



## DARWIN INITIATIVE

### APPLICATION FOR DARWIN FELLOWSHIP PROGRAMME 2006

Please read the Guidance Notes before completing this form. Give a full answer to each section; applications will be considered on the basis of information submitted on this form. Please note the additional information requirements (CVs and letters of support as detailed in the Guidance for Applicants). Whilst this form is to be submitted by the host institution the proposed Fellow should be fully involved in development of the proposal.

**Submit by 10 March 2006**

#### 1. Contact Details

<i>Ref. (Defra/ECTF only):</i>
<b>Name and address of UK applicant organisation</b>
Dr Jane K. Hill Department of Biology (Area 18) , PO Box 373, University of York. York YO10 5YW.

#### 2. Darwin Fellow. A one page CV must be enclosed.

<b>Name and official address of proposed Darwin Fellow</b>
Mr Noel B. Tawatao, Institute of Tropical Biology & Conservation, Universiti Malaysia Sabah, Kota Kinabalu, Sabah, Malaysia.

#### 3. Summary of proposed Fellowship (no more than 100 words)

<p>The Fellow will investigate whether responses of species to land-use changes co-vary, and if responses are predictable from species' ecological traits and taxonomy. Specifically, the Fellow will analyse existing published data across a range of taxonomic groups and analyse new ecological and genetic data for ants to determine general patterns of species' response to selective logging and forest fragmentation on Malaysian Borneo (Sabah). The Fellow will receive training in ecological, statistical, and molecular genetic techniques, and will successfully implement them during his research and will thus have the tools and knowledge to train others on his return to SE Asia.</p>
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**4. Principals in Project. Please give the details of the individuals from the UK host organisations (and other institutions if relevant) who would be directly involved in supervising/working with the Darwin Fellow. A 1 page CV on each must be enclosed.**

Details	Main UK expert	Other UK expert	Other UK expert	Other UK expert
Surname	Hill	Hamer		
Forename(s)	Jane	Keith		
Post held	Lecturer	Senior lecturer		
Institution (if different to above)		University of Leeds		
Department	Biology	Biology		
Telephone				
Fax				
Email				

**5. Describe briefly the aims, activities and achievements of the UK applicant organisation. (Large institutions please note that this should describe your unit or department)**

The Department of Biology, University of York has >40 HEFC-funded lecturing staff and >100 research staff. The Department was rated 24/24 in the last Teaching Quality Assessment, and was ranked 5 in the last Research Assessment Exercise. Ecology is one of three main research foci within the Department, with particular expertise in the areas of global environmental change (Prof Ineson, Prof Fitter, Dr Atkin, Dr Hodge), conservation of biodiversity (Prof Thomas), conservation genetics (Prof Searle, Dr Oxford) and tropical ecology (Prof Law, Dr Hill). The Department teaches undergraduate BSc courses in Biology, Ecology and Genetics as well as graduate Masters courses (including MRes in Ecology and Environmental Management).

**6. Describe briefly the aims, activities and achievements of the proposed Darwin Fellow's organisation. (Large institutions please note that this should describe your unit or department)**

The Institute of Tropical Biology and Conservation is a research institute within the Universiti Malaysia Sabah. It has >15 permanent staff, including staff trained under previous Darwin Initiative projects. The Director of the Institute Prof Maryati Mohamed has been instrumental in the expansion of the Institute over the past decade (reflecting Malaysia's obligations under the Convention of Biological Diversity) and in gaining legal protection for forest areas within the State. The Institute recognises the importance of describing the distribution of animal and plant diversity within the State, and much research currently focuses on understanding the impacts of forest loss and disturbance on species diversity.

**7. Describe briefly the proposed Fellow's current role within their organisation and link to a Darwin project.**

Noel Tawatao is a graduate Biology student within the Institute of Tropical Biology and Conservation, Universiti Malaysia Sabah. He has recently completed his Masters degree (final grade 3.6 out of 4) including a thesis investigating impacts of commercial selective logging on the diversity of ants and termites (graded A - 100%). He is currently continuing with his research on the ecology of forest ants and is currently registered for a PhD, and is also teaching undergraduate Forestry students. Noel is currently collaborating with Drs Hill and Hamer on a research project investigating changes in ant diversity following logging. This research is developing work carried out under the Darwin Initiative projects "Biodiversity of tropical forest butterflies on Sabah, Borneo" (1998-2001; number 6/7040) and "Molecular tools for promoting biodiversity in tropical forest fragments in Sabah, Borneo" (2001-4; number 9/10025).

