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	16-011
Project Title	Biodiversity and ecosystem functioning: Building research capacity in SE Asia
Host country(ies)	Sabah, Malaysia and other SE Asian nations
UK Contract Holder Institution	University of Swansea
UK Partner Institution(s)	Universiti Malaysia Sabah, Malaysia Yayasan Sabah, Malaysia ASEAN Centre for Biodiversity, Philippines Sabah Forestry Department, Malaysia WWF Malaysia University of Beijing, China
Host Country Partner Institution(s)	Centre for Population Biology, Imperial College, UK Institute for Environmental Sciences, University of Zurich, Switzerland
Darwin Grant Value	£199,605.00
Start/End dates of Project	Start date: July 2007; End date: July 2010
Project Leader Name	Dr Glen Reynolds
Project Website	www.sabahbiodiversityexperiment.net (overall site – not project specific)
Report Author(s) and date	Dr Glen Reynolds (author) Dr Henry Bernard (contributor) Prof. Andy Hector (contributor) Mr. Christopher Philipson (contributor) Dr Jake Snaddon (contributor) Mr. Philippe Saner (contributor)

1 Project Background

Rainforests support much of SE Asia's biodiversity, provision important ecosystem services and are a major source of income. Forest conversion and degradation by logging are having a serious impact on biodiversity and ecosystem functioning, and as a result the livelihoods many people.

In order to understand the consequences of biodiversity loss, the importance of conservation and sustainable management, and the necessity for forest restoration, there is a pressing need for long-term biodiversity experiments to be established – and training provided to local institutions in their design and analysis.

This project addressed these issues through a multi-level training programme - and included a substantial research component as part of the Sabah Biodiversity Experiment at Danum Valley.

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

The project contributed in particular to Article 10 of the CBD (sustainable use of biodiversity), Article 12 (research and training), Article 18 (scientific and technical cooperation) and Themes relating to ecosystems approaches, forest biodiversity and the sustainable use of biodiversity.

Both the training component, and research component through its resulting publications, have 1) elucidated the links between/importance of biodiversity to ecosystem functioning and sustainability/resilience, 2) trained a large number of young scientists and early-career university lecturers and researchers in the design and analysis of biodiversity experiments, 3) embedded technical skills in data recording, management and basic analysis among a large team of research assistants and other field-based staff.

3 Project Partnerships

The Royal Society SEARRP has long-standing links with a number of our partners on this project, particularly Yayasan Sabah, the Sabah Forestry Department and Universiti Malaysia Sabah (UMS). The project has made a particularly important contribution to UMS who, as in previous years, hosted the 2010 training course at their Institute of Tropical Biology and Conservation (ITBC). Teaching materials and methods developed during the course have now been incorporating into the statistics courses given by the ITBC to its own and other science stream students. SEARRP continues to provide supplementary support and training to key staff from ITBC and, funds allowing, we expect to provide annual refresher courses for key ITBC staff.

As with earlier courses, participation from our other Malaysia-based partners on the 2010 statistical training course was excellent (see attached list of attendees) – and the Institute of Botany (University of Beijing), China again sent a number of senior staff to participate. However, due to the continuing fall in the value of the GB Pound relative to the Malaysian Ringgit (a reduction in value of almost 35% over the duration of the project) we were unable to invite participation from the wider SE Asian region, as had been the original intention.

Support from UK and other non-Asian partners remained strong – particularly from the University of Zurich (who provide substantial co-funding for the Sabah Biodiversity Experiment and contributed staff time, travel and administrative support to the statistics courses).

4 Project Achievements

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

Project impacts on biodiversity were indirect and delivered through awareness, capacity building and research. These focussed on demonstrating and understanding the links between biodiversity and ecosystem functioning, training in the design and monitoring of long-term biodiversity studies and advanced techniques for the analysis of biodiversity data.

The project created a pool of expertise in these fields among lecturers, graduate students and research assistants – who have gained the ability, formerly absent or at best incomplete, to establish and monitor long-term biodiversity studies and therefore improve understanding of the importance of biodiversity conservation and sustainable management.

4.2 Outcomes: achievement of the project purpose and outcomes

The project purpose was to: *Increase and sustain the capacity of SE Asian research institutes and conservation organisations to conduct effective research on the linkage between biodiversity and ecosystem functioning*.

