

Darwin Initiative Annual Report

Darwin Project Information

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| Project Ref Number | 162/14/054 |
| Project Title | Training the next generation of Papua New Guinean conservation biologists |
| Country(ies) | Papua New Guinea (PNG) |
| UK Contract Holder Institution | University of Sussex |
| UK Partner Institution(s) | Natural History Museum, UK |
| Host country Partner Institution(s) | Binatang Research Center, Papua New Guinea Wildlife Conservation Society, Papua New Guinea |
| Darwin Grant Value | £197,555 |
| Start/End dates of Project | 1 September 2005 – 30 August 2008 |
| Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..) | 1 September 2007 to 31 March 2008 Annual Report No. 3 |
| Project Leader Name | Dr A J A Stewart |
| Project website | http://waterbeetles.info/Darwin/DarwinHTMLs/DarwinBackground.html |
| Author(s), date | Dr A J A Stewart, 2 May 2008 |

1. Project Background

Acronyms used in report:

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|------|---|
| PNG | Papua New Guinea |
| US | University of Sussex |
| NHM | Natural History Museum, London |
| WCS | Wildlife Conservation Society, Goroka, Eastern Highlands Province, PNG |
| BRC | Binatang Research Center, Madang, PNG ('Binatang' means 'insect' in the most widely spoken local language in PNG, Tok Pisin). |
| UPNG | The University of Papua New Guinea, Port Moresby. |

The project is a collaboration between the University of Sussex (US), the Natural History Museum (NHM) in London, the Binatang Research Center (BRC) in Madang, Madang Province, Papua New Guinea and the Wildlife Conservation Society (WCS) in Goroka, Eastern Highlands Province, Papua New Guinea. During the reporting period in question, the project work was divided between the above two centres in PNG.

The project stems from the recognition that one of the major obstacles to successful conservation planning in Papua New Guinea is the extremely deficient state of knowledge of the country's flora and fauna and how existing knowledge can be applied to biodiversity conservation. Part of the problem is that the country lacks adequately trained conservation biologists who can obtain the requisite data, interpret them and make decisions or give advice

based on the findings. The project tackles this problem through training in conservation biology and research methods.

The purpose of the project has been twofold: (1) to train eight new conservation biologists to become the potential conservation leaders of tomorrow, and (2) in the process of that training, gather highly relevant data that can be used to guide conservation planning and policy. The strategy has been to bring two early-career PNG biologists to the UK for a two-month period of intensive training in advanced entomological techniques, who then return to PNG to become local training and research coordinators at each of the two partner institutions. These individuals then become responsible for training eight PNG honours students (in two cohorts) in a variety of fieldwork and laboratory techniques and for coordination of these students' research projects. The principal output of the project will be these ten highly trained conservation biologists (eight students and two early-career scientists), who will be equipped with the necessary skills and experience to conduct biodiversity surveys, conduct field investigations and make sound conservation decisions and recommendations based upon robust scientific principles and data.

2. Project Partnerships

Collaboration between UK and host country partners

Collaboration between the UK and host country partners continues to work well with free flow of email discussion and prompt resolution of problems. Dr Michael Balke (NHM team) has spent a total of five weeks in PNG during the reporting period (in two visits), visiting both WCS and BRC to run training events, as well as to set up research and teaching materials and sample aquatic insects (especially water beetles) from a wide range of sites.

Synergy with other Darwin projects

The students based at BRC (Kanawi Chamillou, Leontine Baje and Francesca Dem) were assisted in the more practical aspects of their Honours research by BRC Parataxonomists employed in the later stages of Darwin post-project EIDP09/10-030 (Consolidating local capacity for biodiversity surveys in Papua New Guinea; Project Leader: Alan Stewart). This project finished in July 2007, but the parataxonomists trained by that project remain at BRC and continue to be an invaluable source of local information and assistance for the students. Similarly, these students and their successors have continued informally to educate the parataxonomists in the more theoretical aspects of biology. As reported in both previous Annual Reports, this remains a very fruitful synergy with tangible benefits for both sides.

BRC retains contact with a Darwin project on butterfly farming (Sustainable insect collecting and farming in Papua New Guinea; Ref: 14-003; led by Dr. Tim Bayliss-Smith, Cambridge University), having had regular discussions with Mr. Rob Small, a doctoral researcher on this project, based in Madang in 2007.

Collaboration with other projects

Darwin-funded research and training based at BRC is benefiting greatly from synergy with the concurrent NSF-funded project on plant-insect food webs and tropical rain forest succession (NSF-00515678). This project is studying the differences in host specificity and species richness of insects feeding on young and mature trees (as models of the effects of rainforest disturbance) in four 1ha plots (two each in pristine and cleared forest) at one of BRC's main field study sites at Wanang (Madang province), in which all mature trees have been inventoried and all insects on the vegetation are being reared for species-level identification. This continues to be a very substantial logistic undertaking that has provided ideal training opportunities for the Darwin-funded students, especially Kipiro Damas. It also fits in well with the objective of the Darwin project to build student projects around the comparison of pristine and disturbed rainforest habitats.

The BRC-based projects by Toko Pagi and Samuel Legi follow field protocols designed by the Centre for Tropical Forest Studies (CFTS) for insect surveys associated with 50-ha permanent forest plots. Their Honours projects follow these protocols at a site selected for a

future 50-ha plot so that there is the prospect of their studies becoming part of an international cross-continental comparison lead by CTFS.