**8. Provide a concept note on the Darwin Fellowship. This should include:**

- a clear outline of the aim and objectives of the Fellowship
- the programme of work, including key milestones through the duration of the Fellowship and their timing
- the role of the UK applicant organisation, and others where relevant (including contacts)

- where appropriate, how the Fellowship will contribute towards sustainable development or sustainable livelihoods

### **DEVELOPING ECOLOGICAL TOOLS FOR PREDICTING IMPACTS OF FOREST DISTURBANCE ACROSS TAXA**

**Background.** Tropical rain forests rapidly are being logged and conservationists urgently need to understand the ecological consequences of these habitat changes. For example, the Malaysian State of Sabah (Borneo) was once almost completely covered by forest, of which approximately 58% was remaining in 2001. Throughout the tropics, much research has focused on understanding responses of species to habitat disturbance and there is now a considerable literature on this topic although no clear consensus has emerged and responses of one taxon to disturbance do not seem to reflect responses of other taxa. One possibility is that this lack of consensus is due to differences in factors such as sampling methodologies among studies. For example, our previous work indicates that the spatial scale at which studies are carried out largely predetermines the reported response of species diversity to habitat disturbance, and thus obscures any underlying general trends that may exist. Such findings are potentially important to tropical ecologists given that, by contrast to temperate regions, there are few recommendations on the most appropriate methods for sampling different taxonomic groups in the tropics making it difficult to deduce any general patterns that may exist. The Fellow will tackle this issue by re-analysing existing published data, analysing new field data, and examining patterns of genetic diversity to determine whether or not there are general patterns of species' response to disturbance once confounding factors have been controlled for.

**Aims.** The rapidity of land-use changes and the high diversity of tropical regions has resulted in many researchers searching for possible 'short cuts' for biodiversity conservation. Previous research has focused on the usefulness of rapid sampling techniques or species identification by non-experts ('parataxonomy'); research during this fellowship will take an alternative but complementary approach and determine whether or not species responses to land-use change are predictable from their ecological traits and taxonomy. Evidence for general patterns in terms of species' responses to disturbance is urgently needed to determine general patterns of ecological responses to habitat changes and would be an important advance in our ability to make reliable predictions of the distribution of biodiversity in the future.

**Programme of research.** Research and training during the Fellowship will have three main strands in relation to responses to land-use changes. 1) The meta-analysis of existing published data on responses of different taxa to habitat disturbance. 2) The analysis of new field data on patterns of ant diversity following commercial selective logging, and comparison with data for other plant and animal taxa sampled at the same sites and over the same range of spatial scales. 3) Lab analysis of changes in genetic diversity within ant populations following forest fragmentation, and comparison with data for other invertebrates from the same sites. This multi-faceted approach will allow the Fellow to receive training in a wide variety of statistical, experimental and lab skills necessary for his development as an independent conservation scientist, and will capitalise on the considerable expertise at the Universities of York and Leeds. The Fellow will investigate impacts of two types of land-use change – commercial selective logging and forest fragmentation – and will investigate patterns of responses in terms of changes in species and genetic diversity. The Fellow will test the hypothesis that, after controlling for confounding effects, responses of species can be predicted from their ecological traits (e.g. geographic range size, dispersal ability, habitat specialisation).

**Key milestones and outputs.** Successful completion of Masters-level courses in ecology, conservation and transferable scientific skills (2 modules completed Dec 2006; 2 modules completed April 2007). Training and successful use of meta-analysis statistical protocols (Feb 2007). Training in use of molecular genetic techniques (September 2007). Training and successful implementation of analyses of diversity indices, spatial statistics and modelling (April 2007). Presentation of results at a national conference (British Ecological Society Annual Meeting; September 2007). Research findings submitted for publication (September 2007).

