# 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)*

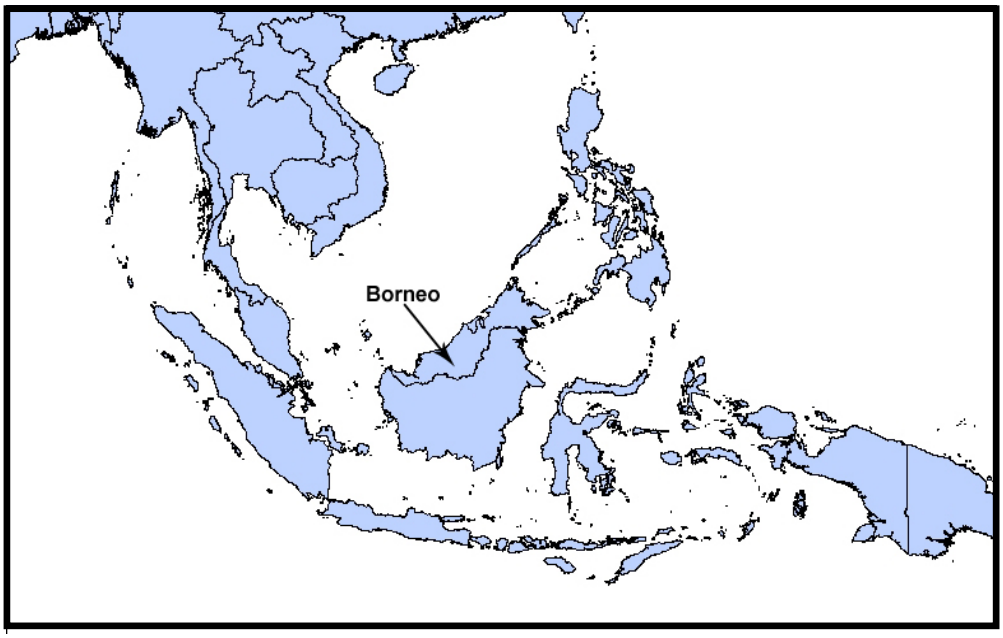
## Darwin project information

| | |
|---|---|
| Project Reference | 17003 |
| Project Title | Developing tools for reducing biodiversity losses in tropical agricultural landscapes |
| Host country(ies) | Malaysia |
| UK Contract Holder Institution | University of York |
| UK Partner Institution(s) | University of Leeds |
| Host Country Partner Institution(s) | Universiti Malaysia Sabah, Malaysian Palm Oil Board, Forest Research Centre, Wilmar (PPB Oil Palm Bhd), Royal Society SE Asian Rainforest Research Programme, Dato' Henry S. Barlow |
| Darwin Grant Value | £XXX |
| Start/End dates of Project | I June 2009 – 21 May 2012, with final workshop in March 2013 |
| Project Leader Name | Prof Jane K Hill |
| Project Website | http://www.york.ac.uk/biology/research/ecology-evolution/kane-k-hill/ |
| Report Author(s) and date | Jane Hill, Keith Hamer November 2012 |