This has been achieved in the following ways:

- Training developed and delivered during the project have now been embedded into the curriculum of the main partner institution (Universiti Malaysia Sabah)
- A team of full-time permanently employed staff has been trained in the monitoring of biodiversity experiments and basic methods of data analysis
- A number of articles have been published in international peer-reviewed journals that investigate and elucidate the links between biodiversity and ecosystem functioning
- The project made a major contribution to the establishment and outputs of the Sabah Biodiversity Experiment – a major, long-term study that seeks to examine the links between biodiversity and ecosystem functioning and to optimise methods for the restoration of degraded rainforest.

4.3 Outputs (and activities)

The project outputs where as follows:

1. Raise awareness amongst scientists, conservationists and forest managers in SE Asia of the latest findings and methods for research on biodiversity and ecosystem functioning and their relevance to SE Asia

Achieved mainly by information provided and training delivered during opening project workshop and annual training courses. Embedded through incorporation of teaching materials as part of the curriculum of the lead partner institution

2. Develop standard research methodologies and protocols for long-term research on biodiversity and ecosystem functioning

Techniques used on the Sabah Biodiversity Experiment presented to partner institutions and methodologies published in journal articles and via project website.

3. Identify skills gaps amongst post-doc and postgraduate researchers/research managers and conduct linked training courses and field training events to remedy gaps identified

Skills gaps identified through consultation with partner institutions and addressed through training programme, both classroom and field based

4. Identify skills gaps amongst researcher assistants/field staff and conduct linked training courses and field training events to remedy gaps identified

As above

Final (year 3) Statistics Course at Danum Valley Borneo can be viewed at: http://www.youtube.com/watch?v=wPSQwXCk2rg

5. Disseminate results of new analyses, training course curricula and teaching material, and prepare policy level and public awareness material

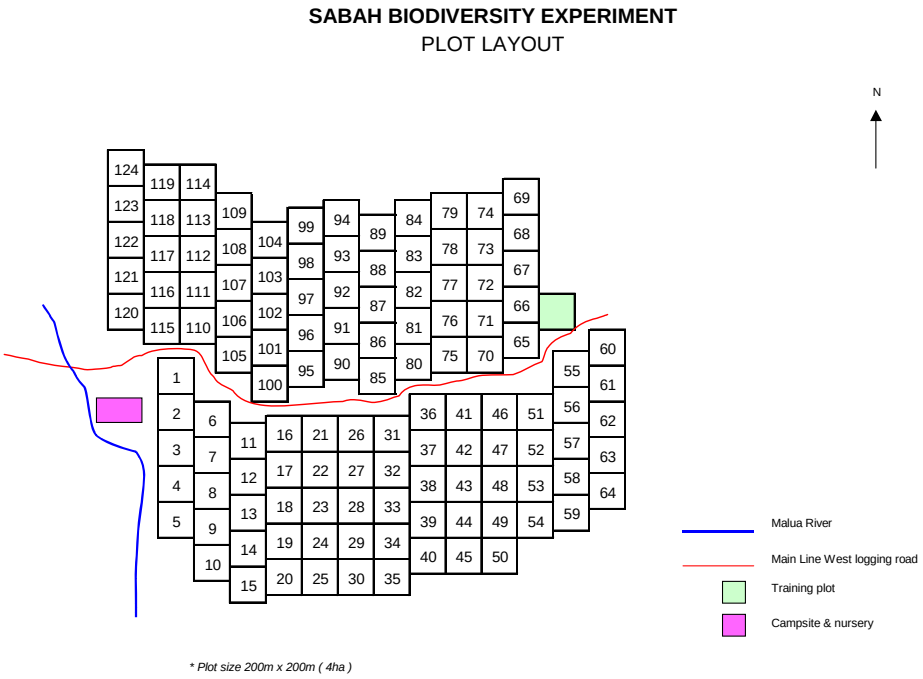
Achieved by teaching materials being incorporated into curriculum of main partner institution and training provided (as part of and additional to the main project) to trainers. Project website launched and several journal articles published. Contributions made to policy discussions through SEARRP's long-standing links with main partner organisations.