**Role of research organisation.** The Department of Biology at York will provide all the training and expertise necessary for the training of the Fellow and his successful completion of the research project. The Fellow will capitalise on the considerable expertise at York and Leeds Universities in the research areas of global environmental change, biodiversity, statistical techniques, and insect ecology. The Fellow will benefit from existing links through current Darwin Initiative projects and other on-going research projects with the Natural History Museum and the NERC molecular genetics facility at the University of Sheffield. The Fellow will also benefit from links with NERC-funded Masters course in Ecology (York) and Conservation (Leeds).

**Sustainable development.** Sabah is exceptionally biological diverse yet one of the poorest financially in Malaysia and the vast majority of its income is generated from conversion of forest into oil palm plantation and other forms of silviculture. Results from this study will provide information for local forest managers and stakeholders to enable them to balance sustainable economic growth with the conservation of biodiversity.

**9. Legacy. Provide information on how the Darwin Fellow will utilise, promote and disseminate the benefits of the Fellowship on return to his/her home country. Will a strategy be developed during the Fellowship to ensure this is achieved?**

The Fellowship will leave a lasting legacy of a fully trained Darwin Fellow able to use ecological and molecular genetic techniques to design and carry out experiments and field campaigns investigating impacts of land-use changes on tropical ecosystems. The training the Fellow receives in the UK will enable him to develop as an independent scientist and to use his skills in developing and carrying out novel research projects on his return to SE Asia, and to train others. Noel Tawatao has already developed skills and gained useful experience during his time as a graduate student that will be important in his future career as a scientist, and the opportunity provided by this Fellowship will assist in the successful completion of his PhD studies. Our previous experience of past Darwin Initiative projects in Sabah indicates that once the Fellow has successfully completed his PhD he is very likely to be employed by the host organisation, and so he will be ideally placed to train others.

**10. How will the Fellowship assist the Fellow's organisation and/or local communities and/or home country in working towards the objectives (or implementation) of the Convention on Biological Diversity? References to the Convention should be specific, for example, by referring to articles, cross-cutting or thematic issues<sup>1</sup>.**

The training and research carried out during the Fellowship will strengthen the capacity of researchers and conservationists to quantify the conservation value of existing forest reserves in Sabah and to examine the likely consequences of future land-use and environmental changes on their conservation value and ecosystem functioning. Thus the Fellowship will support the Government's implementation of Articles 6, 7, 10 and 12 of the Convention of Biological Diversity, with particular emphasis on protected areas, forest biodiversity and climate change and biodiversity themes.

**11. What collaboration has there been with the Darwin Fellow to date in developing the proposal, and what collaboration is planned for the duration of the Fellowship? Where relevant, describe any consultation or collaboration by the proposed Fellow within his/her own country.**

During his Masters research project, Noel Tawatao investigated the responses of ants and termites to forest disturbance, and related changes in diversity to abiotic factors. As part of their research, Drs Hill and Hamer have visited the field site at Danum Valley, Sabah where Noel is working on many occasions. During these trips, the implications of Noel's findings were discussed, in particular whether or not there was evidence for any consensus between responses of ants and other invertebrates to habitat disturbance. The animal groups that are being studied during this on-going collaboration span a range of functioning types (e.g. predators, herbivores, pollinators, decomposers) and comparing responses among taxa will be important for predicting changes in ecosystem functioning following habitat disturbance; this application arises directly from these discussions.

Most previous tropical research has focused on ecological consequences of land-use changes but it is becoming increasingly clear that global climate warming will affect tropical regions, particularly through changes in precipitation. The Departments of Biology and Environment at York, and Departments of Biology and Geography at Leeds have considerable expertise in modelling impacts of climate warming on species' distributions (current project 13/14022) and future collaboration is planned investigating how predicted climate changes may interact with land-use changes to affect the future distribution of biodiversity on Borneo.

**12. Provide details of the Darwin Initiative project that the proposed Fellow was associated with, including his/her role in that project and any ongoing involvement.**

