

Darwin Initiative – Final Report

Darwin project information

Project Reference	15/018
Project Title	Developing land snail expertise in South and Southeast Asia
Host country(ies)	Sri Lanka, India, Nepal, Thailand, Laos, Vietnam, Malaysia
UK Contract Holder Institution	The Natural History Museum, London (NHM)
UK Partner Institution(s)	University of Nottingham, University of Cambridge
Host Country Partner Institution(s)	The Wildlife Heritage Trust (WHT), Sri Lanka Ashoka Trust for Research in Ecology and the Environment (ATREE), India Centre for Biological Conservation (CBC), Nepal Chulalongkorn University, Thailand (CUT) National University of Laos Hanoi University of Science, Vietnam (now including Vietnam National Museum of Nature and Department of National Parks) Universiti Sains Malaysia
Darwin Grant Value	£262,657
Start/End dates of Project	Start date: 1 st May 2006 End date: 31 st March 2011
Project Leader Name	Fred Naggs
Project Website	www.nhm.ac.uk/tropicalsnails
Report Author(s) and date	Fred Naggs in consultation with Dinarzarde Raheem and the following project leaders: Somsak Panha (Thailand); N. Aravind (India); Prem Budha (Nepal). 25 th August 2011.

1 Project Background

The phylum Mollusca is second only to the Arthropoda in terrestrial diversity. Snails are powerful research tools in evolutionary biology, are sensitive indicators of habitat change as exemplified by the fact that there are more recorded extinctions of land snails than for all other animal groups combined. There are few terrestrial malacologists world wide and very few in tropical countries where the greatest diversity of species occurs. This project sought to build expertise and capacity in land snail work in South and Southeast Asia to foster regional cooperation and build on the regional centre of expertise available at Chulalongkorn University, Thailand.

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

CBD objectives have been achieved by identifying recording, revising and describing land snail taxa, the main project focus related to Article 7 of the CBD (Articles 7a,b,c,d). This work was carried out on a large scale in host countries as detailed in our publications and reports. Training and research were central to the project (Article 12) as demonstrated by publications

and the success in establishing trained project workers in relevant employment as detailed in section 4.6. International cooperation was achieved through the international structure of the project, through Unitas Malacologia <http://www.unitasmalacologica.org/> and as a culmination of the programme's international achievements, at the World Congress of Malacology hosted in Thailand in July 2010 <http://phuketnews.phuketindex.com/government/the-17th-world-congress-of-malacology-held-in-phuket-178135.html>. Particularly in SE Asian partner countries, close cooperation has been established in working towards detailed base line inventories of land snail faunas that provide a regional perspective to patterns of diversity and endemism and a resource for recognising regional conservation priorities (Article 5). Project partners in Nepal and India have set up projects in response to the need to monitor and control the major land snail pest *Achatina fulica* (Article 8(h)). Malaysia and Vietnam have donated material to the Frozen Ark programme as part of this project <http://www.frozenark.org/> (Article 9); Indian, Thai and Nepalese project partners have set up associated tissue collections held within country owing to national restrictions on the transfer of genetic material. As detailed in reports, publication of popular identification guides for Sri Lanka, the Western Ghats, India, Nepal and Thailand plus numerous workshops, community activity and exhibitions have contributed to public education and awareness (Article 13).

We cannot claim to have made any immediate impact in reducing biodiversity loss in relation to the 2010 target as set at the 2002 summit on sustainable development but we have developed the skills and provided baseline studies by which future measurements of species survivorship can be assessed. These deliverables can be measured by the survey data, much held in new national collections holdings, and the number of trained personnel holding posts relevant to implementing CBD objectives. All host country partners made direct contact with their national CBD focal points but no host country partners have reported any developments as a result of these contacts.