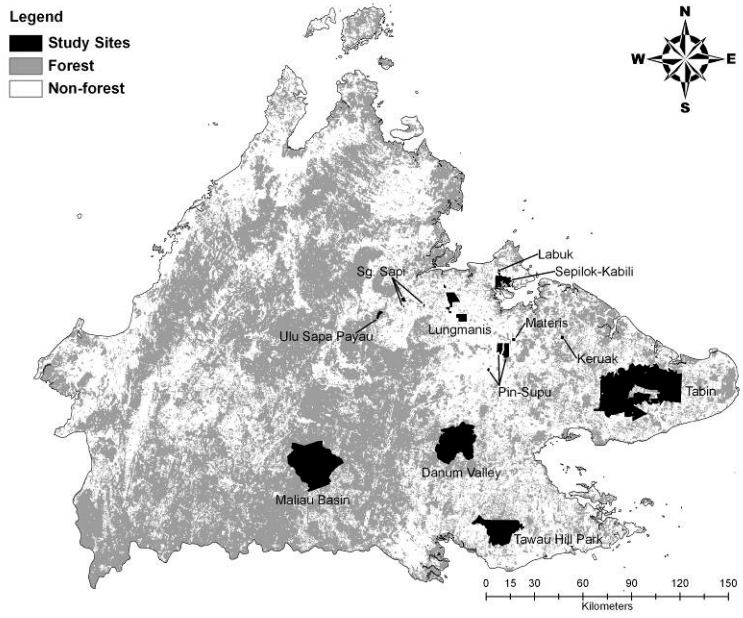
## 1 Project Background

The main aims of the project were capacity building, training and research to enable conservationists, land managers, and policy makers to assess the ecological benefits of promoting biodiversity within tropical agricultural landscapes. Findings from the project have provided clear practical advice on the consequences for biodiversity and ecosystem function of incorporating natural forest remnants within oil palm plantations. We achieved these objectives by: (1) collecting new field data on species richness of ants and butterflies in natural rainforest remnants and adjacent areas of oil palm, (2) quantifying forest 'spill-over' effects and the contribution of forest remnants to biodiversity and ecosystem functioning in the agricultural landscape, and (3) using computer models to determine the effectiveness of natural forest remnants for promoting landscape connectivity.

**A. Map of study area showing the location of the island of Borneo in SE Asia**




**B. Map of study sites in Sabah (Malaysia, North Borneo)**




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

The project related specifically to the following CBD articles:

6. General measures for conservation and sustainable use. The project provided data on the effectiveness of remnant forest patches of 'High Conservation Value (HCV)' for contributing to biodiversity in oil palm plantations, and thus helped to develop methods for more sustainable production of palm oil that are incorporated into the Roundtable for Sustainable Palm Oil (RSPO) Principles & Criteria for sustainability.

7. Identification and Monitoring. New field data for ants and butterflies were collected to assess fragment biodiversity value, 'spillover' into surrounding plantations and dispersal ability of species to cross agricultural landscapes.
8. In-situ Conservation. Findings from the project provide information on the conservation value of forest remnants in agricultural landscapes, and how biodiversity values could be enhanced through e.g. increasing the habitat quality of remnants to help improve landscape connectivity and landscape biodiversity.
12. Research and Training. Two DRFS were trained in experimental design, insect identification, statistical analysis, field techniques and computer modelling for examining effectiveness of forest remnants for enhancing habitat connectivity.

The project also directly addressed the cross-cutting themes of 'Aichi Targets', 'Global taxonomy Initiative, 'Protected Areas' and 'Biodiversity for development'.

The project addressed the following 2010-20 biodiversity targets:
Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes
Goal 2. Promote the conservation of species diversity
Goal 4. Promote sustainable use and consumption.
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.
Goal 7. Address challenges to biodiversity from climate change, and pollution.

The project addresses the CBD thematic programmes of 'Forest Biodiversity' and 'Agricultural Biodiversity'.

The training of two Darwin Fellows contributed to building capacity in Malaysia to help them meet their CBD targets. At the end of the project, the subsequent employment of one Darwin fellow at the University of the Philippines Los Baños makes them ideally placed to train others in SE Asia. Collaborations with staff at the University Malaysia Sabah, Forest Research Centre Sabah, and the Round Table for Sustainable Palm Oil (RSPO) and dissemination of project findings will contribute to Malaysia's ability to meet its CBD targets. The project did not support CMS or CITES.

The CBD focal point for Malaysia (Ministry of Natural Resources and the Environment) will be invited to the workshop in January, and circulated into policy-related material arising from the workshop. The Director of the Sabah Economic Planning Unit (Sabah office) will also be invited to the workshop, which has received additional funding from the FCO and British High Commissioner, Malaysia (who will attend the end-of-project workshop in March 2013).

## 3 Project Partnerships

The existing collaborative partnerships between the three UK Institutions, Universiti Malaysia Sabah, the Forest Research Centre, and Wilmar (PPB Palm Oil) were strengthened during this project. Specifically, these host organisations were crucial in:

- recruiting staff
- facilitating permission to visit field sites and permits to sample insects
- providing access to plantations and support in kind during field work and sampling
- taxonomic help in identifying Lepidoptera material

- information on the HCV process in plantations and historical information on HCV sites

The project had developed through previous collaborations and on-going discussions with the host organisations who had highlighted that little was known of the conservation value of forest fragments within plantations, or how these could be enhanced. Lack of local expertise in experimental design, statistics and computer modelling had been highlighted by project partners during the project planning phase and so these skills were prioritised in DRF training programmes.