The existence of the Darwin project has prompted Banak Gamui, acting co-director of WCS Goroka, to submit a proposal in March 2008, with assistance from Drs Michael Balke and Alan Stewart, to the British Ecological Society (BES): "An ecological investigation into the herbivory and defence mechanisms of *Piper aduncum*, in its introduced and native habitat ranges." Aileen Sagolo (Darwin student, 2nd cohort) and M. Balke are compiling another grant proposal to the BES, addressing hunting issues using GIS data. Chris Dahl, the project coordinator at BRC, submitted a proposal in April 2008, with assistance from Vojtech Novotny, to the American Zoo and Aquarium Association: "The amphibian decline crisis: is it happening in Papua New Guinea?"

3. Project progress

Team-building:

Mr Katayo Sagata returned to WCS-PNG in August 2007 after having successfully completed his MSc at the University of Wellington in New Zealand. On his return, he took over the position of Darwin Initiative student supervisor that had been temporarily filled by Ms Miriam Supuma in his one-year absence.

Mr Darren Bito (previously the PNG Project Co-ordinator and research supervisor based at BRC) was successful in securing a PhD studentship at Griffith University in Brisbane, Australia, working with Professor Roger Kitching on tropical forest insect communities. He left BRC to take up this position in June 2007. Darren also successfully competed for a Darwin Fellowship to come to the UK for a year (primarily at Sussex, but also at Oxford and Leeds universities); however, by the time the Fellowships were announced, he had already accepted the PhD position in Australia. After a prolonged search, BRC was able to hire a Research Supervisor to replace Darren. The new Research Supervisor is Mr. Chris Dahl, a Honours degree biologist from UPNG who has had a long association with BRC and is a popular choice for the position.

Dr Frank Clarke was hired from January 2007 to assist in the training of student conservation biologists in PNG. Unfortunately, he contracted a serious eye infection whilst in PNG that required urgent medical attention, was on sick-leave for three months, and then tendered his resignation at the end of July 2007. After considerable discussion, it was clear that we would have difficulty in finding someone to fill the remaining 2.25 months of this post, given the time required to advertise, recruit, obtain a visa and induct a new recruit (as reported by email to Sarah Nelson, 10.9.07). It was therefore decided that the remaining funds would be better directed towards part-supporting another cohort of Honours students (see below).

Training of the research supervisors:

Mr Chris Dahl

Mr Dahl is the new PNG Project Co-ordinator and research supervisor based at BRC. Alongside his supervision duties and training of Honours students, he is continuing in his research on amphibian communities in tropical rainforests, which started as his Honours project. With the assistance from Darwin project collaborator Professor V. Novotny (Director of BRC), he has been working on a manuscript analysing amphibian communities in Papua New Guinea, scheduled for submission in May/June 2008.

Mr Katayo Sagata

After returning from his Masters programme in New Zealand, Katayo has continued to receive training from Dr Michael Balke, both by attending his lectures on PNG aquatic insect diversity and the importance of DNA in taxonomy and systematics and by acting as his research assistant on numerous field trips across PNG collecting water beetles. He was trained both in the lab and in the field to collect, database and identify aquatic insects and write up scientific papers. Katayo was also further trained to organize fieldwork logistics, an important issue in PNG. With the help of Dr Balke, he has applied for a curatorial position at the University of Papua New Guinea (UPNG); if his application were successful, this would make him one of the country's most important biodiversity research officers.

Ms Miriam Supuma

Following the departure of co-Directors Drs Andrew Mack and Debra Wright in April 2007, Ms Supuma took over the management of the WCS-PNG Program. Her responsibilities included administration and management, as well as training of the Darwin students until Katayo Sagata returned in August 2007. These responsibilities were shared with Mr Banak Gamui upon his completion of his Masters degree in June 2007. Ms Supuma was invited in September 2007 to attend a course on *Proposal Writing and Fundraising for NGOs* which was organised by the *Strengthening Conservation Capacity Project* (SCCP) run by UPNG; skills learnt on this course have since enabled Ms Supuma to write proposals for external funding. She was the instructor for tree census and plant survey techniques on the annual *WCS Field Techniques Training Course* (22 Feb-20 Mar 2007), as well as assisting in course logistics. She led a team of six students to the Society of Conservation Biology-Australasia (SCB-A) inaugural conference in Sydney, Australia (she is on the board of SCB-A). Together with Research and Conservation Foundation (RCF) (partners to WCS) she was invited to attend the WCS-Asia Regional Capacity building workshop in Lao-PDR (9-19th November 2007), a meeting to evaluate the success of capacity building, awareness and environmental education in country programs of WCS in Asia. WCS-PNG was highlighted for its particular success in running the annual conservation training courses and the number of both students and staff successfully competing for scholarships in postgraduate studies.

Training of honours students:

Unfortunately, one of the students in the first cohort at BRC, Mr. Kanawi Chamillou, dropped out of the programme for family reasons. Thus, instead of four BRC-based students completing their Honours studies within the lifetime of the project, we are now aiming at three. However, using the funds released from the UK Co-ordinator post (Dr Clarke), we have been able to initiate a third cohort of students at BRC, in the expectation that the two newly-recruited students (Samuel Legi and Toko Pagi) will be able to complete half of their studies within the lifetime of the Darwin project and then finish on support from other sources. As in previous years, the two student positions were advertised nationwide. Both students were recruited from the annual biological training course held at WCS and are undertaking research for their Honours degrees at UPNG.

