



Submit by 21 January 2005

## DARWIN INITIATIVE APPLICATION FOR GRANT ROUND 13 COMPETITION:STAGE 2

Please read the Guidance Notes before completing this form. Applications will be considered on the basis of information submitted on this form and you should give a full answer to each question. Please do not cross-refer to information in separate documents except where invited on this form. The space provided indicates the level of detail required. Please do not reduce the font size below 11pt or alter the paragraph spacing. Keep within word limits.

### 1. Name and address of organisation

<b>Name:</b> University of York	<b>Address:</b> Department of Biology, PO Box 373, University of York, York YO10 5YW
------------------------------------	---

### 2. Project title (not exceeding 10 words)

Predictive tools for targeting conservation effort in Bornean forest reserves
---

### 3. Project dates, duration and total Darwin Initiative Grant requested

<b>Proposed start date:</b> 1st June 2005		<b>Duration of project:</b> 3 years			
<b>Darwin funding requested</b>	<b>Total</b>	<b>2005/06</b>	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>
	£128,560	£28,100	£40,835	£38,075	£21,550

### 4. Define the purpose of the project in line with the logical framework

Capacity building to enable conservationists, forest managers and policy makers to prioritise the conservation value of existing rainforest reserve networks in Sabah and to assess the likely impacts on conservation value of future land-use and environmental changes. In this way, to enable stakeholders in Sabah to promote responsible economic growth whilst maximising the conservation of biodiversity. We shall achieve these objectives (1) by collating existing data on distributions of forest species and mapping fine-scale distributions across the whole of Borneo, based on species' climate and habitat requirements, (2) by using computer models to integrate these data across species to quantify the conservation value of existing reserves in Sabah based on biologically important criteria, and (3) by using model outputs to provide clear practical advice on the biodiversity consequences within reserve networks of changes in climate and land-use. We shall focus on butterflies, but the principles developed by the project will be applicable to a wide range of other taxa and we shall leave a lasting legacy of personnel trained in their application.
---

### 5. Principals in project. Please provide a one page CV for each of these named individuals

Details	Project Leader	Other UK personnel (working more than 50% of their time on project)	Main project partner or co-ordinator in host country
<b>Surname</b>	Hill		Mohamed
<b>Forename (s)</b>	Jane K		Maryati
<b>Post held</b>	Lecturer in Biology		Professor/Director
<b>Institution</b>	University of York		Universiti Malaysia Sabah
<b>Department</b>	Biology		Institute of Tropical Biology & Conservation
<b>Telephone</b>			
<b>Fax</b>			
<b>Email</b>			

**6. Has your organisation received funding under the Darwin Initiative before? If so, give details**

Yes – ‘Molecular tools for promoting biodiversity....’ round 9 ref 10025.  
‘Conservation of whale sharks....’ round 8 ref 9005.

**7. IF YOU ANSWERED NO TO QUESTION 6 describe briefly the aims, activities and achievements of your organisation. (Large institutions please note that this should describe your unit or department)**

**Aims (50 words)**

**Activities (50 words)**

**Achievements (50 words)**

**8. Please list the overseas partners that will be involved in their project and explain their roles and responsibilities in the project. Describe the extent of their involvement at all stages, including project development. What steps have been taken to ensure the benefits of the project will continue despite any staff changes in these organisations? Please provide written evidence of partnerships.**

**Institute of Tropical Biology and Conservation, Universiti Malaysia Sabah.**

The Director, Prof. Maryati, will be instrumental in recruiting staff and in co-ordinating the day-to-day running of the project in Sabah. She will facilitate access to museum collections in Sabah (‘Borneensis’ collection) and use her links as co-ordinator for research at the ASEAN Regional Centre for Biodiversity Conservation (ARCBC) to facilitate access to other SE Asian collections. Prof. Maryati has been pivotal in obtaining legal protection for forest areas and during our previous collaborations we discussed the undeveloped potential of permanent collections for describing the distribution of tropical diversity and for conserving protected areas; this project arises directly from these discussions. Any staff changes at ITBC would have little effect on the project; the Institute has >15 permanent research staff (including staff previously trained as Darwin Fellows on earlier projects) who would be able to take over co-ordination of the project if necessary.

**Forest Research Centre, Sepilok, Sabah**

The Head of the Environmental Sciences Division at FRC, Dr Chey Vun Khen, will provide access to extensive collections held at FRC. Dr Chey was involved with the drawing up of Sabah State legislature for biodiversity conservation and he will facilitate access to other collections throughout SE Asia. Dr Chey will provide permission to carry out research at sites managed by the Forestry Department. The Conservation Officer at FRC, Joseph Tangah (Darwin Fellow on one of our previous projects) will provide practical assistance in fieldwork, specifically in gaining access to more remote sites for ground-truthing output from distribution models. This project arises directly from discussions during previous collaborations with FRC about the importance of insect collections to biodiversity conservation. Any staff changes at FRC would have little impact on the project as other staff involved in forest conservation would be able to take over.