The UK and Malaysian project partners have collaborated for >10 years and this contributed greatly to the success of the project, thus re-affirming the value of having strong links with host partners from the original inception of the project. Being able to appoint and retain key staff as DRFs was crucial to the project's success.

We did not establish an MOU.

The UK partners were the Universities of York and Leeds, who provided skills and training through their Masters taught degree programmes. Through other on-going collaborations between the University of York and California Academy of Sciences, one DRF visited the US and received expert personal tuition in ant taxonomy, photography, DNA barcoding, and provision of on-line ant identification resources (with Dr Brian Fisher).

# 4 Project Achievements

The project reached all achievements set out in the original logframe:

1. Training of two DRFs in field sampling, data analysis and computer modelling techniques,
2. Collection of new field data on ant diversity and habitat quality in forest remnants, plantations and control sites,
3. Collection of new field data on butterfly dispersal across forest/plantation ecotones,
4. Development of computer models to assess landscape connectivity and how increased habitat quality might affect habitat connectivity,
5. Findings and implications of results will be discussed at end-of-project workshop with local and regional stakeholders in March 2013

Annex 1 provides further information on these outputs, activities and achievements.

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

The impacts of the project are:

1. Increased institutional capacity for examining and understanding the role of forest remnants in reducing biodiversity losses in agricultural landscapes,
2. Increased awareness of the conservation value of forest remnants, and how these may be enhanced by rehabilitation and management to enhance forest quality,
3. Increased awareness of dispersal capability of species across non-forest areas.

4. Increased awareness of the conservation value of remnants and which types of species are lost from small remnants.

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

The project achieved its original purpose and its outcomes. Findings from the project will provide additional information and evidence for local researchers and conservationists in support of their attempts to increase the conservation value of forest remnants, and to prevent further loss of species in agricultural landscapes.

### 4.3 Outputs (and activities)

The project achieved all its outputs as outlined in the logframe.

The end-of-project workshop has been delayed until March 2013 but we anticipate no impact to the project of this slight delay. The contribution of additional funds from the British High Commission and FCO in KL for running the workshop (through their 'Global Partnerships' project funds) will greatly enhance the number of participants and hence the dissemination of findings, and provide considerable added-value.

### 4.4 Project standard measures and publications

These are listed in Annexes 4 and 5.

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

During the project, the two DRFs and project partners have:

1) Successfully developed and implemented techniques for sampling biodiversity (ants) and assessing habitat quality in 20 forest remnants and control sites, and adjacent plantations.

2) Successfully analysed the data to examine effects of remnant size and habitat (forest) quality on their conservation value.

3) Compared diversity of rainforest fragments formed from highly degraded logged forest (Low Grade Reserves; LGRs) with those formed from largely undisturbed primary forest (High Grade Reserves; HGRs), and with control sites in extensive tracts of forest.

4) Collected new field data for butterflies to quantify dispersal across forest/plantation ecotones and 'spillover' effects from forest remnants.

5) Used molecular techniques to examine genetic diversity of ants in fragments.

6) Updated web resources with new ant data and photos of new species to aid identification.

Our project concludes that;