General training activities:

A wide variety of training activities took place at both WCS and BRC, including formal fixed-length courses (which were open both to Darwin students and others), lectures and short training sessions by visiting scientists and ongoing day-to-day training for the Honours students. The following lists the main components:

- **Introduction to DNA Sequencing in Taxonomy and Systematics:** 3-4 December 2007, WCS, Goroka, led by Dr Michael Balke (NHM collaborator). Following the needs-assessment seminar held in Goroka in December 2006 (reported in previous Annual Report), two powerpoint lectures were given to provide an introduction to a new but rapidly growing field that will strongly impact upon field biology in PNG. Ten students and staff participated in the seminar and discussions afterwards (Sagata, Gamui, Asigau, Dahl, Sagolo, Novera, Yhuanje, Tomda, Warakai, Supuma).

- **Aquatic insects - field techniques and identification:** 15-19 February 2008, BRC, Madang, led by Dr Michael Balke. The aim was to introduce parataxonomists and students to field techniques, to sort and identify the material to ordinal, and where possible to species, level. Nine participants (Ibalim, Kua, Keltim, Cturtecka, Idigel, Toko, Manumbor, Mogia, Kalwa) conducted fieldwork around Madang, targeting stationary as well as running waters. All accessible major habitat types were briefly surveyed, including first order streams, lowland rivers, forest puddles, larger swamps, and streams in two different geological terrains to demonstrate the impact of soil type on faunal composition and relative abundance of different groups. Seminars included powerpoint-based lectures illustrating aquatic insect diversity and a brief introduction to the use of DNA sequence data in taxonomy and biogeography. A reference collection was compiled which has been added to the national reference collection of aquatic insects.
- **Proposal-writing:** short seminars at WCS held by Dr Michael Balke, December 2007. Attended by various Darwin students and WCS staff.
- **Tropical ecology postgraduate course:** weekly lectures at BRC given by Prof V. Novotny, January-March 2008. Attended by all Honours students.
- **Plant ecology and floristics:** one week, November 2007, training at BRC by Dr George Weiblen (University of Minnesota)
- **Entomology (especially Lepidoptera):** 2 days, November 2007, training at BRC by Dr Scott Miller (Smithsonian Institution, Washington).
- **Community ecology and botany:** 1 week, August 2007, training at BRC by Professor Jan Leps (University of South Bohemia).
- **Entomology & statistics:** numerous short presentations at BRC by Prof. Novotny and Petr Klimes (Czech Academy of Sciences).
- **Bird survey techniques:** 8th February 2008, a one day refresher course at Mt Gahavisuka Provincial Park, led by Mr Paul Igag (staff ornithologist). This was attended by six people, two of which were Darwin students. Mr Igag demonstrated mist netting and bird handling techniques. Attendees on this course were; Samoa Asigau (DI), Aileen Sagolo (DI), Junior Novera, Kenneth Yhuanje, Anthony Parak (a museum curator), and Miriam Supuma.

PNG Honours students' research projects:

The following students have been undertaking research for their Honours Degrees (UPNG), based at either WCS or BRC. The following accounts summarise their progress within the reporting period. The second cohort of students (who started around January 2007) finished their field work in the previous reporting period and have since been working on essays, literature searches, data analyses and completing their theses. Two of the students (Kaledimimo, Tau) gave presentations to the inaugural conference of the Society of Conservation Biology-Australasia (SCB-A) in Sydney on 9th July 2007.

Ms Leontine Baje (BRC, started January 2006)

Host specificity and species richness of sap-sucking insects (Auchenorrhyncha, Hemiptera) in a lowland rainforest in Papua New Guinea

Ms. Baje's studies have been made difficult by her family situation (she is married with two young children), but despite a slower pace, she has been progressing well and is close to completion. Ms Baje has submitted all four required essays, completed field work and progressed well with data analysis. She is now writing her thesis. Her study represents the first successful rearing of mesophyll cell-sucking herbivorous guild insects (Auchenorrhyncha, Typhlocybininae) from diverse tropical vegetation. Overall, 90 species of rainforest trees were sampled and 900 herbivores from 47 species were reared, most of them strictly specialised to a single host plant species.

Mr Kipiro Damas (BRC, started January 2007)

Floristic composition and structure of lowland rain forest in Papua New Guinea.

Mr. Damas has completed his field work, surveying 1 ha of secondary and 1 ha of primary tropical forest. Further, he has also completed his plant identifications at the Forestry Research Institute herbarium, thus producing the complete data set required for his thesis, due by the end of this project. He has also completed three of the four required essays. His data include information on species, location and size of ~2,200 individual trees from ~200 species, ready for an analysis of spatial distribution and structure of vegetation in secondary and primary forests.

Ms Francesca Dem (BRC, started January 2007)

Host specificity and species richness of phloem- and xylem-sucking herbivores in a lowland rainforest in Papua New Guinea

Ms. Dem has completed her field work, rearing almost 1,000 sap-sucking insects of 48 species feeding on 14 rainforest tree species. These data represent the first community-wide rearing programme for xylem- and phloem-sucking insects attempted in a tropical rainforest. The rearing is particularly difficult for these sap-sucking guilds as it has to be done on live plants. Ms Dem is now analysing her data and starting the writing of her thesis, due by the end of the project. She has also completed all four required essays.