4.4 Project standard measures and publications

See Annexes 4 and 5

4.5 Technical and Scientific achievements and co-operation

The main research/technical component of the project focussed on the Sabah Biodiversity Experiment – a large-scale (500 hectare) forest biodiversity/ecosystem functioning experiment that we have been establishing over the past 10 years. We have established 124 x 4 hectare plots in an area of severely degraded forest close to Danum Valley and replanted these at 3 levels of dipterocarp (the main canopy tree species in the forests of SE Asia) diversity. This has involved planting some 100,000 dipterocarp seedlings.



Further details on the design of the experiment can be found at: www.sabahbiodiversityexperiment.net

The project is managed through the Royal Society SEARRP, led scientifically by a team from the Institute of Environmental Science, University of Zurich and involves close collaboration with our partners in Sabah, primarily Yayasan Sabah, the Sabah Forestry Department and Universiti Malaysia Sabah.

The Sabah Biodiversity Experiment is based approximately 50km (by road) from the Danum Valley Field Centre. We have established an on-site project headquarters including nursery and shade house facilities, a basic laboratory and accommodation for our staff and visiting scientists. The experiment has a permanent staff of 15 research assistants led by a project manager.

The main activity during our Darwin Initiative project, and directly funded by the project, has been re-planting; the plots were first planted from 2002 to 2003 but due to a severe drought in 2003/2004, many of the planted seedlings died with mortality in some species greater than 80%. During the Darwin project we collected and germinated over 100,000 seedlings from 16 dipterocarp species of which approximately 80,000 have been planted (re-planting was completed in 2011). The Darwin Initiative, through co-funding of field staff salaries, has made a significant contribution to these activities.

The Sabah Biodiversity Experiment is still in its early stages and findings to date have mainly been generated by associated nursery and small-scale field experiments. Research foci have included growth and survival rates in dipterocarp seedlings, soil respiration, seed predation and the role of mycorrhiza. We also have a major methods paper in press that will be published in a special issue of the Philosophical Transactions of the Royal Society.

In terms of research degrees, to date the experiment has been the base for two successfully completed PhDs and three Masters. Currently, the Sabah Biodiversity Experiment is the main site for two post-doctoral projects a further 4 PhD studies including 3 being undertaken by local students. With the main experiment now fully established we expect regular output of peer-reviewed publications and research degrees. Experimental (postgraduate) research during the project has been funded mainly by the University of Zurich – but Darwin Initiative funding has made a significant contribution through the funding of field staff salaries who assisted on all the successfully completed thesis and with data collection that led to publications.

During the project, 6 peer reviewed papers were published or accepted for publication, with a further 5 papers in preparation (listed in Annex).

4.6 Capacity building

The project has contributed to capacity building at several levels; among the Sabah Biodiversity Experiment and other permanently employed field staff, graduate students and academics attending the statistical training courses, key academic staff at our main local partner organisation (Universiti Malaysia Sabah) in providing statistical training to their own students and, albeit less tangibly, among University of Zurich and Royal Society SEARRP staff and in designing and delivering training to students who did not, in most cases, have English as a first language.

4.7 Sustainability and Legacy

The sustainability and legacy of this project has been secured and embedded in several ways:

- Incorporation of teaching materials developed during the project into the curriculum of the main project partner, Universiti Malaysia Sabah
- Training of graduate students, many of whom will become leaders in their fields
- Training of a large team of permanently employed field staff
- Contribution to the PhD and Masters projects of a number of local and overseas students
- Major contribution (financial and otherwise) to the establishment of a major, long-term ecological experiment - the Sabah Biodiversity Experiment

The Royal Society SEARRP and Universiti of Zurich continue to collaborate with Universiti Malaysia Sabah, Yayasan Sabah and other project partners – and intend to do so in the long term. Subsequent to and overlapping with the Darwin Initiative project we have also secured a number of major grants in support of the Sabah Biodiversity and anticipate that this project will run for decades. Funding provided by the Darwin Initiative played a key role at a critical, but difficult to fund, stage of the experiment.

Of particular note, and largely as a result of opportunities arising from the Project, Ms Elia Godoong (Universiti Malaysia Sabah) and Mr Hamzah Tangki (Yayasan Sabah) – both Sabahans – who have attended the training courses, have been awarded PhD scholarships to study at the University of Zurich. Ms Godoong was awarded a scholarship from the Malaysian Government and Mr Tangki from the Royal Society SEARRP.