- Faunal composition of ants in High Grade Reserves (HGRs) was more similar to continuous forest than to LGRs, and LGRs supported few unique species not present in HGRs. Ant assemblages in small, poor-quality fragments were nested subsets of those at larger, better quality sites supporting the notion that LGRs support a degraded HGR fauna.
- High Grade Reserves (HGRs) generally had higher habitat quality in terms of tree sizes, density and vegetation cover, and consequently supported more species than LGRs, even after accounting for fragment size.
- Fragment quality is an important determinant of species richness, and forest restoration and rehabilitation, for instance through enrichment planting, may increase the effectiveness of poor-quality fragments as reservoirs of biodiversity.
- Molecular analyses of genetic diversity of one species of ant (*Pachycondyla obscurans)* showed little effect of habitat fragmentation but locations separated by forest supported populations that were more genetically similar than those separated by agricultural areas. This implies that an inhospitable intervening matrix may prevent ant dispersal, and may result in genetic erosion of ant communities in the longer term.
- Species richness of both ants and butterfly taxa were reduced in plantations compared with forest, but to a greater extent in butterflies (54% reduction) than ants (20% reduction), although absolute loss was greater in ants (27 species lost) than butterflies (19 species lost). Butterflies showed a 'spillover' effect from forest such that diversity in oil palm plantations increased with increasing proximity to forest. Thus we conclude that proximity to forest can improve diversity up to 1 km within plantations, and that presence of natural habitat remnants may increase landscape connectivity in agricultural areas.

### 4.6 Capacity building

This project has left a lasting legacy of two fully trained researchers capable of designing research experiments, statistical analysis, insect taxonomy, and using GIS techniques for studying biodiversity in agricultural landscapes. The evidence that this has been successful comes from the publication of findings in peer-reviewed papers, presentation of findings at conferences, and the completion of work for graduate theses.

### 4.7 Sustainability and Legacy

We expect the following achievement to endure:

- The database of ant information within antweb.org. This will be maintained at the California Academy of Sciences, and is freely available for downloading by researchers for further analyses.

Of the two DRFs employed on the project, one of them (Noel Tawatao) is now employed as a Lecturer at the University of the Philippines Los Baños where he will continue to use the skills learned in this project.

The University of York, Universiti Malaysia Sabah (UMS),and Forest Research Centre (FRC)) will continue their successful collaboration through projects funded by

Earthwatch, and by NERC-funded PhD studentships. Many of the project partners are currently collaborating on a study funded by the Roundtable for Sustainable Palm Oil to examine biodiversity in tropical agricultural landscapes of Borneo, and to test the RSPO sustainability criteria (more information at: www.searrp.org/sensor).

# 5 Lessons learned, dissemination and communication

Overall, we found the project to be a very successful and a positive experience for all. This was primarily due to the appointment and retention of excellent research staff from our host partner organisations. This in turn was a consequence of the long-running existing collaboration between UK and host partners, which meant that host partners were able to recruit staff with suitable skills, interests and experience, who were then retained during the lifetime of the project, and very likely to be employed at host partner Institutes at the end of the project. One of our partners (Calley Beamish at Wilmar/PPB) organised a workshop in Sabah in year 2 of the project that was a very effective way of discussing the wider implications of our findings with stakeholders, forging stronger links among partners, and disseminating findings and discussing their implications with stakeholders.

We have disseminated information from the project via several methods in order to reach our target audience of researchers, conservationists, policy makers and the general public. Our main research findings have been presented at International conferences and published in international peer-reviewed journals.

The workshop being organised in Sabah in March 2013 will involved >40 participants from ~20 organisations across SE Asia (e.g. representatives from local Universities, Research Institutes, Government Departments and agencies, Forestry Departments, and conservation bodies, plantations, as well as UK Institutions). The most effective ways of disseminating findings will be discussed with stakeholders at the workshop, and then implemented.

Findings from the project will continue to be presented at future conferences and workshops, and the submission of additional research papers to peer-reviewed Journals is planned.

## 5.1 Darwin identity

The Darwin Initiative identity was promoted by:

- Incorporating the Darwin logo on all web-based information (e.g. antweb.org)
- Acknowledging Darwin funding in scientific publications, reports, and conference presentations.
- Acknowledging Darwin funding in press releases

The project was recognised as a distinct project by researchers and conservation organisation in Sabah – our research focus on forest remnants and habitat connectivity is very different from any other on-going DI, international or local research projects.

Photos show workshop organised by project partner Wilmar in year 2. (A) Project leader Jane Hill describing current research (B) audience of stakeholders, researchers and plantation managers.

(A)


**Project leader** Jane Hill describing current research at workshop.

(B)

**Darwin Fellow** Yen Yee Loh presented her findings at the workshop

## 6 Monitoring and evaluation

There were no changes to the logframe during the project.