3 Project Partnerships

1. Collaboration with the lead project partner institution, the Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand (CUT), has developed into a close and ongoing partnership. Collaboration in research, as evidenced by our joint publications record, is ongoing with revisionary taxonomic papers and descriptions of new taxa, including the new (2010) Family Diapheridae, the result of partnership between the NHM, Chulalongkorn University, University of Nottingham and University of the Philippines, Manila. Fred Naggs was awarded a Certificate of Recognition from CUT in 2006, where he is currently a visiting professor and jointly supervising a PhD student registered at CUT, is the Consulting Editor for *Tropical Natural History*, which is published by CUT and he is hosting six visiting scientists working on land snails at the NHM from CUT Biology Department in the current year with visits ranging from 3-6 months. FN has also been invited to work with colleagues at CUT for a period of three months in 2012, fully funded by CUT. We are in day to day contact
2. Collaboration with Malaysian partners at the Universiti Sains Malaysia, Penang, is ongoing. Following the joint surveys carried out under the Darwin Initiative project we received an additional two years funding from the British Council with Dr Chris Wade, University of Nottingham, as PI. We continue to work with Professor Zulfigar Yasin, Dr Aileen Tan Shau Hwai and research students Norhanis Razali and Siti Balkis Abu Bakar, with several papers in preparation as evidenced by contributions at the 2010 World Congress of Malacology. We are in regular contact. Additional collaboration has been developed with Universiti Sains Malaysia, Sabah, including joint monitoring of Liew Thor Seng <http://www.eol.org/content/page/110> with Leiden University and National Natural History Museum Naturalis in Leiden, Netherlands on Liew's Rubenstein Encyclopedia of Life fellowship <http://www.eol.org/content/page/110>
3. The partnership with WHT in Sri Lanka came to an end following the winding up of the Trust and our project partner's relocation to Australia. Nevertheless, our work in Sri

Lanka has continued with Dinarzarde Raheem actively engaged in research projects with the Department of Archaeology investigating patterns of distribution through time and the forest restoration project at Agrapatna is continuing under the new owner.

4. As planned, collaboration with the National University of Laos was managed by our partners at CUT and this continues with regular joint field surveys and reciprocal visits.
5. Our project partnership with the Centre for Biological Conservation Nepal has changed. With Prem Budha having obtained a tenured position in June 2011 as a lecturer in the Zoology Department, Tribhuvan University, Kathmandu, Nepal, we now collaborate with Prem in his new position. Fred Naggs and Thierry Backeljau continue to supervise Prem's PhD (registered at the University of Antwerp). In addition to publications recorded in Annex 5, several joint systematic revisionary papers are in preparation, including a description of the new genus *Darwininitium*, to be named as a tribute to the Darwin Initiative. However, collaboration is severely constrained by restrictive legislation that prevents access to Nepalese specimens to collaborators outside of Nepal.
6. Close collaboration continues with Aravind at the Ashoka Trust for Research in Ecology and the Environment. However, collaboration is greatly hindered by the Indian 2002 Biodiversity Act, which, for example, prevents Aravind from bringing any of his survey specimens to the NHM in order to check their identity by comparison with type material at the NHM. It is difficult to collaborate effectively with such draconian constraints but we are in regular contact and currently developing a collaborative project attempting to integrate molecular sequencing results carried out within India with joint projects at the University of Nottingham and the Royal Belgian Institute of Natural Sciences, Brussels.
7. CUT and FN continue to have regular contact with Hanoi University of Science and, with their help, we are currently arranging shipment of frozen collections for the NHM and the Frozen Ark. Following introductions by Hanoi University of Science, the NHM has developed close collaboration with the Vietnam National Museum of Nature and the Vietnamese Department of National Parks. The NHM has carried out six joint surveys in the past two years under an institution to institution MoU signed in 2009. Research collaboration has extended to include fish and plants as well as land snails and joint discussions have taken place about collaboration with exhibitions development. Extended exchange visits have been supported by the NHM and Fred Naggs hosted a high level Vietnamese delegation to the NHM funded by the Vietnamese government in November 2010. The delegates were Prof. Nguyen Dinh Cong, Vice President of the Vietnam Academy of Science and Technology; Professor Pham Van Luc, Director, Vietnam National Museum of Nature; Dr Nguyen Dinh Minh, Director of the Department of Science, Education and Social Issues, Government Office of Vietnam; Dr Le Quang Thanh, Deputy Director of the Department of Social and Natural Sciences, Ministry of Science and Technology; Dr Le Thi Kim Dung, Deputy Director, Department of Planning Management, Ministry of Planning and Investment and Mrs Nguyen Thi Hien, Vice Head, Department of Administration and Finance, Ministry of Finance. The objective of the visit was to investigate the case for establishing biodiversity funding priorities in Vietnam. In March 2010 FN hosted a delegation from the Vietnamese Embassy at the NHM. We are currently planning a survey programme under the 2009 MoU involving Vietnamese partners and NHM staff from the Zoology, Botany, Entomology and Palaeontology Departments. Mr Luong Van Hao, Vietnamese Department of National Parks and Mr Pham Van Sang, Vietnam National Museum of Nature will both be registering for Masters degrees on land snail research in Vietnam and FN will be involved in their supervision.