Mr Samuel Legi (BRC, started January 2008)

Community composition of butterfly communities along a rainforest successional gradient

Mr. Legi has successfully designed and started his field protocol of butterfly transect surveys in lowland rainforest habitats. The protocol includes repeated surveys of all butterflies within 20 transects, 250 x 10 m each, distributed evenly among five habitat types: closed primary forest, primary forest stream, closed secondary forest, initial succession on forest clearings, and food gardens created during swidden agriculture. His studies are now at the stage of routine data collection in the field.

Mr Toko Pagi (BRC, started January 2008)

Species richness and community composition of rainforest Lepidoptera communities in Papua New Guinea

Mr. Pagi has successfully designed and started his field protocol of light trapping of moths from primary and secondary lowland rainforest habitats. The protocol includes regular light trapping of all Macrolepidoptera moths in the two rainforest habitats. The study will estimate the local species richness and composition of moth communities as well as their overlap between the two rainforest succession stages. He is now engaged in routine collection of field data.

Ms Kore Tau (WCS, started January 2006)

Flying fox abundance, reproduction and roost selection in caves and stone holes in the Crater Mountain Wildlife Management Area, Papua New Guinea.

Miss Tau successfully defended her honors thesis on the 25th of March 2008 on the abundance and reproductive cycle of two bats species, one of which is endangered (*Aproteles bulmerae*). Miss Tau was also among 8 participants from WCS-PNG that took part in the Society for Conservation Biology-Australasia regional conference in Sydney in July 2007, presenting a talk on her work. She will commence postgraduate studies in the USA beginning July 2008.

Miss Samoa Asigau (WCS, started January 2007)

Impacts of subsistence agriculture on the diversity and relative abundance of small rodents and its relation to hunting practices in the sub-montane forest of Papua New Guinea

Miss Asigau is currently analyzing her data together with writing the essays that accompany her thesis topic. She has provided the following comment on her involvement with the Darwin project: "Being a young and aspiring scientist in the field of mammalogy, WCS and the Darwin Initiative have given me the opportunity to be trained by some of the best scientists in the field and equipped me with the skills and 'know-how' in applying these methods and techniques in generating results and making robust conclusions for better management of mammals in general. Being a female in a male dominated society, I consider myself fortunate as this scholarship has given me a rare opportunity in fulfilling my dreams of pursuing further studies in something I've always dreamed of studying and that is mammals. With the scholarship granted by WCS and the Darwin Initiative, I feel that I am more than equipped to make better decisions on wildlife management in PNG given the opportunity in the near future".

Miss Aileen Sagolo (WCS, started January 2007)

Interactions between Hunters and Game Population in Sokamin, PNG; a Spatial Analysis Integrating GPS and GIS

Miss Sagolo recently (early February) traveled to Port Moresby to receive training on GIS. Since her return, she is analyzing her field data set. She has provided the following comment on her involvement with the Darwin project: "I joined the ongoing WCS-PNG hunting study at Sokamin in 2007. As an upcoming young female researcher, I want to become one of the few female experts in conservation and research in the country. Thanks to the Darwin Initiative, I am achieving all this while on this program, apart from funding my three-month field trip in the remote part of Sokamin in Telefomin of Sandaun Province to carry out my honours project. My project was looking at interactions between the local hunters and game hunted, using GIS and GPS tools. I investigated how this might have implications on the wildlife population and how this could be a crucial study for food security in PNG. I was able to experience working under harsh environmental conditions, rough terrain, hiking long hours, camping out of villages, working with GPS under poor GPS coverages, dealing with land issues and local conflicts and working with the local people. I believe that I am now more physically fit and have gained endurance and experience in field work than when I first started with the program. I intend to use my expertise in GIS, after further studies if possible, to work in environmental NGOs or other departments in conservation and do more research work with GIS. Logistically, PNG proves a very tough challenge for scientific ecological research, and with the GIS tools, this can help in bridging the gap in lack of studies for the whole region".

Comments from past Darwin students (1st cohort) now studying abroad:

Enock Kaledimimo - University of Missouri, St Louis, USA:

"The support I received from Darwin Initiative, especially sponsoring my Honours degree work has manifold benefits. The support helped me to achieve better training and experience in the field to conduct conservation related biological research. The support helped equip me for better research in the future for wildlife conservation and management in Papua New Guinea. The experience I gained through this grant also helped me to reach a step further in my training in the field of Conservation Biology as I am currently doing a Masters course based at the University of Missouri in St. Louis, USA. The support did not only help me achieve better training, but I've also collected the first ever year-long data on density, diversity and reproductive seasonality of small mammals in Papua New Guinea that will be useful for designing sustainable management especially in harvesting of small game species by rural communities. I would like to work with conservation organizations when I return to Papua New Guinea after completing my studies. I would like to contribute my expertise towards conservation and or sustainable management of PNG's wildlife and natural resources".