**9. What other consultation or co-operation will take place or has taken place already with other stakeholders such as local communities? Please include details of any contact with the government not already provided.**

Many existing forest areas are under the direct control of the Forestry Department whose Conservation and Research division is FRC, one of our partners. Most other forest areas are managed by Yayasan Sabah (Sabah Foundation), whose mission is to improve the quality of life of Sabahans. We have established links with senior Forest Managers at Yayasan Sabah (Dr Waidi Sinun, Group Manager of the Research and Development Division) who will provide logistic support and consultation on establishing the conservation value of existing forest reserves. Dr Waidi will also facilitate consultation with other government and State agencies in Sabah and so ensure that the project is carried out with their full collaboration and that information from the project is disseminated widely to local stakeholders.

## PROJECT DETAILS

**10. Is this a new initiative or a development of existing work (funded through any source?) Are you aware of any other individuals/organisations carrying out similar work, or of any completed or existing Darwin Initiative projects relevant to your work? If so, please give details explaining similarities and differences and showing how results of your work will be additional to any similar work and what attempts have/will be made to co-operate with and learn lessons from such work for mutual benefits.**

Over the past few decades, researchers from a number of Universities and conservation bodies have worked on analytical tools for mapping tropical biodiversity and for designing reserve networks. However, lack of available distribution data means that these analyses are generally limited to only a few well-studied taxa analysed at coarse spatial scales. Moreover, climate change has not been considered in this context and conservationists generally have assumed that species ranges are static and have not taken account of how climate change may interact with land-use changes to affect species distributions. This project is a new initiative which will capitalise on the project partners' previous experience in modelling limits to species' distributions and in determining impacts of future climate and land-use changes on species. The project will investigate whether the computer modelling techniques we have developed can be used effectively in highly-diverse, relatively aseasonal tropical regions. The project will train local scientists in the appropriate use of these techniques and will have the potential to develop methodologies that can be applied to a range of other taxa and tropical regions. We are not aware of any other organisation carrying out similar research in Borneo (or more generally in SE Asia), or of any current or previous Darwin projects on this topic.

**11. How will the project assist the host country in its implementation of the Convention on Biological Diversity? Please make reference to the relevant article(s) of the CBD thematic programmes and/or cross-cutting themes (see Annex C for list and worked example) and rank the relevance of the project to these by indicating percentages. Is any liaison proposed with the CBD national focal point in the host country? Further information about the CBD can be found on the Darwin website or CBD website.**

By strengthening of the capacity of researchers and conservationists to prioritise the conservation value of existing reserves in Sabah, and by quantifying the likely impacts of future land-use and environmental changes on conservation value, the project will support the Government's implementation of Articles 6 (5%), 7 (10%), 10 (5%), and 12 (20%) of the Convention of Biological Diversity, with particular emphasis on protected areas (20%), forest biodiversity (20%) and climate change and biodiversity (20%) themes.

**12. How does the work meet a clearly identifiable biodiversity need or priority defined by the host country? Please indicate how this work will fit in with National Biodiversity Strategies or Environmental Action Plans, if applicable.**

The State of Sabah (Borneo) is exceptionally biologically diverse yet one of the poorest financially in Malaysia and the vast majority of its income is generated through conversion of rainforest into oil palm plantation and other forms of silviculture. Thus existing areas of forest are under increasing pressure from land-use changes but resources for protection are highly limited. The choice of forest areas to preserve is largely arbitrary because local researchers and forest managers lack the analytical tools required to identify sites which have the greatest conservation value, or to determine how their value may change in the future as a consequence of changes in the size, number or quality of other reserves. The critical need to address this issue has been recognised by local scientists who have given a high priority to gazetting and surveying biodiversity. However, practical constraints make it impossible to sample large regions adequately and existing data from site inventories are scattered across Institutes and countries and have not been collated. Thus important distribution datasets exist but there is a lack of trained staff capable of capitalising on their potential, or the means to provide the necessary training.

**13. If relevant, please explain how the work will contribute to sustainable livelihoods in the host country.**

This project will, in consultation with Forest Managers, allow the development of strategies that balance conservation of rainforest biodiversity with agricultural developments to meet local community requirements.