5 Lessons learned, dissemination and communication

The research component of the Project, being part of the larger Sabah Biodiversity Experiment, contributed to the early stages of a long-term experiment and hence was not expected to generate major findings. However, a number of associated publications, in part supported by the Project, have been generated and these are listed in Annex 3.

In terms of the training, on balance we felt this was appropriately focussed and addressed a major knowledge gap. However, this component of the project highlighted other areas where focus is needed and we will look to explore in the future, primarily in the formulation of project ideas (i.e. generating interesting research questions), writing grant and other funding applications and general scientific writing.

From a project design/budgeting perspective, we should have included a greater contingency against currency exchange rate fluctuations. In the early stages of the project the value of the GB Pound vis-à-vis the Malaysian Ringgit (the currency in which the majority (±90%) of project costs were expended) declined by 25% – and by the end of the project by almost 35%. This reduction in spending power was compounded by major and unforeseen cost increases in some areas, particularly vehicle operating costs. Fuel prices in Malaysia more than doubled during the project due to increasing oil prices and reductions in government subsidies on fuel. These factors, which completely beyond our control, had major impacts and although we sought to prioritise expenditure as far as possible, and provide additional funding from the University of Zurich and SEARRP's own resources, we were unable to deliver all the outputs anticipated at the start of the project.

Dissemination of training materials developed during the training programme was via the University of Zurich website and by providing handouts and course materials directly to course participants.

Information on research findings were disseminated via the Sabah Biodiversity Project website (funded mainly by the University of Zurich). Web address: www.sabahbiodiversityexperiment.net

As both the research and training components of this project are part of wider, long-term initiatives we fully anticipate that findings of the project will be embedded and continue to be disseminated (not least since the statistical training materials developed during the project have been incorporated into Universiti Malaysia Sabah's teaching curriculum).

5.1 Darwin identity

The Darwin Initiative logo was placed on all printed, on-line and projected materials used during the training courses. The Darwin Initiative was also identified as a funder in all publications generated wholly or partly by the project.

The Darwin Initiative was also promoted as a key partner in all briefings provided by SEARRP – including to senior policy makers both in Malaysia and the wider region.

Having supported more than a dozen projects in Sabah, the Darwin Initiative is very well known and regarded with wide recognition among the local research and conservation communities as well as policy makers.

6 Monitoring and evaluation

There were no major changes to the project – though some outputs where not possible due to the effective reduction in the available funds (for the reasons given above).

6.1 Actions taken in response to annual report reviews

Action taken and further evidence for project activities provided, as required.

7 Finance and administration

7.1 Project expenditure

The original Project budget is outlined in the following table:

	2007/08	2008/09	2009/10	2010/11	TOTAL
Rents, rates, heating , cleaning, overheads					
• Darwin funding					
• Other funding					
Office costs					
• Darwin funding					
• Other funding					
Travel and subsistence					
• Darwin funding					
• Other					
Printing					
• Darwin funding					
• Other					
Conferences, seminars etc.					
• Darwin funding					
• Other funding					
Capital items/equipment (please break down)					
• Darwin funding					
• Other funding					
Other costs					
• Darwin funding					
• Other funding					
Salaries					
• Darwin funding					
• Other funding					
TOTAL PROJECT COSTS					
TOTAL COSTS FUNDED FROM OTHER SOURCES					
TOTAL DARWIN COSTS					

As Darwin Initiative funding, across most budget categories, contributed to larger costs, Project expenditure was exactly as budgeted.

7.2 Additional funds or in-kind contributions secured

Two major grants were secured during the Project, both of which contribute significantly to the Sabah Biodiversity Experiment – and, to some extent, helped to offset the effective reduction in the Project budget due to the full in the value of the GB Pound.

Earthwatch Foundation *c.* **£650,000** (2009 – 2014). Research grant to G. Reynolds (SEARRP), A. Hector (Zurich), J.K. Hill (York), R.P.D. Walsh (Swansea), J. Tay & K. Bidin (Universiti Malaysia Sabah). "*Maintaining rainforest biodiversity, ecosystem functioning and conservation value in the face of climate and land use change*".