Eunice Dus - James Cook University, Townsville, Queensland, Australia:

“While studying mangrove forest I was exposed to all its beauty and the roles it plays in the coastal ecosystem which made my study bloom. All these were possible through the support grant that Darwin Initiative has provided. With all the support and experience gained in the last two years I am currently undertaking a Masters in Applied Science majoring in Tropical Ecology and Management focusing around mangrove ecosystems. More than 95% of the mangrove forests of Papua New Guinea are still intact; thus I believe that the knowledge and experience I gained through my studies will be of great benefit to Papua New Guinea. Using my knowledge in some of the resource management or conservation groups in PNG, I can help reduce impacts and destruction of this enormous ecosystem or better maintain the current status of the forest and even better increase restoration to increase the vital roles of the forest. I would like to acknowledge and greatly appreciate the Darwin Initiative grant for its support towards building my career as an ecological manager and how this will benefit PNG.”

Capacity building in aquatic entomology:

Training:

Aloysius Posman was selected as the new member of staff for the aquatic entomology part of the project after Andrew Kinibel retired to his village for family reasons, an unfortunate but common issue in PNG society. Aloysius received intensive training from Michael Balke in November / December 2007 as well as February 2008, including field sessions to cover lowland fauna around Madang, as well as highlands work around Goroka. Mr. Posman, formerly of BRC, has now re-entered university with the UPNG open campus and will be sponsored in part by M. Balke and his ongoing PNG water beetle survey. He hopes to register as full-time student in mid-2008, his goal being to finish studies as soon as possible and conduct higher degree work overseas. As one of the most talented PNG entomologists, he will be strongly encouraged to pursue this career in the expectation that he will return to PNG as a highly trained conservation biologist.

Biodiversity surveys:

Dr Michael Balke has continued to organize and carry out surveys of important new areas of PNG for aquatic insects, including along the Bismarck Range, the Owen Stanleys and New Britain, as well as continuing work in Madang and Eastern Highlands Provinces. Fieldwork has been conducted mostly by PNG biologists who had been previously trained by this Darwin project and other projects: Katayo Sagata, Andrew Kinibel and more recently Aloysius Posman. Their collections were usually good to excellent and well preserved. Unfortunately, the taxonomic work that follows the fieldwork is slow, due to the currently ubiquitous problem of the few remaining taxonomists having significant other duties. Nevertheless, many new species have been collected (e.g. new species in the genera *Rhantus* and *Carabdytes* (Coleoptera: Dytiscidae). Some of the material has already been distributed to taxonomists for identification and description; other material is currently being used for molecular biodiversity assessments (water beetles, selected bugs and mayflies). The DNA sequencing efforts at the NHM and the ZSM Munich have proceeded well, and Dr Balke plans to present a comprehensive DNA database of PNG diving beetles by mid 2009, part of the already near-complete database of Australian-Oceanian diving beetles (www.zsm.mwn.de/col/mba.htm). This tool will not only allow faster identification of samples derived from wetland surveys, but will reveal the biogeographic history of PNG faunal evolution based on one particularly well sampled taxon. As students in PNG have expressed great interest in understanding these processes using DNA sequencing techniques, Dr Balke is now seeking funding to organize more seminars and practicals on this topic in 2009 and 2010.

Reference collection:

This collection continues to grow steadily, with parts housed at BRC in Madang (having been moved from WCS), parts at the NHM in London, and parts in Munich, Germany. After successfully obtaining export permits, Dr Michael Balke has been sorting, identifying and curating a reference collection of PNG aquatic insects which will be repatriated to the PNG National Insect Collection in Port Moresby by the end of 2008.

Progress in carrying out project activities

3.1 Progress towards Project Outputs

Output 1: 2 training courses for PNG students

The annual conservation biology training courses run by WCS regularly attracts a large number of participants: 15 in Jan-Feb 2006, 23 in Jan-Feb 2007. At the last annual reporting stage, we had therefore already exceeded our target of training 30 students on this course during the lifetime of the project. The course has proved to be an excellent way of training a large number of students in a very focused and time-efficient manner, but it is also a good way of selecting the most promising and motivated students for further study, including the Honours programme. Due to the recent organisational and staffing upheavals at WCS (see below), the course did not run in Jan-Feb 2008. However, it is fully envisaged that it will be reinstated for future years once the new organisational arrangements are in place.

Output 2: 8 BSc. Honours students trained (18 months each)

Of the first cohort of five BSc Honours students, Kaledimino, Dus and Tau completed writing and defending their theses and are now continuing their studies at Masters level. Unfortunately, Chamilou was forced to drop out of the programme for personal reasons and Baje is still writing up. All these students are being actively encouraged to produce manuscripts for publication in good quality ecology/conservation journals.

The second cohort of students (Sagolo, Asigau, Damas, Dem) have all made good progress on their research projects, having spent the latter part of the reporting period collecting their field data.

BRC have also recently recruited a further two Darwin-funded Honours students (Pagi, Legi) who have decided upon their research topics and are actively collecting data. Although these students will not complete their studies by the end of the Darwin project, BRC has pledged to continue their support until they have finished.

Thus, by the time it is finished, the project will have engaged eleven honours students, i.e. three more than the eight originally planned. We expect a significant proportion of these will either go on to further academic studies (either within PNG or overseas) or will remain in the conservation field within PNG. Those obtaining further qualifications overseas have a high probability of returning to fill positions as senior managers in conservations NGOs, local and national government etc. Most students have a strong affinity for their home country and view their future there. Our project will have made a substantial impact on PNG's ability to meet its commitments under the CBD if, as we expect, these people become influential decision makers driving future conservation policy in the country.