<sup>1</sup> Refer to the Guidance Notes for Applicants for further information

Our two previous Darwin Initiative projects (9/10025 & 6/7040) examined the degree to which the species richness and genetic diversity of butterflies were affected by habitat disturbance and forest fragmentation. Our findings revealed significant impacts of commercial selective logging and forest fragmentation on butterfly diversity but that these impacts were relatively minor compared within the consequences of clear-felling and conversion of forest to agriculture. Our findings suggested that small forest remnants make an important contribution to regional diversity and in this Fellowship Noel will investigate whether similar patterns are evident across taxa with different ecological traits and life-histories. Noel has been carrying out fieldwork at sites in logged and unlogged forest on Sabah in order to quantify changes in ant diversity. Noel will sample sites where we have already sampled a range of other taxa and this novel research will allow us, for the first time, to compare impacts of habitat disturbance across a wide range of animal and plant taxa at the same sites and over the same range of spatial scales. Noel has been developing the sampling protocols and identification skills necessary for the proposed fieldwork and we consider that the results from this collaboration will be important for ecologists and conservationists in determining general patterns of species' responses to habitat disturbance, and thus for making reliable predictions of changes the distribution of biodiversity in the future.

### 13. Duration of the Fellowship: what are the intended start and finish dates?

1<sup>st</sup> October 2006 – 30<sup>th</sup> September 2007

### 14. Where will the Darwin Fellow be based? Please be specific with organisational details and dates (where more than one location).

The Darwin Fellow will be based within the Department of Biology, University of York throughout the period of the Fellowship.

### 15. Financial Aspects.

<b>Fellow payment</b>			
London: £1200/month	Number of months	2006/7	2007/8
		£	£
UK (outside London): £1000/month	Number of months 12	£	£
Overseas location £ /month*	Number of months	£	£
<b>Host Organisations' costs</b>			
UK: £300/month	Number of months 12	2006/7	2007/8
		£	£
Overseas location: £ /month*	Number of months		£
<b>A. Total Fellow &amp; Host Organisation Costs</b>		<b>£</b>	<b>£</b>

<b>Actual travel costs (Return journey to Fellowship location)</b>		
Return airfare. Kota Kinabalu – Kuala Lumpur - Manchester	2006/7	2007/8
	£	£
Travel to/from airports. Manchester-York	£	£
Visas etc. <i>Details</i>	£	£

\* Figures available from Margaret Okot on 0207 082 8430

<b>B. Total Fellowship Travel Costs (Actual costs up to £2000 will be paid)</b>	<b>£</b>	<b>£</b>
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<b>Actual travel costs 'Other Travel'</b>		
<b>Specify purpose. Maximum £500 within country of Fellowship location, £1500 for international travel.</b>		
<i>Airfares Details</i>	2006/7 £	2007/8 £
Subsistence Attendance at the British Ecological Society Annual Meeting. September 2007. Travel, registration, 4 nights' accommodation.	£	£
Travel to/from airports. <i>Details</i>	£	£
Visas etc. <i>Details</i>	£	£
<b>C. Total (Other travel) costs</b>	<b>£</b>	<b>£</b>

<b>D. ACADEMIC FEES</b>	2006/7 £	2007/8 £
Attending Masters graduate taught modules and practicals on the MRes in Ecology and Environmental Management. 2 modules per term for autumn & spring terms, plus Departmental training courses in molecular genetics, statistics, and transferable scientific skills.		

<b>TOTAL FELLOWSHIP COSTS (A + B + C + D)</b>	<b>£</b>	<b>£</b>
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#### 16. Other sources of funding: provide details and amounts

Field work is being carried out under the Royal Society's SE Asia Rainforest Research programme and the Darwin Fellow will have access to their facilities (vehicles, field assistants, computers, field equipment) at greatly reduced local rates.

#### FCO NOTIFICATION

Please check the box if you think that there are sensitivities that the Foreign and Commonwealth Office will need to be aware of should they want to publicise details of the Darwin Fellowship and the resultant work in the UK or the Darwin Fellow's home country

#### CERTIFICATION

I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.

I enclose CVs for project principals and letters of support as requested in the Guidance Notes.

## Fellowship 823

<b>Name (block capitals)</b>	DR JANE K. HILL
<b>Position in the organisation</b>	LECTURER IN BIOLOGY

Signed

Date:

10<sup>th</sup> March 2006

Please return completed form to The Edinburgh Centre for Tropical Forests (ECTF) by 10 March 2006 by email to [darwin-applications@ectf-ed.org.uk](mailto:darwin-applications@ectf-ed.org.uk). A hard copy of the full application should also be sent to ECTF, Darwin Applications Unit, Pentlands Science Park, Bush Loan, Penicuik, Edinburgh EH26 OPH.