Swiss National Science Foundation *c.* **£325,000** (2009 – 2012). Research grant to A. Hector (Zurich). "*Life history trade-offs in dipterocarp tree seedlings: implications for the structure and functioning of tropical ecosystems".*

7.3 Value of DI funding

Funding from the Darwin Initiative allowed is to incorporate a major training programme to the Sabah Biodiversity Experiment that would otherwise have been difficult to fund. It also contributed directly to the experiment during the critical early years of its establishment – a phase that would have been near impossible to fund from standard grant awarding bodies.

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

Project summary	Measurable Indicators	Progress and Achievements	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			n/a
Purpose *To increase and sustain the capacity of SE Asian research institutes and conservation organisations to conduct effective research on the linkage between biodiversity and ecosystem functioning*	• Postgraduate and post-doctoral researchers and research managers aware of latest research and pursuing revised and relevant programme in SE Asia • Revised research protocols and procedures being used effectively by researchers and field staff • Policy makers and wider public made aware of value of research on biodiversity and ecosystem functioning		n/a
Output 1. Raise awareness amongst scientists, conservationists and forest managers in SE Asia of the latest findings and methods for research on biodiversity and ecosystem functioning and their relevance to SE Asia	• Workshop includes all key players and reaches consensus	Achieved: general consensus on project need and broad direction of training programme and importance of long-term biodiversity monitoring and experiments	

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Activity 1.1 Conduct detailed review of latest international practices and results	• Report prepared and circulated for comment and review. Feedback incorporated and final version circulated	Completed in year 1 – as reported	
Activity 1.2 Introductory workshop for policy makers, university department heads, senior conservationists and forest managers to introduce the importance of research linking biodiversity with ecosystem function and the application of the latest experimental design and analytical techniques	• Workshop held for 30+ participants and feedback incorporated into training and research programme development	Completed in year 1 – as reported	
Output 2. Develop standard research methodologies and protocols for long term research on biodiversity and ecosystem functioning	• Wide representation in development of new protocols • Approved and validated protocols for field design, data collection and archiving, analysis and interpretation • New datasets included in course materials	Partially achieved: We continue to discuss protocols and the formation of a possible coordinated network of similar forest biodiversity/ecosystem functioning experiments – with grant applications in support of this initiative. In retrospect, this output was over-ambitious.	
Activity 2.1 Conduct detailed review of current practices and standards and prepare analytical report	• Report prepared and circulated for comment and review. Feedback incorporated and final version circulated	Completed in year 1 – as reported.	
Activity 2.2 Develop and validate revised research protocols including experimental design, layout, data collection and analysis systems	• Report prepared and circulated for comment and review. Feedback incorporated and final version circulated	See above (Output 2)	

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Activity 2.3 Collect sample datasets for analysis and use in training courses using revised protocols	• Data collection on Sabah Biodiversity Experiment – continues for duration of project	Completed/ongoing throughout duration of project: Collection and analyses ongoing as part of the Sabah Biodiversity Experiment	
Output 3. Identify skills gaps amongst post-doc and postgraduate researchers/research managers and conduct linked training courses and field training events to remedy gaps identified	• Training course material developed to remedy skills gaps identified • Trainees' level of understanding and competence measurably increased	Completed – as detailed below	
Activity 3.1 Conduct detailed skills gap analysis for postgraduate and post-doctoral researchers and research managers	• Report prepared and circulated for comment and review. Feedback incorporated and final version circulated		
Activity 3.2 Develop and deliver a course on 'Experimental design and analysis for biodiversity and ecosystem functioning'	• One week course held for 25 participants	Completed in year 1 – as reported	
Activity 3.3 Develop and deliver a course on 'Analysis of biodiversity data using Linear Models in R incl. basic graphing in R'	• One week course held for 25 participants	Competed in year 2 – as reported	
Activity 3.4 Develop and deliver a course on 'Analysis of biodiversity data using Generalised Linear Models and advanced graphing in R'	• One week course held for 25 participants	Completed in final year of project See video of course: Darwin Initiative Statistics Course Danum Valley Borneo 2010 (**English**): http://www.youtube.com/watch?v=wPSQwXCk2rg See also appended teaching materials	