Monitoring and evaluation of the project were assessed via regular progress reports from DRFs and by regular field work visits by Project leader (Hill), and Database manager (Hamer). Training of DRFs was also assessed in York by the project leader (Hill) and GIS manager (McClean) via weekly individual meetings and weekly lab group discussions and research presentations.

The initial logframe measurable indicators were useful in the monitoring and evaluation of the project. Baseline information was collected from field surveys of forest remnants. These data were then successfully analysed to assess conservation value of existing remnants and how the value of remnants could be enhanced.

External evaluation of the project arises from acceptance of research papers in Journals via the peer-review process and the examination DRFs PhD/MSc theses.

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

During the life-time of the project, comments on our annual reviews have generally been positive and our host partners have been pleased to see that the good progress of the project has been appreciated.

## 7 Finance and administration

### 7.1 Project expenditure

| Item | Budget (from stage 2 application) | Underspend |
|---|---|---|
| Rent, rates, heating, overheads etc | | - |
| Office costs | _ | - |
| UK Travel and subsistence for UK staff | | - |
| Printing | | - |
| Conferences, seminars, workshop | | -* |
| Capital items/equipment | _ | - |
| Bench fees, DRFs travel, fieldwork costs, DRFs subsistence in UK | | - |
| Salaries (DRF1 and DRF2) | | - |
| UK salaries | | - |
| TOTAL | | |

*Workshop (budget £11,750 in year 4) to be held in Kota Kinabalu, Sabah 26-27th March 2013. This workshop has been rescheduled and has received additional funding and support from the Foreign & Commonwealth Office, KL, Malaysia under their 'Global Partnerships' Fund. The Darwin Initiative permitted viring of £1,916-93 towards the workshop costs.

## 7.2 Additional funds or in-kind contributions secured

Additional funds were secured from Earthwatch for a Sabah PhD studentship (tuition fees, stipend, fieldwork costs) which is allowing us to extend the fieldwork to examine impacts of enrichment planting of dipterocarp trees in forest remnants for biodiversity and ecosystem functioning. Additional funding (£34K) from the FCO, Malaysia to support and extend the scope of the end-of-project workshop.

## 7.3 Value of DI funding

DI funding has enabled the following:

- Training of researchers at host partner Institutes in skills and knowledge related to impacts of land-use change and agriculture on forest biodiversity in tropical regions
- Enhancing a web-based resource for identification of Borneo ants. Ants are a commonly studied group used to assess ecological impacts of land-use change, and changes to ecosystem functioning, and so this resource will be widely used by other researchers in future.
- The first empirical analysis to quantify habitat connectivity of forest areas on Borneo, and to highlight the degree to which low land Protected Areas are increasingly isolated with agricultural matrices, and thereby isolating the populations of species within them.

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

| Project summary | Measurable Indicators | Progress and Achievements April 2009 - March 2012 | 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<br>• The conservation of biological diversity,<br>• The sustainable use of its components, and<br>• The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources | | A greater understanding of the current conservation value of forest remnants within plantations.<br>Identifying locations where forest quality could be enhanced which would promote conservation of regional biodiversity. | n/a |
| **Purpose** Increased capability at local and national levels used to determine ecological benefits of natural rainforest remnants for reducing biodiversity losses in oil palm plantations. | Dialogue with stakeholders indicates that project outputs have contributed to application of management policy for promoting agricultural biodiversity in Sabah within 3 years of end of project. | Forest remnants prioritised in terms of forest quality and ant diversity. | n/a |
| **Output 1.** Improved capacity for capturing, analysis and computer modelling of ecological data. Development of standardized protocols for research. | Two DRFs successfully trained in ant and butterfly sampling and identification techniques, in quantifying ecosystem functioning, and in spatial modelling of ecological data. | DRFs fully trained as evidence by submission of research findings for publication | |
| Activity 1.1 Training of 2 DRFs | | done | |
| Activity 1.2, 1.2 Sabah collaborators visit UK | | done | |
| **Output 2**. Clear advice provided to managers and policy makers at national and regional levels and through RSPO group and ASEAN biodiversity network. | Draft recommendations for management of forest remnants and agricultural areas in Sabah | To be completed after workshop | |