**14. What will be the impact of the work, and how will this be achieved? Please include details of how the results of the project will be disseminated and put into effect to achieve this impact.**

By collating existing distribution data and modelling species-specific relationships between climate, habitat and distribution, this project will enable local scientists for the first time to map accurately the distribution of species at fine scales over large areas, and to exploit these data for the effective targeting of conservation effort. Results will be disseminated to researchers, conservationists and forestry managers via publications, international conferences, and reports, and disseminated to the local community through our established links with the Environmental Education Officer at Yayasan Sabah (Ms Sylvia Yorath). In addition, a major workshop will (1) train other researchers in developing distribution databases and modelling distribution changes, (2) discuss the implications of the results and (3) consult with stakeholders on how the results of the project will impact on future conservation decisions. The project will work closely with the SE Asian Rainforest Research Programme (SEARRP, Senior Scientist Glen Reynolds) which is a major collaboration between UK institutions and SE Asian Governments, thus ensuring that implications of the project will be disseminated widely to international and local scientists, and that project findings are incorporated into future management plans.

**15. How will the work leave a lasting legacy in the host country or region?**

The project will leave a lasting legacy of two fully trained Sabah scientists able to make use of ecological and computer modelling techniques for analysing species distributions. At the end of the project, the scientists will be able to work independently and to use these techniques in novel research projects and to train others in their use. The databases and distribution maps generated during the project will be housed in the host organisations and made freely available to local scientists thus ensuring that results arising from the project continue to be used in conservation planning and research, and that similar analytical techniques can be developed for use with other taxa.

**16. Please give details of a clear exit strategy and state what steps have been taken to identify and address potential problems in achieving impact and legacy.**

Databases and distribution maps will continue to be updated by the Forest Research Centre and Universiti Malaysia Sabah for long-term monitoring of impacts of land-use changes on biodiversity well beyond the end of the grant period. Forest management strategies written in the final year of the project will include recommendations for future monitoring and research. These will be written in consultation with Conservation Officers at Yayasan Sabah and Regional Forestry Managers, to ensure that recommendations are carried out. Facilities for housing permanent collections are already in place so that the availability of fully trained staff resulting from this project will ensure that research on species distributions and biodiversity changes in Borneo continues beyond the lifetime of the project.

**17. How will the project be advertised as a Darwin project and in what ways would the Darwin name and logo be used?**

The project will focus on butterflies which are charismatic flagship species of high public concern. The University of York and collaborating Institutions will advertise the project as a Darwin project through use of the name and logo on all information, publications, databases and literature, at workshops, conferences and other meetings and in press releases and magazine articles.

**18. Will the project include training and development? Please indicate who the trainees will be and criteria for selection and that the level and content of training will be. How many will be involved, and from which countries? How will you measure the effectiveness of the training and will those trained then be able to train others? Where appropriate give the length and dates (if known) of any training course. How will trainee outcomes be monitored after the end of the training?**

Two Sabahan graduate biologists (Darwin Research Fellows, DRFs) will be trained at York in a wide range of ecological and modelling techniques. In addition to specific training in data collation, GIS, computer modelling and fieldwork, the DRFs will also attend taught Masters courses on topics in conservation ecology and biodiversity. The effectiveness of this training will be measured through close monitoring of the work produced throughout the project. DRFs will be appointed on the basis of qualifications and aptitude. We have already identified the candidate for DRF1 who has close ties with UMS and FRC. Both Fellows are likely to be employed by one of the host organisations at the end of the grant, guaranteeing continued use of skills learnt during the project, and thus they will be ideally placed to train others.

## LOGICAL FRAMEWORK

19. Please enter the details of your project onto the matrix using the note at Annex B of the Guidance Note. This should not have substantially changed from the Logical Framework submitted with your Stage 1 application. Please highlight any changes.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p><b>Goal:</b> To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</p> <ul style="list-style-type: none"> <li>• the conservation of biological diversity,</li> <li>• the sustainable use of its components, and</li> <li>• the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</li> </ul>			
<p><b>Purpose</b> To prioritise the biological importance of forest reserves for maximising biodiversity, and to provide clear practical advice on biodiversity consequences of changes in climate and land-use. To enable effective long-term conservation planning.</p>	<p>Practical advice given to stakeholders (May 2008). Computer modelling tools used to predict species distributions (May 2007), current patterns of biodiversity (Dec 2007), and potential changes in distribution of biodiversity (Feb 2008)</p>	<p>Conservation guidelines written and reserves prioritised to assist in effective conservation planning and promotion of biodiversity. Production of species' distribution maps and database.</p>	<p>Forest managers and conservation organisations have an effective input into economic planning. This is guaranteed by State legislature.</p>
<p><b>Outputs</b> Quantitative assessment of conservation value of forest reserves based on a range of integrated biodiversity criteria. Training of 2 Darwin Fellows in ecological and modelling techniques for reserve design and assessment and for predicting potential biodiversity changes in the future.</p>	<p>Research papers written up. Successful completion of training courses by Darwin Research Fellows</p>	<p>Research papers published in peer-review journals. Darwin Fellows successfully apply the techniques they have developed.</p>	<p>Darwin Fellows take up conservation posts in Sabah and use their knowledge and skills to inform decision makers. Our close links with local collaborators will facilitate this: our previous Darwin Fellows now have permanent posts at UMS and FRC. Research leads to clear recommendations and guidelines for stakeholders.</p>
<p><b>Activities</b> Collection of data on distribution of species in Borneo from existing sources, including Museum collections and published information (Jun 05 - Sep 06). Development of models to predict species' distributions across Borneo in relation to climate, elevation and habitat and testing model predictions with new field data (Oct 06 – Sep 07). Using distribution data to determine conservation value of existing forest areas in Sabah and to quantify biodiversity changes under a range of climate and land-use scenarios (Oct 07 – May 08). Invite local scientists and stakeholders to a 3-day workshop in Sabah to discuss implications of project findings (May 08).</p>	<p><b>Activity Milestones (Summary of Project Implementation Timetable)</b> Protocols for data collection developed, production of relational database and maps of species' distributions. Appointment of two Darwin Fellows who travel to the UK for training in database design and testing, development of techniques for predicting species' distributions and prioritising forest reserves. Organisation of workshop in Sabah for disseminating project findings.</p>		