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Output 4. Identify skills gaps amongst researcher assistants/field staff and conduct linked training courses and field training events to remedy gaps identified	• Training course material developed to remedy skills gaps identified • Trainees' level of understanding and field competence measurably increased	Completed in year 1 – as reported Field staff remain with the project and are increasingly able to work independently, particularly in terms of data collection and management.	
Activity 4.1 Detailed skills gap analysis for research assistants and field staff	• Report prepared and circulated for comment and review. Feedback incorporated and final version circulated	Completed in year 1 – as reported	
Activity 4.2 Develop and deliver a classroom and field based course for research assistants and field staff on 'Data collection, management and archiving', including a mini-project (field based) by each participant	• 3 week course (1 week classroom, 2 weeks field-based) held for 20 participants	Completed in year 1 (but duration of course reduced to 14 days due to budget limitations)	
Activity 4.3 Develop and deliver a classroom and field based course for research assistants and field staff on 'Field survey, sampling and monitoring techniques', including a mini-project (field based) by each participant	• 3 week course (1 week classroom, 2 weeks field-based) held for 20 participants	2 week course completed in year 2	
Activity 4.4 Develop and deliver a classroom and field based course for research assistants and field staff on 'Additional biodiversity monitoring techniques and introductory data analysis',	• 3 week course (1 week classroom, 2 weeks field-based) held for 20 participants	2 week course completed in year 3	

Project summary	Measurable Indicators	Progress and Achievements	Actions required / planned for next period
including a mini-project (field based) by each participant			
Output 5. Disseminate results of new analyses, training course curricula and teaching material, and prepare policy level and public awareness material	• Refereed papers accepted for publication by end of project • Web material available and being accessed • Policy level and publicity material available and accessible • Wrap-up workshop held and final report prepared	6 papers published or accepted for publication during project, with a further 5 papers in preparation with publication expected during 2011/2012 Sabah Biodiversity Experiment website launched Project findings disseminated to policy makers via a number of forums Completed	
Activity 5.1 Refereed papers on research component and associated studies	• At least 6 papers published	Completed. 6 papers published or accepted for publication (listed in Annex 5)	
Activity 5.2 Group mini-projects carried out during training courses 4.2, 4.3 and 4.4	• Projects written-up, compiled and circulated	Completed	
Activity 5.3 Project newsletter	• Newsletter circulated (and posted on websites of partner organisations) to UK and regional partners, to national media and British High Commission, Malaysia	Not completed. After launch of Sabah Biodiversity Experiment website we considered that, in view of budget limitations, the production of regular newsletters could be foregone without compromising project delivery.	
Activity 5.4 Posters and simple publications for public consumption through participating institutions, regional media and environmental awareness programmes	• Posters and publications prepared and distributed	Not completed – for reasons given above (activity 5.3). Resources diverted to website.	

Project summary	Measurable Indicators	Progress and Achievements	Actions required/planned for next period
Activity 5.5 Development (and translation if necessary) of teaching material for incorporation into teaching programmes of partner universities	• Course materials prepared and draft submitted to participating universities for comment. Final version incorporated into university teaching programmes	Completed. Teaching materials incorporated into curriculum of Universiti Malaysia Sabah	
Activity 5.6 Policy level briefing papers summarising findings and their significance	• Workshop held and final feedback incorporated into policy briefings	Completed/ongoing: Findings from the Sabah Biodiversity Experiment will continue to contribute to policy	
Activity 5.7 Final wrap-up workshop for all project partners, CBD focal point, representatives of government departments and British High Commission, Malaysia	• Presentation of policy briefings and statements to project partners and other stakeholders – for 30+ participants	Completed/ongoing: As above – findings will continue to flow from the Sabah Biodiversity Experiment and make a significant contribution to policy in the fields of biodiversity conservation and sustainable forest management (and hence Malaysia's implementation of the CBD.	

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

Note: Project logframe is unchanged from that in the original proposal.