Darwin Initiative project MoUs were signed with Sri Lanka, Indian, Nepalese, and Thai partners (the Thai partners initially managed the projects with Lao, Vietnam and Malaysia). The NHM has subsequently signed current institution to institution MoUs with Vietnam (Vietnam National Museum of Nature and the Vietnamese Department of National Parks) and with ATREE, India. Contacts with Thai, Indian and Nepalese partners were initiated by the host country partners whereas contacts in Malaysia, Laos and Vietnam were sought for the Darwin Initiative project. Collaboration in Sri Lanka is long-standing and contact with the host partner was first made in 1996. The partnership with our Lao partner is restricted to

collaboration through our Thai partners. All other country partners have been intimately involved in developing and running country projects.

UK institutional collaboration involves the University of Nottingham and the University of Cambridge. Collaboration with Chris Wade <http://www.nottingham.ac.uk/biology/research/parasite-biology-and-immunogenetics/chris.wade> at the Institute of Genetics, University of Nottingham, involves molecular phylogenetic studies of land snail lineages and historical biogeography. These investigations have allowed us to recognise several independent lineages that date back to deep in the Mesozoic and qualify as extreme EDGE species <http://www.edgeofexistence.org/> that are of the highest priority for conservation. They have allowed us to recognise early cladogenesis of an Achatinoid/Streptaxoid clade and to erect the new family of snails, the Diapheridae with the Thai group. Chris Wade is jointly supervising a CUT PhD student working on the Cyclophoridae as well as running the two year British Council funded project with Malaysia. Richard Preece <http://www.zoo.cam.ac.uk/zoostaff/preece.htm> at Cambridge has worked closely with the Thai group in providing access to the University Museum of Zoology reference collections of snails. Richard has joined in fieldwork in Thailand and provided informal seminars on the use of land snails for investigating habitat and climate change through the Quaternary and into the early Tertiary. We are currently collaborating on investigating how current SE Asian snail faunas relate to European Eocene snail faunas and how climate change has resulted in extinctions in what are currently SE Asian groups but groups that previously had much wider distributions.

In Belgium we are collaborating with Thierry Backeljau, Royal Belgian Institute of Natural Sciences and University of Antwerp. We are currently jointly supervising Prem Budha's PhD registered at the University of Antwerp. Thierry is also the curator in charge of the invertebrate collections at the Royal Belgian Institute of Natural Sciences, which holds the French colonial period collections from Vietnam, an essential resource for identifying described Vietnamese snail species. We have borrowed material and my colleague at the NHM Jon Ablett has recently been working on the collections in Brussels; we are in the process of imaging the type material on a joint project with our Vietnamese colleagues. Dinarzarde Raheem is currently holding a European Union Synthesys Integrated Activities grant <http://www.synthesys.info/> working with Thierry Backeljau at the Royal Belgian Institute of Natural Sciences and has been awarded a Belgium Science policy Office Fellowship to be held at the Royal Belgian Institute of Natural Sciences from January 2012 http://www.belspo.be/belspo/home/calls/postdoc_info_en.stm.

4 Project Achievements

Project achievements are detailed in Annex 1.

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

As the second most diverse phylum and with recorded extinctions higher than for all other animal groups combined the need addressed by this project has been to produce skills and resources that will allow the status of Mollusca to be established in Asia as an essential first step towards their conservation. In this we have been successful beyond our expectations with individuals and/or research groups being firmly established in India, Nepal, Sri Lanka, Malaysia and Vietnam and in having contributed to the growth, outputs and degree of international collaboration in the Thai research group. As detailed in successive reports, through the media, exhibitions, community projects, training, involvement with ecotourism and publication of guides aimed at naturalists, schools and colleges we have generated interest and support ranging from national levels to local communities and individuals.