20. Provide a project implementation timetable that shows the key milestones in project activities.

Project implementation timetable		
Date	Financial year	Key milestones
	Apr-Mar 2005/6 Apr-Mar 2006/7 Apr-Mar 2007/8	
July 2005	Apr-Mar 2005/6	Two Sabahan biologists (Darwin Research Fellows, DRF1 & 2) recruited to project.
September 05	Apr-Mar 2005/6	DRFs complete training at York in project protocols. Arrangements completed with European museums for collation of data.
September 06	Apr-Mar 2006/7	DRFs 1&2 complete collation of data from European and SE Asian museum collections. DRFs complete training in database design at NHM, and complete construction of distribution databases.
September 07	Apr-Mar 2007/8	DRF1 completes training at York in modelling techniques. DRF2 completes fieldwork in Borneo, updating distribution records and ground-truthing outputs from DRF1's models.
May 08	Apr-Mar 2008/9	DRFs 1 & 2 complete training at York in use of distribution data to prioritise conservation value of existing reserves and complete simulations of consequences of various land-use and climate change scenarios for site rankings.
May 08	Apr-Mar 2008/9	Workshop held in Sabah to discuss implications of project, train local scientists in predictive tools and consult with local stakeholders.

**21. Set out the project's measurable outputs using the separate list of output measures.**

<b>PROJECT OUTPUTS</b>		
<b>Year/Month</b>	<b>Standard output number (see standard output list)</b>	<b>Description (include numbers of people involved, publications produced, days/weeks etc.)</b>
May 2008	4C & 4D	Training of 2 Sabahan biologists (DRFs) at York University (18 months each) in database design, climate-distribution modelling, and analytical techniques for reserve design.
Mar 06 & Mar 07	6	Two Sabah collaborators to visit the UK to gather information on teaching and use of analytical tools.
May 2008	7	Production of 3 educational packages (pamphlet, poster, powerpoint presentation) to assist in teaching analytical and modelling techniques to local scientists and to interpret project results for local communities.
Oct 05 - May 08	8	UK staff to spend a total of 12 person weeks per year in Sabah training the Darwin personnel in the field and liaising with overseas partners.
May 2008	9	Production of habitat management plan (1) detailing conservation priorities of existing reserves and predicting likely changes in biodiversity distribution under various land-use and climate-change scenarios.
May 2008	10, 12A, 13B	Production of database (1) of butterfly species ranges, and quantitative inventories (1 per site) of species in different forest reserves. Production of fully labelled collection of specimens arising from fieldwork. All to be housed with overseas and UK partners.
May 2008	11A, 11B	2 papers accepted and 4 papers submitted on evaluation of climate-distribution modelling, analytical techniques, ranking of conservation value of existing reserves and changes in conservation value under various land-use and climate change scenarios.
May 2008	14A, 14B	Presentation of results at conferences of the British Ecological Society (3), Royal Entomological Society (1) the Sabah Society (1) and UMS (1), and organisation of a research workshop (1) at UMS.
May 2008	15B, 15D	Dissemination of results through Sabahan (1) and British (1) media where appropriate

**MONITORING AND EVALUATION**

**22. Describe, referring to the Indicators in the Logical Framework, how the progress of the project will be monitored and evaluated, including towards delivery of its outputs and in terms of achieving its overall purpose. This should be during the lifetime of the project and at its conclusion. Please include information on how host country partners will be included in the monitoring and evaluation.**

Both DRFs will produce written annual reports and field work visits by the Project Leader (Hill) and database manager (Hamer) will monitor progress with fieldwork. All partners will be involved in production of scientific papers and dissemination of results at conferences and workshops.