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**			
Purpose *To increase and sustain the capacity of SE Asian research institutes and conservation organisations to conduct effective research on the linkage between biodiversity and ecosystem functioning.*	• Postgraduate and post-doctoral researchers and research managers aware of latest research and pursuing revised and relevant programme in SE Asia	• Review of relevant current research activities being undertaken in SE Asia and extent to which this has responded to new ideas	Current interest levels are maintained
	• Revised research protocols and procedures being used effectively by researchers and field staff	• Validation of protocols, etc.; improved data handling and archiving; field and research skills levels	Staff remain in post to take sequential courses
	• Policy makers and wider public made aware of value of research on biodiversity and ecosystem functioning	• Policies reflect some measure of incorporation of research findings	Policy makers will to incorporate project outputs into decision making processes
Outputs 1. Raise awareness amongst scientists, conservationists and forest managers in SE Asia of the latest findings and methods for research on biodiversity and ecosystem functioning and their relevance to SE Asia	• Workshop includes all key players and reaches consensus	• List of attendees and outputs from workshop	Key players all willing and available to attend workshop
2. Develop standard research methodologies and protocols for long term research on	• Wide representation in development of new protocols		Researchers accept and use revised protocols, analytical methods *etc.*

Project summary	Measurable Indicators	Means of verification	Important Assumptions
biodiversity and ecosystem functioning	• Approved and validated protocols for field design, data collection and archiving, analysis and interpretation • New datasets included in course materials	• Protocols agreed by user groups and being used in practice • Review of training course material	
3. Identify skills gaps amongst post-doc and postgraduate researchers/research managers and conduct linked training courses and field training events to remedy gaps identified	• Training course material developed to remedy skills gaps identified • Trainees' level of understanding and competence measurably increased	• Skills gaps identified are addressed in training material developed • Ability to design and conduct research activities using new techniques	Trainees remain in permanent/long-term employment and attend all 3 courses
4. Identify skills gaps amongst researcher assistants/field staff and conduct linked training courses and field training events to remedy gaps identified	• Training course material developed to remedy skills gaps identified • Trainees' level of understanding and field competence measurably increased	• Skills gaps identified are addressed in training material developed • Ability to conduct and record field research activities using new techniques	Trainees remain in permanent/long-term employment and attend all 3 courses
5. Disseminate results of new analyses, training course curricula and teaching material, and prepare policy level and public awareness material	• Refereed papers accepted for publication by end of project • Web material available and being accessed • Policy level and publicity material available and accessible • Wrap-up workshop held and final report prepared	• Acceptance letters from journals • Material posted on partner organisation websites • Use made of material • List of attendees and outputs from workshop	Research of publishable quality Key players all willing and available to join workshop

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	10%	Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	10%	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	5%	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	20%	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	30%	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	5%	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 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	10%	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

Article No./Title	Project %	Article Description
		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

Standard Measures

Code	Description	Totals (plus additional detail as required)
Training Measures		
1a	Number of people to submit PhD thesis	2
1b	Number of PhD qualifications obtained	2
2	Number of Masters qualifications obtained	3
3	Number of other qualifications obtained	Project contributed to several successfully completed undergraduate theses
4a	Number of undergraduate students receiving training	Several undergraduates gained experience on the Sabah Biodiversity Experiment (additional to main project)
4b	Number of training weeks provided to undergraduate students	No formal training provided to undergraduates – but see 4a
4c	Number of postgraduate students receiving training (not 1-3 above)	30+
4d	Number of training weeks for postgraduate students	Approximately 3 weeks (1 week per year)
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(ie not categories 1-4 above)	20+ - full time Research Assistants employed by the Royal Society SEARRP and partner organisations
6a	Number of people receiving other forms of short-term education/training (ie not categories 1-5 above)	n/a
6b	Number of training weeks not leading to formal qualification	6 (2 weeks per year) – plus additional on-the-job training
7	Number of types of training materials produced for use by host country(s)	All course materials provided to partner institutions – and adapted by lead partner (Universiti Malaysia Sabah) for incorporation into teaching curriculum
Research Measures		
8	Number of weeks spent by UK project staff on project work in host country(s)	UK project staff were present throughout the duration of the project
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s)	n/a
10	Number of formal documents produced to	n/a