4.2 Outcomes: achievement of the project purpose and outcomes

The project purpose of developing the Mollusca Group at Chulalongkorn University as a regional centre of expertise and resources on land snails as part of an Asia-wide capacity building project has been achieved. Ongoing exchange visits exceed 60 visiting weeks in the current year. Current papers in preparation for international peer reviewed journals involve Sri Lanka, Indian, Nepalese, Thai, Malaysian and Vietnamese researchers. In addition, India, Nepal, Malaysia and Vietnam have developed stand-alone capacity with Mollusca researchers in tenured posts, reference collections established, and being further developed, and collaborative research underway. As presented in contributions at the 2010 World Congress of Malacology (Abstracts listed in Annex 5), a shared vision of recording, understanding and conserving the molluscan fauna is in place. We have extended collaboration with new contacts in India, Malaysia and Vietnam and also established new collaboration in China.

4.3 Outputs (and activities)

The project has exceeded expectations in almost every area as detailed in Annex 1.

The only significant way in which the project fell short of its original planned objectives was the trickle down effect of not having a centralised database that could generate illustrated guides. This issue was highlighted at the time of the Mid Term Review. The only positive option was to move forward and, as far as possible, compensate for these shortcomings. Developments in mega web-based projects since the DI project was conceived have in any case partly removed the need for such regional guides and we have provided input to the Encyclopaedia of Life and the Barcode of life. One shortcoming of all such mega-projects is that they are often not based on type material and, particularly for the vast number of poorly known invertebrate groups, a category to which land snails belong, it is essential that identifications are based on critical evaluation of type material or that primary types are illustrated. In compiling an illustrated guide to land snails of the Western Ghats we have followed these rigorous criteria and illustrated all known types and designated primary types where the type series was untraceable or where there is a syntype series. This has been a far more sophisticated and demanding output than that originally conceived. Publication of this as a special book edition of *Tropical Natural History* will be a significant step in Indian land snail taxonomy and fill a current void.

4.4 Project standard measures and publications

Project standard measures are given in Annex 4 using the coding and format of the Darwin Initiative Standard Measures.

Of the 56 published items listed in Annex 5, 31 are in peer reviewed journals, 15 Abstracts from two World Congresses of Malacology demonstrate the extent of our joint participation in this international arena at which each contributor from our programme acknowledged the Darwin Initiative and presented the Darwin Initiative logo.

Our book *Land snails of the Western Ghats* (in press) is a major work and FN will be working with the Thai group on an English version of the *Land snails of Thailand*, the Thai version of which is in preparation.

Published material in Annex 5 has been numbered for convenience and three entries highlighted in bold are worthy of special mention. Number 15 published in the *Zoological*

Journal of the Linnean Society exemplifies the fruits of collaboration between Chris Wade at Nottingham and his research student from the University of Manila, Ian Fontinella, the Thai research group and FN at NHM. The paper started as a confirmation of earlier but ambiguous reports recording the presence of *Diaphera* in Thailand; a genus exhibiting its greatest diversity in the Philippines. Description of a new species was provided by the Thai group with information on the internal anatomy of *Diaphera* for the first time. FN recognised peculiarities in the anatomy that indicated that *Diaphera* differed from other members of the family to which it had been attributed, the Streptaxidae. FN then carried out a review of published literature on the anatomy of members of the Streptaxidae and concluded that *Diaphera* represented a distinct group. Chris Wade and Ian Fontinella then extracted and sequenced DNA from the Thai *Diaphera* sample and included it in a molecular phylogenetic tree of the Achatinoid/Streptaxidae clade that we were already working on. This confirmed the position of *Diaphera* from both comparative morphological and molecular criteria, as a basal group leading to the Streptaxidae. Comparison with other stylommatophoran clades showed that the differences exhibited between the Streptaxidae sensu stricto and *Diaphera* plus *Sinoennea*, an additional streptaxoid genus, warranted the erection of a new family, the Diapheridae, plus the recognition of a new superfamily, the Streptaxoidea to include both the Streptaxidae and the Diapheridae. FN then wrote the paper up incorporating all of the findings.