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|---|---|---|
| | | |
| Activity 2.1. UK staff supervise fieldwork | | Done |
| Activity 2.2. Production of species data bases & reference collection | | Done |
| **Output 3.** Research data provided on how biodiversity and ecosystem function in oil palm areas relate to size and proximity of forest remnants. | Databases constructed and used to produce species richness estimates for key taxa in forest remnants and surrounding agricultural areas, plus ecosystem function estimates. Data incorporated into spatially explicit computer models to quantify landscape permeability and to identify best areas for forest protection and reforestation. | Done |
| Activity 3.1. Submit papers for publication | | Done |
| Activity 3.2. Presentation of results at conferences | | Done |
| **Output 4.** Raising of awareness of project findings and latest research methods, and dissemination of information. | Workshop held at end of project. Findings made available via the web. | To be done in March 2013 |

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

| Project summary | Measurable Indicators | Progress and Achievements April 2009 - March 2012 | 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<br>• The conservation of biological diversity,<br>• The sustainable use of its components, and<br>• The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources | | A greater understanding of the current conservation value of forest remnants within plantations.<br>Identifying locations where forest quality could be enhanced which would promote conservation of regional biodiversity. | Project completed |
| **Purpose** Increased capability at local and national levels used to determine ecological benefits of natural rainforest remnants for reducing biodiversity losses in oil palm plantations. | Dialogue with stakeholders indicates that project outputs have contributed to application of management policy for promoting agricultural biodiversity in Sabah within 3 years of end of project. | Forest remnants prioritised in terms of forest quality and ant diversity. | Project completed |
| **Output 1.** Improved capacity for capturing, analysis and computer modelling of ecological data. Development of standardized protocols for research. | Two DRFs successfully trained in ant and butterfly sampling and identification techniques, in quantifying ecosystem functioning, and in spatial modelling of ecological data. | DRFs fully trained as evidence by submission of research findings for publication | |
| Activity 1.1 Training of 2 DRFs | | done | |
| Activity 1.2, 1.2 Sabah collaborators visit UK | | done | |
| **Output 2**. Clear advice provided to managers and policy makers at national and regional levels and through RSPO group and ASEAN | Draft recommendations for management of forest remnants and agricultural areas in Sabah | To be completed after workshop | |

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| biodiversity network. | | |
| Activity 2.1. UK staff supervise fieldwork | | Done |
| Activity 2.2. Production of species data bases & reference collection | | Done |
| **Output 3.** Research data provided on how biodiversity and ecosystem function in oil palm areas relate to size and proximity of forest remnants. | Databases constructed and used to produce species richness estimates for key taxa in forest remnants and surrounding agricultural areas, plus ecosystem function estimates. Data incorporated into spatially explicit computer models to quantify landscape permeability and to identify best areas for forest protection and reforestation. | Done |
| Activity 3.1. Submit papers for publication | | Done |
| Activity 3.2. Presentation of results at conferences | | Done |
| **Output 4.** Raising of awareness of project findings and latest research methods, and dissemination of information. | Workshop held at end of project. Findings made available via the web. | To be done in March 2013 |

# 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 | 20 | Develop national strategies that integrate conservation and sustainable use. |
| 7. Identification and Monitoring | 30 | Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data. |
| 8. In-situ Conservation | 20 | 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 | 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 | | 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 |

| Article No./Title | Project % | Article Description |
|---|---|---|
| | | 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 | | 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** | | |
| 1a | Number of people to submit PhD thesis | 1 |
| 4c | Number of postgraduate students receiving training (not 1-3 above) | 2 |
| 4d | Number of training weeks for postgraduate students | 72 (18 months) |
| **Research Measures** | | |
| 8 | Number of weeks spent by UK project staff on project work in host country(s) | 28 |
| 9 | Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (s) | 1 |
| 10 | Number of formal documents produced to assist work related to species identification, classification and recording. | 1 >200 species details added to antweb.org |
| 11a | Number of papers published or accepted for publication in peer reviewed journals | 8 papers + 3 submitted/in prep |
| 12b | Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country | 1 >200 species details added to antweb.org |
| 13b | Number of species reference collections enhanced and handed over to host country(s) | 1 |
| **Dissemination Measures** | | |
| 14a | Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work | 1 with Wilmar, plus 1 in March 2013 (with UK FCO) |
| 14b | Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated. | 3 |
| 15d | Number of local press releases or publicity articles in UK | 1 |
| 16a | Number of issues of newsletters produced in the host country(s) | 3 |
| 16b | Estimated circulation of each newsletter in the host country(s) | 50 |
| **Physical Measures** | | |
| 22 | Number of permanent field plots established | 20 |
| 23 | Value of additional resources raised for project | |
| **Other Measures used by the project and not currently including in DI standard measures** | | |

