masters candidates

iii) Grades for Masters in Biodiversity Conservation coursework (CONFIDENTIAL)

Class of 2007

Class of 2008

iv) Images from the Project – Years 1 and 2

Project Main Office at RUPP - Callum McCulloch and Rath Sethik

RUPP-FFI Steering Committee

Students on field trip to Phnom Samkos Wildlife Sanctuary – Ecological Survey Techniques module (led by Dr Jenny Daltry)

First Year Class – Integrated Natural Resource Management (led by Dr Brad Pettitt)

Logo for the “Centre for Biodiversity Conservation”

Room prior to conversion into the national museum.

Zoological Reference Collection room

Temporary storage

Catalogued wet specimens

Herbarium boxes containing dry plant specimens

"Fixing" specimens in the field

vi) Images from the Project – Year 3

Final year students undertaking examinations in 2007. This project has introduced a number of safeguards to ensure qualifications are earned through merit only.

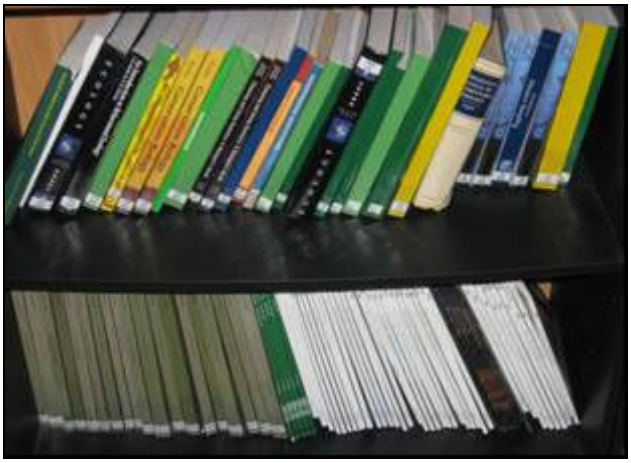
Sign on the Centre for Biodiversity Conservation office at the Royal University of Phnom Penh's Department of Biology, Faculty of Science

Darwin Scholar Chav Thou learning how to set up camera traps for large mammals (tutor Jeremy Holden, FFI).

Print of a large leopard or young tiger found during field training. (Photo by Jeremy Holden, FFI)

Curator Saveng studying mammal specimens in the zoological reference museum

A new Cambodian frog, *Chiromantis samkosensis*, co-discovered and described by two Darwin Scholars in 2007



Some of the 230+ titles in the Conservation Library

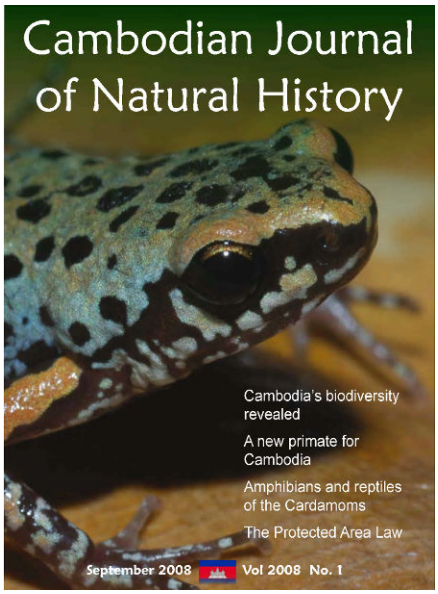
Student class using plant specimens in the herbarium.

Herbarium boxes in the new herbarium.

Undergraduate student using microscope in the new research laboratory.

Botanist Dr Sovanmoly Hul has joined the Editorial Board of the *Cambodian Journal of Natural History*

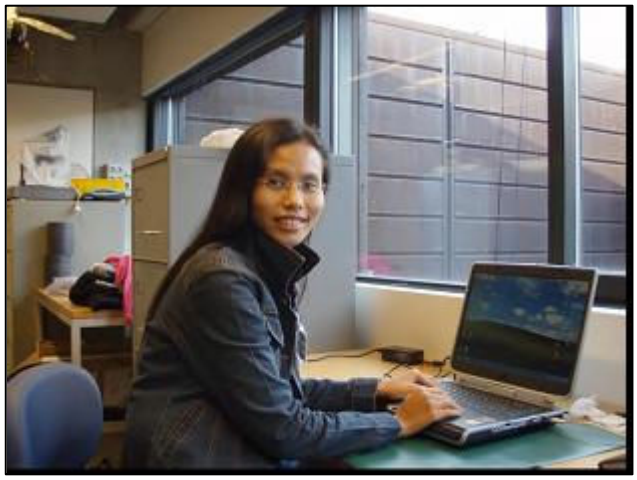
vi) Images from the Project – Final Year



Cover of the new Cambodian Journal of Natural History

MSc students using the Zoological Reference Museum for their research

Darwin Scholar Neang Thy, with a monitor lizard.



MSc candidate Kannitha Lim overseas for advanced training in analysing gibbon vocalizations.

Kannitha Lim demonstrating her analysis of gibbon calls to high school graduates.

MSc student field trip led by Dr Lee Grismer

Students being taught how to preserve specimens in the field