Darwin Fellowship - Interim Report

(Submit within one month after 3 or 6 month period, max 3 pages.)

Darwin Project Ref No.	EIDPS12
Darwin Project Title	Developing ecological tools for predicting impacts of forest disturbance across taxa
Name of Darwin Fellow	Noel Tawatao
UK Organisation	University of York
Your Organisation(s)	Institute of Tropical Biology and Conservation Universiti Malaysia Sabah
Your role within your Organisation	Research student/tutor
Start/end date of Fellowship	October 2007 - October 2008
Location	York
Darwin fellowship funding (£)	£19,700
Type of work (e.g. research, training, other, please specify)	Research and Training
Main contact in UK Organisation	Dr. Jane Hill
Author(s), date	

Background

- Briefly describe your involvement in the Darwin project before the start of your fellowship.

  Prior to the start of the fellowship programme, I investigated responses of ants and termites to tropical forest disturbance, and related changes in diversity to abiotic factors. My fieldwork was carried out in Sabah (Malaysian Borneo) where previous and existing Darwin projects are being implemented. This work was carried out for my Masters degree. During my research and field studies at Danum Valley it became clear to me from talking to other researchers that there was little consideration of whether or not ants responded to habitat disturbance in a similar way to other invertebrates. This fellowship arose directly from these discussions.

  During the field work for my Master's research project, I particularly discussed my ideas with researchers involved with previous Darwin Initiative projects 9/10025 & 6/7040. These previous projects examined the degree to which species richness and genetic diversity of butterflies were affected by habitat disturbance (selective logging) and forest fragmentation. Findings revealed significant impacts of commercial selective logging and forest fragmentation on butterfly diversity but that these impacts were relatively minor compared with the consequences of clear-felling and conversion of forest to agriculture. The findings also suggested that small forest remnants make an important contribution to regional diversity. In this fellowship, I am investigating whether similar patterns are evident across taxa with different ecological traits and life-histories.

- Describe aim and objectives of the Fellowship, and programme of work

  The fellowship is investigating whether responses of species to land-use changes co-vary, and if responses are predictable from species' ecological traits and taxonomy. I am analysing existing published data across a wide range of taxonomic groups as well as analysing new field data for ants. These new data will be analysed to examine changes in species richness and abundance, and genetic diversity of ants in response to selective logging and forest fragmentation.

- Briefly describe the roles of the UK and Fellow's institutions

  The Department of Biology at York University is providing all the training and expertise necessary for my training and for the successful completion of the research project. I am also benefiting from the expertise at York and Leeds Universities in the research areas of global environmental change, biodiversity, statistical techniques and insect ecology. I am benefiting from existing links through current Darwin Initiative projects and other on-going research projects e.g. with the Natural History Museum and the NERC Molecular Genetics Facility at the University of Sheffield.

  The Institute of Tropical Biology and Conservation is a research institute within the Universiti Malaysia Sabah. 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. Thus the findings of my research are of great importance to other researchers at UMS, and complement on-going research projects.

Progress

- Provide a brief account of your work since the start of your fellowship, showing progress against the programme of work.

  There are three main aspects to this project;

  1) Meta-analysis of existing published data. This research is on-going and should be completed in the next few months. I have searched on-line data bases for studies reporting impacts of commercial selective logging on tropical taxa. I have found >50 studies and I am currently extracting data from these studies for re-analysis. I will construct a relational database and then analyse data to determine patterns of response across taxa and across different trophic levels.

  2) Analysis of new field data for ants. The project started in October 2007, but prior to the start of the fellowship programme, I have sampled ground-dwelling ants in primary, logged and fragmented forest sites (10 locations in total). At each location, I sampled $1m^2$ of leaf litter at 25 sites using Winkler techniques. These samples have been sorted and individuals identified to species and functional type. Data have already analysed and a publication is in preparation. Results show little difference in ant diversity following commercial selective logging but a significant decrease in predatory individuals and an increase in detritivores following logging. Findings from this research have been presented at the British Ecological Society Meeting in Leeds on 07-08 March 2007 and at the Royal Entomological Society Postgraduate forum at University of York on 13 April 2007 (winner of best student poster prize).

  3) Laboratory analysis of changes in genetic diversity of ant populations following forest fragmentation. I will use AFLP analysis to examine genetic diversity of ants. I have just completed a 1-week (19-23 February 2007) training course at the NERC Molecular Genetic Facility, University of Sheffield. This work is on-going - DNA extraction from selected ant species, and subsequent AFLP analysis will be carried out at York over the next few months.

Transferable skills

I have attended 4 Masters-level modules to date within the Biology Department at York: Conservation Genetics, Molecular techniques in Ecology; Transferable scientific skills (oral presentations, posters, writing skills, project management); Statistics for Ecologists.

- Provide an account of any problems encountered and how you have or are planning to overcome them.

  I have not had any problems so far. Unfortunately I have just broken my ankle and it is likely to take about 4 weeks to mend. Hopefully this will not affect my research given that most of it is desk based.

- Any issues you would like to raise?

  None

Achievements and Outcomes

- What have been the main achievements and outcomes todate, and how do they related towards the overall aim and objectives of the Fellowship.

  Previous studies on the meta-analysis of existing data have led to greater understanding of general patterns of ecological responses to habitat changes. My investigation so far indicates that important new findings will emerge from my meta-analysis of species responses to commercial selective logging. I am particular pleased with the large number of studies I have found for re-analyses, and the ease with which it was possible to extract information from them. Findings from this investigation will be directly relevant to my main aim of comparing responses of different species and taxa to habitat disturbance.

  I have analysed my new field data on ants and am currently writing up my findings for publication. My results have complimented previous studies showing that commercial selective logging has relatively little impact on the diversity of ants. The novel part of my research has been to categorise ants into different feeding guilds and functional groups based on their ecological and morphological traits. This revealed that selective logging has had significant impacts on predatory species as well on detritivores. I think this suggests that analysing species responses by function rather than by taxonomy may be more important. I am now collaborating with the Museum of Comparative Zoology of the Harvard University to upload images of ants I collected in Sabah for taxonomic studies.

Next Steps

- Briefly describe forthcoming activities, events, milestones

  The remaining months will be devoted to meta-analyses and writing up my findings for publication in scientific journals I will also receive training in the design of relational data bases suitable for meta-analyses. I will also carry out more work on the molecular genetic studies. I have started collaborating with the University of Leeds on a project examining changes in stable isotope ratios of omnivorous ants following habitat disturbance. I am hoping to examine whether changes in stable isotopes of nitrogen can be used to understand trophic status and feeding patterns of ants in different habitats. I intend to present my findings at future relevant conferences (e.g. Tropical Ecological Group, British Ecological Society Annual Meeting, Glasgow, September 2007). I am also collaborating with staff at York, Leeds and Cambridge Universities and will present some of my results at the Royal Society Summer Exhibition in London (July 2007).
  .