| Code | Description | Totals (plus additional detail as required) |
|---|---|---|
| | | |
| | | |
| | | |
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# Annex 5 Publications

| Type * (eg journals, manual, CDs) | Detail (title, author, year) | Publishers (name, city) | Available from (eg contact address, website) | Cost £ |
|---|---|---|---|---|
| Journal | Laurance, W.F. …**Hill, J.K.** & 213 co-authors (2012) *Nature* 489, 290-294. | | | |
| Journal | Lucey, J.M. & **Hill, J.K.** (2012) *Biotropica* 44, 368-377 | | | |
| Journal | Proctor, S., **McClean, C.J**. & **Hill, J.K**. (2011) *Biodiversity and Conservation* 20, 2693-2704. | | | |
| Journal | **Tawatao, N**., Harper, N.E., Mohamed, M., **Chey V. Khen**, Searle, J.B. & **Hill, J.K.** (2011) *Asian Myrmecology* 4, 59–68. | | | |
| Journal | Klorvuttimontara, S., **McClean, C.J.** & **Hill, J.K**. (2011) *Biological Conservation* 144, 2534–2540. | | | |
| Journal | Chen, I-C., **Hill, J.K**., Shiu, H-J., Holloway, J.D., **Benedick, S., Chey, V.K., Barlow, H.S**. & Thomas, C,D. (2011) *Global Ecology and Biogeography* 20, 34-45. | | | |
| Journal | Berry, N.J., Phillips, O.L., Lewis, S.L., **Hill, J.K**., Edwards, D.P., **Tawatao, N.B**., **Ahmed, N.,** Magintan, D., **Chey V.K.**, Maryati, M., Ong, R.C. & **Hamer, K.C.** (2010) *Biodiversity and Conservation* 19, 985-997. | | | |
| Journal | Sodhi, N. S., Koh, L. P., Clements, R., Wangerd, T.C., **Hill, J.K., Hamer, K.C**., Clough, Y., Tscharntke, T., Rose, M., Posa, C., Lee, T.M. (2010) *Biological Conservation* 143, 2375-2384 | | | |

# Annex 6 Darwin Contacts

| | |
|---|---|
| **Ref No** | 17003 |
| **Project Title** | Developing tools for reducing biodiversity losses in tropical agricultural landscapes |
| | |
| **UK Leader Details** | |
| Name | Prof Jane K Hill |
| Role within Darwin Project | Project leader |
| Address | Department of Biology, University of York, Y010 5DD. UK |
| Phone | |
| Fax | |
| Email | |
| **Other UK Contact (if relevant)** | |
| Name | Dr Keith C Hamer |
| Role within Darwin Project | Database manager |
| Address | Institute of Integrative & Comparative Biology, University of Leeds LS1 9JT |
| Phone | |
| Fax | |
| Email | |
| **Partner 1** | |
| Name | Dr Suzan Benedict |
| Organisation | Universiti Malaysia Sabah |
| Role within Darwin Project | Local project co-ordinator |
| Address | School of Sustainable Agriculture |
| Fax | |
| Email | |
| **Partner 2 (if relevant)** | |
| Name | Dr Chey Vun Khen |
| Organisation | Forest Research Centre, Sabah |
| Role within Darwin Project | Lepidoptera taxonomist |
| Address | Sabah Forestry Department (SFD)<br>PO Box 1407, 90715 Sandakan, Sabah |
| Fax | |
| Email | |