Output 3: 2 PNG local coordinators trained, including in UK

The UK training part of this output was achieved in the first annual reporting period. Katayo Sagata temporarily suspended his involvement with the project while he pursued a Masters degree in New Zealand (being replaced by Miriam Supuma), but has since returned to WCS and the Darwin project. Darren Bito has now taken up a PhD position in Australia (working on tropical forest insect communities), but will undoubtedly return after his studies are finished. Again, we fully expect both of them to pursue promising careers in the conservation sector after completion of their studies and, to this end, we have given them every encouragement to obtain further and higher qualifications.

Output 4: Insect reference collection enhanced with specimens and databases

This is an ongoing objective throughout the project. Both BRC and WCS maintain insect reference collections (although that at WCS is not extensive), supported by databases of holdings. Material is also regularly supplied to the national insect collection at NARI in Port Moresby. Dr Balke has continued to make excellent progress in adding to the reference collection of PNG's aquatic insects that he set up, currently housed at BRC.

Output 5: Baseline biodiversity surveys in lowland and montane disturbed and undisturbed forests conducted

This is also an ongoing objective, achieved through the field survey work done on a range of taxonomic groups by the Honours students. So far, these cover plants, insects, bats, and small mammals. All are providing important insights into the basic ecology of PNG's flora and fauna which will be vital for understanding and making decisions about their future conservation. Those based at BRC are especially focused around contrasting primary with secondary forest, using this comparison as a model for pristine versus disturbed rainforest.

Summary of progress to date:

Fortunately, the early personnel problems are behind us and the project has settled down to a very full and successful training programme and some highly productive research. Collaboration between partners is working well and we already have evidence that the students are keen to pursue their training in conservation ecology to a higher level. We are confident that the remaining project outputs can be achieved (in some cases exceeded) by the end of the project's lifetime.

3.2 Standard Measures

Table 1 Project Standard Output Measures

| Code No. | Description | Year 1 Total | Year 2 Total | Year 3 Total | Year 4 Total | Total to date | Total planned from application |
|----------|---|--------------|--------------|--------------|--------------|---------------|--------------------------------|
| 6A, 6B | 3-week Conservation Biology course (participants) | 15 | 23 | | | | 30 |
| 7 | Postgraduate training manual on biodiversity survey methods (revised) | | 1 | | | | 1 |
| 7 | Conservation Biology course materials | | 2 | | | | 2 |
| 14B | Student presentations at NG Biological Conference | | 5 | N/A | | | 8 |
| 10 | Forest Biodiversity field guide produced | | | Under review | | | 1 |
| 4C, 4D | BSc Honours PNG students graduate after 18 months of training | | | 3 | | | 8 |
| 15A, 15B | Press release, student graduation announced | | | 1 | | | 2 |
| 11A, 11B | Papers from Hons. dissertations | | | 4 in prep. | | | 8 |
| 8 | UK personnel weeks in PNG for student training | | 24 | 9 | | | 50 |

Table 2 Publications

| Type * (eg journals, manual, CDs) | Detail (title, author, year) | Publishers (name, city) | Available from (eg contact address, website) | Cost £ |
|--|--|----------------------------|--|-----------|
| Journal | Novotny, V., Miller, S.E., Hulcr, J., Drew, R.A.I., Basset, Y, Janda, M., Setliff, G.P., Darrow, K., Stewart, A.J.A., Auga, J., Isua, B., Molem, K., Manumbor, M., Tamtai, E., Mogia, M. & Weiblen, G.D. (2007) Low beta diversity of herbivorous insects in tropical forests. <i>Nature</i> 448: 692-6. | | pdf from authors | N/A |
| Journal | Bito, D. (2007) An alien in an archipelago: geographic variability in moth (Lepidoptera) communities colonizing <i>Spathodea campanulata</i> in the New Guinea and Bismarck Islands. <i>Journal of Biogeography</i> , 34, 769–778 | | pdf from BRC | N/A |
| Journal | Balke, M., Kinibel, A., & Sagata, K. (2007) <i>Rhantus elisabethae</i> sp.n. – a new diving beetle from Papua New Guinea highlands. <i>Mitteilungen der Münchner entomologischen Gesellschaft</i> 97, 17-21. | | pdf from authors | N/A |
| Journal | Balke, M. J. Pons, I. Ribera, K. Sagata, and A. P. Vogler. Infrequent and unidirectional colonization of megadiverse Papuadytes diving beetles in New Caledonia and New Guinea. Submitted to: <i>Molecular Phylogenetics and Evolution</i> 42(2) 505-516. | | pdf from authors | N/A |
| Journal | Sagata, K. & Lester, P.J. Behavioural plasticity associated with propagule size, resources, and the invasion success of the Argentine ant, <i>Linepithema humile</i> . (submitted to <i>Journal of Applied Ecology</i>). | | pdf from authors | N/A |

3.3 Progress towards the project purpose and outcomes

We feel that we are making good progress towards the projected outcomes of this project, namely the training of postgraduate students to become conservation biologists, and ultimately leaders in biodiversity conservation and research within PNG. We are on schedule to have trained eight such students by the end of the project, and the likelihood is that this will be significantly exceeded. Three of the five in the first cohort have already embarked upon Masters-level training overseas, and we expect others in the subsequent cohorts to follow.