Papers numbers 22 and 27 in the *Journal of Biogeography* and *Journal of Applied Ecology* summarise some of the findings from the survey work in Sri Lanka led by Dinarzarde Raheem. The importance of this work for understanding patterns of tropical land snail distributions based on the Sri Lankan snail fauna were summarised by Triantis, K.A. Parmakelis, A. and Cameron, R. 2009. Understanding fragmentation: snails show the way. *Journal of Biogeography* **36**: 2021-2022 (pdf attached). The process of faunal surveys followed by systematic revisions, analysis of distributions and putting conservation measures in place has been advanced furthest in our Sri Lankan work. Key points are that snails may retain pre-existing distributions, even where habitats are severely degraded; only a subset of forest species can survive outside of forest habitats; even small forest fragments are important as habitats for snails in the medium term; the history of fragmentation, size and shape of forest fragments and period of isolation are important in determining what species are present. We conclude that forest connectivity is a central requirement for long term conservation and that the mosaic of surrounding, transformed habitats vary greatly in their suitability as habitats in which a subset of forest species can survive. Conservation measures need to take account of these findings and DR's current research activity addresses these issues and will provide concrete examples of implementation of appropriate conservation measures.

4.5 Technical and Scientific achievements and co-operation

Earlier reports and outputs summarised in this section demonstrate the range of technical and scientific achievements and the excellent levels of cooperation achieved. The ways in which a wider audience has been reached vary greatly between partner countries. As befits its central role, the Thai group has been particularly successful in obtaining media coverage with TV appearances and extensive press coverage and in reaching a wider audience through several major public exhibitions. The Thai projects have worked with national education schemes at all levels from the youngest primary school children to university programmes. Projects in India, Sri Lanka and Nepal have been particularly successful in reaching community groups at the village level and the workshops run in Sri Lanka for eco-tourist guides were very successful with a special snail guide for Sinharaja Forest being commissioned by Sri Lanka Tourism <http://www.srilankatourism.org/index.html> Ministry of Economic Development, completed some time ago but yet to be published.

4.6 Capacity building

Capacity building on the project has primarily involved the setting up or development of national collections and, most importantly, the training and establishment of project personnel.

Thailand: Professor Somsak Panha is the main project partner. As Professor of Biology and Associate Dean for Research Affairs at the Faculty of Science, Chulalongkorn University, since October 2007 and as Director for the National Centre of Excellent Biodiversity, Prof. Panha is one of Thailand's leading academics. In recognition of his outstanding achievements Prof. Panha was awarded the Gold Medal as the National Outstanding Researcher in the field of Agriculture and Biology for 2010. He is a member of the Biodiversity Research and Training Program in Thailand. President of UNITAS Malacologica <http://www.unitasmalacologica.org/> the society for worldwide malacologists and malacology, until July 2010, a current UNITAS Council Member and, having hosted the World Congress of Malacology in Thailand in 2010, Prof Panha has achieved a high international profile. In addition he is an Adjunct Curator at the University of Michigan, a Research Associate at the Field Museum Chicago and a member of the IUCN Mollusc Species Specialist Group. Having started the study of land snails within Thailand from scratch, Prof. Panha has successfully supervised a series of research students and built what is probably the largest land snail research group in the world. His research group has expanded to cover additional invertebrate groups. Prof Panha is currently visiting FN at NHM (August 2011), he will be making a further visit in November 2011 and also be making a visit to Richard Preece at the University of Cambridge. The development of the following doctoral and post doctoral land snail researchers and their tenure into Thailand's university system has taken place during this project and our ongoing collaboration. **Dr Chirasak Sutcharit** is a lecturer in the Biology Department at Chulalongkorn University; a highly productive researcher he uses classical comparative morphology as his main investigative tool in land snail systematics research (will be visiting FN at NHM and Richard Preece at University of Cambridge, November 2011). **Dr Piyoros Tongkerd**, also a lecturer in the Biology Department at Chulalongkorn University focuses on the use of molecular systematics in land snail research (visiting FN at NHM and Chris Wade at the University of Nottingham for three months from the beginning of October 2011). **Dr Pongpun Prasankok** a lecturer in the Department of Biology at Srinakharinwirot University specialises in the study of allozyme variation in land snails. **Dr Bang-On Kong-Im** is a lecturer in the Department of Biology, Mahasarakham University; her research is centred on karotype variation in land snails and its value in systematics. Also lecturing at Mahasarakham University is Dr Chanidaporn Tumpeesuwan, specialising in land snail ecology. Current PhD research students are: **Thanit Siriboon** working on a review of Thai Streptaxidae jointly supervised with FN he will be based at the NHM for six months from the beginning of October 2011 and **Nattawandee Nantarat** carrying out a molecular study of *Cyclophorus* jointly supervised with Chris Wade; she will be at the NHM and the University of Nottingham for three months from the beginning of October 2011.