Code	Description	Totals (plus additional detail as required)
	assist work related to species identification, classification and recording.	
11a	Number of papers published or accepted for publication in peer reviewed journals	6 (plus 5 in preparation)
11b	Number of papers published or accepted for publication elsewhere	None
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	n/a
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	n/a
13a	Number of species reference collections established and handed over to host country(s)	n/a
13b	Number of species reference collections enhanced and handed over to host country(s)	n/a
Dissemination Measures		
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	6
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	Numerous - ongoing
15a	Number of national press releases or publicity articles in host country(s)	None formal – but many mentions of Sabah Biodiversity Experiment in newspaper and other media articles
15b	Number of local press releases or publicity articles in host country(s)	As above
15c	Number of national press releases or publicity articles in UK	None
15d	Number of local press releases or publicity articles in UK	None
16a	Number of issues of newsletters produced in the host country(s)	None
16b	Estimated circulation of each newsletter in the host country(s)	n/a
16c	Estimated circulation of each newsletter in the UK	n/a

Code	Description	Totals (plus additional detail as required)
17a	Number of dissemination networks established	n/a
17b	Number of dissemination networks enhanced or extended	n/a
18a	Number of national TV programmes/features in host country(s)	None
18b	Number of national TV programme/features in the UK	None
18c	Number of local TV programme/features in host country	None
18d	Number of local TV programme features in the UK	None
19a	Number of national radio interviews/features in host country(s)	None
19b	Number of national radio interviews/features in the UK	None
19c	Number of local radio interviews/features in host country (s)	None
19d	Number of local radio interviews/features in the UK	None
Physical Measures		
20	Estimated value (£s) of physical assets handed over to host country(s)	Minimal – project included only minor expenditure on capital items
21	Number of permanent educational/training/research facilities or organisation established	None – but contributed to existing organisations
22	Number of permanent field plots established	1 – Sabah Biodiversity Experiment (500 ha permanent field site)
23	Value of additional resources raised for project	Greater than £300K in associated grant and other income
Other Measures used by the project and not currently including in DI standard measures		

Publications

Type	Detail (title, author, year)
Journal (published)	Saner P, Lim R, Burla B, Ong RC, Scherer-Lorenzen M, Hector A. (2009) Reduced soil respiration in gaps in logged lowland dipterocarp forests. Forest Ecology and Management, 258: 2007 – 2012.
Journal (published)	Hautier Y, Saner P, Philipson C, Bagchi R, Ong RC, Hector A. (2010) Effects of Seed Predators of Different Body Size on Seed Mortality in Bornean Logged Forest. PLoS ONE 5(7): e11651.
Journal (published)	Saner P, Philipson C, Ong RC, Majalap N, Egli S, Hector A. (2010) Positive effects of ectomycorrhiza on growth of seedlings of a tropical tree across a range of forest floor light conditions. Plant and Soil, 338: 411 – 421.
Journal (submitted)	Hector A, Philipson C, Saner P, Chamagne J, Dzulkifli D, O'Brien M, Snaddon J, Ulok P, Weilenmann W, Reynolds G, Godfray C. Testing the Potential Role of Tree Diversity in Restoring Tropical Forest Structure and Functioning: The Sabah Biodiversity Experiment. Phil Trans Roy Soc B. Submitted.
Journal (submitted)	Turnbull LA, Philipson C, Purves DW, Atkinson RL, Cunniff J, Goodenough A, Hautier Y, Marthews T, Osborne CP, Paul-Victor C, Saner P, Rose KE, Taylor SH, Tombs J, Woodward FI, Hector A, Rees M. Plant growth rates and seed size: a re-evaluation. Ecology Letters. Submitted.
Journal (submitted)	Philipson CD, Saner P, Marthews TR, Nilus R, Reynolds G, Turnbull LA, Hector A. Growth rates and light partitioning by Dipterocarp saplings. Biotropica. In review.
Journal (in prep)	Saner P, Loh YY, Ong RC, Hector A. Estimates of Components of the Carbon Cycle of Logged Tropical Rainforest in Sabah, Malaysian Borneo.
Journal (in prep)	Saner P, Philipson C, Peters S, Keller F, Bigler L, Turnbull LA, Hector A. Size-specific growth rates and carbon allocation traits in tropical tree seedlings.
Journal (in prep)	Philipson C, Dzulkifli D, Saner P, O'Brien M, Philips S, Bagchi R, Turnbull L A & Hector A. Growth and survival trade-offs between and within species in a Dipterocarp enrichment planting project.