Our original assumptions remain valid. Competition for the Honours student positions is fierce, demonstrating that there is a plentiful supply of talented and motivated students who are interested in postgraduate training in biodiversity. Although it is too early to judge how successful they will be, most of these students express a desire ultimately to forge a career in the field of biodiversity conservation and/or research in PNG.

3.4 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

The main goal of this project is to train PNG's next generation of conservation biologists, in the expectation that these people will ultimately become the country's leaders and decision-makers in the field of biodiversity conservation and environmental management. Clearly, this is a long-term aim that will play out some time after the end of this project. Nevertheless, we believe that several of our students will fulfil that expectation. Once in positions of influence, these people will have the best chance to bring about positive changes in the fortunes of PNG's important species and habitats and move the country towards a more environmentally sustainable future.

4. Monitoring, evaluation and lessons

As the Honours students work closely with the senior staff at both WCS and BRC, their performance is effectively being monitored continuously. Ultimately, evaluation of their work will be through production and defence of their theses and papers published in the scientific literature.

One lesson from this last year has been that it is almost inevitable that a certain proportion of students will drop out of the programme, usually due to personal or family circumstances. In PNG society, family and village ties are very strong and generally override personal career ambitions.

5. Actions taken in response to previous reviews (if applicable)

The only comment in the review of the last Annual Report requiring a specific response (referring to personnel changes in the UK Co-ordinator post), was responded to fully in the last half-year report in October 2007.

6. Other comments on progress not covered elsewhere

The changed circumstances at WCS-PNG were described in some detail in the last Annual Report. At that time, the future of WCS's PNG programme was uncertain. Since then, the current staff employed by WCS-PNG have created a local NGO which will operate by the name *PNG Institute of Biological Research* (PNGIBR). They are working towards a smooth transition phase from WCS-PNG into PNGIBR. Whilst this is happening, assurances have been given that all current obligations to sponsors, including Darwin, will be honoured until the end of the project. This plan is known to WCS headquarters in New York and the current staff are in discussion about how the transition should take place. PNGIBR will continue to do capacity building, training of PNG nationals as conservation biologists, biological monitoring and conservation research. The new organisation is looking to build on previously established links with other conservation NGOs and institutions such as the Research & Conservation Foundation (RCF), The New Guinea Binatang Research Centre (BRC), and the University of Papua New Guinea (UPNG).

7. Sustainability

The exit strategy is that, by the end of the project, we will have trained at least eight skilled PNG scientists, who will be equipped to drive the future national conservation agenda. They will be able to identify conservation priorities and culturally appropriate solutions to PNG's considerable environmental challenges, ultimately enabling the country to meet its commitments to the CBD. We envisage these trainees providing critical future links between indigenous village communities, government officials, NGOs and overseas scientists. Furthermore, the training received by the more senior personnel should equip them to train subsequent generations of biologists after the Darwin project is finished. For these reasons, we are confident that the project's outputs and impacts will be sustained beyond the life of the project.

In addition, the national insect collections will be available for future researchers and the information from the research projects and surveys will provide important baseline data for comparison with subsequent follow-up projects.

8. Dissemination

Dissemination of the project's activities will be principally through publication of research results and conclusions in peer-reviewed scientific journals. The profile of the project is being actively promoted by Dr Balke through the project website that he has created:

<http://waterbeetles.info/Darwin/DarwinHTMLs/DarwinBackground.html>

Both BRC and WCS actively maintain websites that describe their activities and outputs:

WCS: <http://www.wcs.org/international/Asia/175994/PNGpublications>

BRC: <http://www.entu.cas.cz/png/index.html>

All Honours students are strongly encouraged to present the results of their research at the annual New Guinea Biology Conference (BIOCON); several have presented their work at previous BIOCON meetings. At the time of writing, no announcement has been made about the next conference, although it is expected to be in August 2008.

9. Project Expenditure

Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

| Item | Budget | Expenditure | Balance |
|--|--------|-------------|---------|
| Rent, rates, heating, overheads etc | | | |
| Office costs (eg postage, telephone, stationery) | | | |
| Travel and subsistence | | | |
| Printing | | | |
| Conferences, seminars, etc | | | |
| Capital items/equipment | | | |
| Others – Honours Students | | | |
| Others – Trainers | | | |
| Others – Audits | | | |
| Salaries Mirium Supoma | | | |
| Salaries- Katayo Sagata | | | |
| Salaries – Frank Clark | | | |
| TOTAL | | | |