Nepal: Prem Budha, the project leader in Nepal, is continuing his PhD studies registered at the University of Antwerp and supervised by Thierry Backeljau and FN. His career progressed at Tribhuvan University, Kirtipur, Kathmandu, from part time teacher in 2008 he was a Contract Teaching Assistant to June 2011 and was appointed as a Permanent Assistant Professor from 24 June 2011. Of his four MSc students on dedicated snail projects supported by the Darwin Initiative **Ramesh Devkota** is now a PhD student at the University of New Mexico, working on snail parasites from Nepal; **Sunita Katiwara** is a Junior Research Fellow on the Sikkim DBT-Project and is based at the National Centre for Biological Sciences, Bangalore, her work includes conducting snail surveys in Sikkim. **Naresh Kohar** is a high school science teacher and, having completed her thesis, **Srijana Khanal** intends to pursue further research on the Nepalese snail fauna.

India: Dr Aravind <http://www.atree.org/aravindna> is a Fellow and Coordinator at the Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, as of August 2009. Two MSc students worked on the project **Kamalesh Mumbrekar** is currently a teaching assistant at Manipal University and **Sandeep Sen** is a PhD student based at ATREE and registered at Manipal University.

Sri Lanka: Dr Dinarzarde Raheem is a Scientific Associate at the NHM. Dinarzarde's ground breaking ecological research has been a major project output. This has led to focussed and

informed conservation strategies. Her current research interests on the interface of ecology and molecular phylogenetics address the most urgent and fundamental issues for understanding the dynamics of speciation in a changing world and how future climate change in a human transformed environment will impact on species survivorship. Dinarzarde is currently funded by The Rufford Foundation for the project: Conserving Land Snails in Sri Lanka's Fragmented Tropical Forest Landscapes <http://www.ruffordsmallgrants.org/rsg/byYear?page=2> , by The Malacological Society of London and the British Ecological Society. She is currently based at the Royal Belgian Institute of Natural Sciences on a European Union Synthesys Award <http://www.synthesys.info/> where she will hold a Belgium Science Policy Office Fellowship from January 2012 http://www.belspo.be/belspo/res/institut/irsb/irsb_en.stm.

Malaysia: the project is led by **Dr Aileen Tan Shau-Hwai** and **Prof Zulfigar Yasin. Norhanis Mohammad Razalli** has submitted her MSc dissertation on a multivariate analysis of a Malaysian micro-snail and will register for a PhD. **Siti Balkhis** is currently completing her MSc on the molecular phylogenetics of some Malaysian snail groups.

Vietnam: **Dr Pham Van Luc**, Director of the Vietnam National Museum of Nature is giving unreserved support for collaboration with the NHM. **Luong Van Hao** is the Biologist and Conservation Officer at Hoang Lien National Park, Lao Cai Province. Hao is a key person in Vietnam supporting future development of collaboration with the NHM and joining on current joint field surveys. Having set up snail reference collections and snail exhibits from Cuc Phuong National Park at the Park's new museum he has more recently amassed collections from surveys throughout areas of Vietnam that are currently his working collections at Hoang Lien N.P. that will be the subject matter for his new MSc project. **Pham Van Sang** at the Vietnam National Museum of Nature has taken on the study of land snails as his speciality. Sang accompanied the most recent, May 2011, joint snail surveys and he is registering for a snail based MSc project.

At **The Natural History Museum** Fred Naggs is approaching retirement and the future of land snail research at the NHM is currently uncertain.

4.7 Sustainability and Legacy

As detailed in Section 4.6 above, the main and immediate project legacy will be trained personnel and continued collaboration. Our research publications to date have laid a broad foundation in Asian land snail systematics that will continue to be a source of information and a baseline record for the foreseeable future. In addition our outreach activities, publications such as illustrated guides, TV and press coverage, workshops and exhibitions have reached a wide audience and raised the profile and understanding of snails. The resources for identifying land snails will have a major impact on related disciplines by, for example, allowing ecologists, conservationists, horticulturists and agricultural workers to identify snails and include snails within their programmes.