Budget agreed with Lisa Spencer by email 20/03/08

10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

None at this stage.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2007/08

| Project summary | Measurable Indicators | Progress and Achievements April 2007 - March 2008 | Actions required/planned for next period |
|---|---|---|--|
| <p>Goal: <i>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</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p> | | <p><i>(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)</i></p> | <p><i>(do not fill not applicable)</i></p> |
| <p>Purpose</p> <p>To enhance the in-country capacity of PNG to implement the CBD by postgraduate training of outstanding PNG students to become local leaders in biodiversity conservation and research.</p> | <p>a) PNG students better trained in conducting biodiversity research & monitoring</p> <p>b) Enhanced capacity to conduct and communicate biodiversity research & implement conservation policy by PNG nationals.</p> <p>c) Better characterisation of aquatic and terrestrial biodiversity associated with different land use patterns in PNG forests.</p> | <p>a) 2 further Honours students enrolled, receiving training, & started on research projects</p> <p>b) Favourable course reports for students attending courses and ongoing monitoring of student learning progress.</p> <p>c) Research projects initiated</p> | <p>Ensure that research projects are completed promptly, theses defended, and scientific papers submitted for publication.</p> |
| <p>Output 1. 2 training courses for PNG students</p> | <p>30 participants trained in biology and biodiversity sciences</p> | <p>No conservation biology training course held in 2008</p> | |
| <p>Output 2. 8 BSc. Honours students trained (18 months each)</p> | <p>8 students trained</p> | <p>2 honours students enrolled in a 3rd cohort</p> | <p>2nd student cohort currently completing their field work and write-ups; 3rd cohort currently collecting field data.</p> |

| | | | |
|---|---|---|--|
| Output 3. 2 PNG local coordinators trained, including in UK | 2 PNG local coordinators receive UK-based training in taxonomic & DNA methods to implement future training courses in PNG | Main output achieved in first annual reporting period; training continued in PNG. | Output achieved. |
| Output 4. Insect reference collection enhanced with specimens and databases | Collections enhanced at WCS, BRC, UPNG, NARI, databases online. | Further specimen deposition at WCS & BRC, as well as NARI. | Ongoing enhancement of specimen collections; online databases created. |
| Output 5. Baseline biodiversity surveys in lowland and montane disturbed and undisturbed forests conducted | Samples collected, sorted and analysed, museum specimens prepared, data analysed | Ongoing sampling and survey of plant, insect, bat and small mammal communities. | Completion of sampling, sorting of materials etc. |

Annex 2 Project's full current logframe

| Project summary | Measurable Indicators | Means of verification | Important Assumptions |
|--|--|--|---|
| <p>Goal:</p> <p>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"> • 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 | | | |
| <p>Purpose</p> <p>To enhance the in-country capacity of PNG to implement the CBD by postgraduate training of outstanding PNG students to become local leaders in biodiversity conservation and research.</p> | <p>a) PNG students better trained in conducting biodiversity research & monitoring</p> <p>b) Enhanced capacity to conduct and communicate biodiversity research & implement conservation policy by PNG nationals.</p> <p>c) Better characterisation of aquatic and terrestrial biodiversity associated with different land use patterns in PNG forests.</p> | <p>a) Honours degrees awarded</p> <p>b) Student course reports, theses and presentations at NG Biological Conferences</p> <p>c) Research publications on biodiversity patterns by students and researchers</p> | <p>a) There are enough talented and interested students for the postgraduate training programme</p> <p>b) Government & local landowners will consult with and trust scientists & policy makers.</p> <p>b-c) Majority of participants in training courses will take up careers relevant to CBD implementation in PNG</p> |
| <p>Outputs</p> <p>a) 2 training courses for PNG students</p> <p>b) 8 BSc. Honours students trained (18 months each)</p> <p>c) 2 PNG local coordinators trained, including in UK</p> <p>d) Insect reference collection enhanced with specimens and databases</p> <p>e) Baseline biodiversity surveys in lowland and montane disturbed and undisturbed forests conducted</p> | <p>a) 30 participants trained in biology and biodiversity sciences</p> <p>b) 8 students trained</p> <p>c) 2 PNG local coordinators receive UK-based training in taxonomic & DNA methods to implement future training courses in PNG</p> <p>d) Collections enhanced at WCS, BRC, UPNG, NARI, databases online.</p> <p>e) Samples collected, sorted and analysed, museum specimens prepared, data analysed</p> | <p>a) Attendance lists, exam results</p> <p>b) 8 BSc degrees awarded; theses and reports, 8 conference presentations</p> <p>c) 2 seminars at NHM, 2 research publications;</p> <p>d) Specimens receipt acknowledged by the institutions, database evaluation by users</p> <p>e) 4 research publications, report to DEC</p> | <p>a) Active participation of students</p> <p>b) Students are dedicated and capable of carrying out and completing ambitious research work independently</p> <p>c) the PNG local coordinators is interested in broadening his experience overseas.</p> <p>d) sufficient time and facilities for collecting, design of ID tools, collections facilities supported by PNG institutions</p> <p>e) research is cutting-edge</p> |

| Activities | Activity Milestones (Summary of Project Implementation Timetable) |
|---|---|
| <i>Training: Honours programmes.</i> | <i>Yrs 1-2: Cohort 1, Yrs. 2-3: Cohort 2 of students enrolls, completes research, writes and defends theses</i> |
| <i>Training: Research and training coordinators</i> | <i>Yrs. 1-3: Training, project co-ordination and student supervision duties in PNG; Yr. 1: Two PNG local co-ordinators trained in UK</i> |
| <i>Information products & reference collections.</i> | <i>Yrs. 1-2: Fieldwork, databasing; Yrs 2-3: Identification tools created, reference collections and databases enhanced</i> |
| <i>Field research programme & work with landowners.</i> | <i>Yrs 1-3: Research conducted, Yrs. 2-3 research results summarized in technical papers but also in accessible materials to be distributed to schools & village communities; conservation recommendations to Government.</i> |