5 Lessons learned, dissemination and communication

This was a complex, wide-ranging and highly ambitious project certain to encounter difficulties and constraints. The key lesson to be drawn is that perseverance brings its rewards. We have worked together bringing different skills and needs that provided mutual benefit to all concerned. There were several tiers of target audience. First were the project participants, their own development and that of their institutions, secondly the international specialist academic audience reached through meetings, seminars, workshops, conferences and publications. Next was the wider scientific community able to include land snails within their specialised fields such as ecologists, conservation biologists and climate change scientists. The commercial field

was reached through ecotourism projects and work on pest species that were conducted on both a national level such as Aravind's web based *Achatina* Watch in India and on a local level such as Prem Budha's work with village based forest community groups in Nepal. In Sri Lanka the ecotourism projects involved staff from the Sri Lankan government agency, Sri Lanka Tourism, <http://www.srilankatourism.org/> Jetwing Eco Holidays <http://www.jetwingeco.com/> and A. Baur & Co <http://www.bours.com/bours.com/index.php> and others. The wider audience extended through all educational levels from nursery groups, primary school to college levels and to the general public as explained in section 4.7 above. The collaboration set in place is not only thriving but expanding with colleagues in Indonesia and China joining our network.

5.1 Darwin identity

Darwin Identity has been a proud association for all project collaborators. Publications cite the project and acknowledge Darwin Initiative support as did presentations at conferences, seminars, workshops etc., which in addition, prominently displayed the Darwin Initiative logo. The logo and acknowledgements to the Darwin Initiative appeared on all Darwin Initiative special publications such as the folding laminated field guides. The Darwin identity was prominently displayed in exhibitions, on posters, in fact on every opportunity. The Darwin Initiative logo and explanation of what it stands for is prominently displayed both outside and inside of the main invertebrate research laboratory at Chulalongkorn University and in the University's Snail Museum. The Darwin Initiative project had a distinct and high profile, prominently displayed identity for all partner projects but was not the sole activity for all partners during the course of the programme. Of special note is a paper in preparation with the description of a new genus from Nepal to be named *Darwininitium* as a tribute to the Darwin Initiative.

6 Monitoring and evaluation

This was a collaborative programme involving highly motivated and committed participants with shared objectives. Monitoring and evaluation, recorded in Annex 1, was based on running assessments by the project leader regulated by the NHM internal reporting system and by project participants. The structure of outputs in the original Logical Framework provided a valuable backbone for the project leader from which the project outputs grew and evolved. Project partners did not necessarily identify with the M&E system.

6.1 Actions taken in response to annual report reviews

Apart from issues following from the Mid Term Review, involving conflicting opinions that were worked through in some detail at the time but ultimately were of no significance, Annual Report Reviews have been entirely positive and provided encouraging feedback for project partners.

7 Finance and administration

7.1 Project expenditure

Current Year's Costs	2010/11 Grant (£)	2010/11 Total actual Darwin Costs (£)	Variance %	Comments (please explain any variance)

Staff costs
Overhead Costs
Travel and subsistence
Operating Costs
Capital items (see section 8)
Others (see section 9)
Total

7.2 Additional funds or in-kind contributions secured

Additional UK funding amounted to £58,000 as detailed in Annex 4 Standard Measure Code 23.

Project partners obtained a wide range of additional funding to pursue project and related activities. In-kind contributions were many but often difficult to quantify. Most notable was the hospitality afforded to UK based personnel by our Thai partners, food and accommodation being provided on numerous occasions at Chulalongkorn University by Prof. Somsak Panha. Paid flights, accommodation and expenses were provided for FN when attending Chulalongkorn University as a PhD examiner and FN was given very generous support for travel and accommodation as a Visiting Professor at Chulalongkorn University and to attend the World Congress of Malacology in Phuket in 2010.

7.3 Value of DI funding

DI funding was unique in allowing a project of this nature and magnitude to be achieved. Without it collaboration could only have been small-scale and of short duration at best.

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

Project summary	Measurable Indicators	Progress and Achievements April 2007 - March 2011	Actions required/planned for next period
<p>Goal: To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</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 the benefits arising out of the utilisation of genetic resources 		<p>Our projects have been successful in transforming the knowledge base for land snails in South and SE Asia; a group that is the second most diverse phylum and one for which recorded extinctions exceed those recorded for all other animal groups combined. We have amassed a considerable amount of data on what species occur where. This provides baseline information from which species survivorship can be measured. We have put in place the next generation of specialists to carry this work forward.</p>	<p>(do not fill not applicable)</p>
<p>Purpose To develop a long-term relationship between the NHM and Chulalongkorn University, establishing Chulalongkorn University as a regional centre of land snail expertise.</p>	<p>Setting up land snail projects in South and Southeast Asia that are supported regionally and with long-term cooperation from the NHM. Establish reference collections, national databases and a regional database, provide training, develop research output with raised standards, publish local snail guides. Develop and publish conservation strategies based on snails as key indicators.</p>	<p>Land snail projects are ongoing and running successfully in Thailand, Sri Lanka, India, Nepal, Malaysia, and Vietnam and the Laos project partner continues to collaborate with the Thai group. Both the Thai group and the NHM act as centres for collaboration. Collaboration between the NHM and the Thai group is also as close as it could be with FN holding a visiting professorship at Chulalongkorn University, jointly supervising research students, collaborating with the groups' research and making regular visits. Five of the Thai group will be working with FN at the NHM in 2011 for periods from 3 – 6 months each. Collaboration to date was featured at the July 2010 World Congress of Malacology in Thailand with project partners from Sri Lanka, India, Nepal, Malaysia and Vietnam taking part. In addition we have forged links with Chinese and Indonesian partners with Min Wu from China and Ayu Nurinsiyah from Indonesia having worked at NHM. Our two main sessions at the World Congress were <i>Community Ecology of Tropical Forest Land Snails</i> organised by Dinarzarde Raheem and <i>The Systematics of Asian Land Snails</i> Organised by Fred Naggs, Min Wu and Somsak Panha. Prem Budha (project partner Nepal) is currently engaged in joint field work with Min</p>	

		Wu in China to be followed by joint fieldwork in Nepal. Specific outputs detailed below.
Output 1. Illustrated species lists for six countries.	Publication of illustrated species lists for regions covered in projects in India, Nepal, Thailand, Laos, Cambodia and Vietnam	Intended as outputs generated from an integrated database, the comprehensive output of illustrated national species lists was dropped early in the programme when no one was employed to manage the database project in Thailand. Nevertheless, a database for SE Asian taxa is in preparation in Thailand. Comprehensive illustrated guides to the Land snails of Thailand to be published in both Thai and English are close to completion. A detailed illustrated list of the Western Ghats, India, snail fauna, figuring all known primary types, has been submitted for publication as a Special Supplement in <i>Tropical Natural History</i> and will be published as a hardcover book. Illustrated lists of the land snails of Nepal and Vietnam are in preparation. We are collaborating with Liew Thor-Seng, Universiti Sains Malaysia, Sabah and Netherlands Centre for Biodiversity Naturalis, Leiden in preparing an Encyclopaedia of Life project illustrating the land snails of Malaysia http://malaypeninsularsnail.lifedesks.org/ Malaysia replaced Cambodia at an early stage of the programme.
Output 2. Illustrated species lists for six countries.	Publication of six field guides suitable for use by schools universities and naturalists	Field Guides have been published for Sri Lanka, Western Ghats, India, Nepal and Thailand. The Thai snail guide also serves as a provisional guide for Laos and Vietnam. Vietnam proves to have such a rich and diverse snail fauna, with numerous undescribed taxa, that it will take some years for knowledge of the broad extent of the snail fauna to be determined.
Output 3 Taxonomic revisions.	Publication of taxonomic revisions	31 jointly authored peer reviewed papers on systematics have been published so far http://www.nhm.ac.uk/jdsml/research-curation/research/projects/tropical-land-snails/publications.dsmj , section 4.5, with numerous additional papers in preparation.
Output 4 Compilation of national databases and regional database.	Web access to regional database	The whole data-basing aspect of the project failed to materialise as a unified output as explained above under output 1 and earlier project reports. However, our Thai partners have computerised records of all of their specimen holdings both for Thailand and SE Asia as a whole. Separate computerised records are kept for dry shell collections, industrial methylated spirit collections, absolute ethanol preserved collections and -20°C and -80° collections. These records are being

		<p>added to a unified database that will go online. In addition, Somsak Panha is chairman of ThaiBOL, a regional node of iBOL (Barcode of Life) http://ibol.org/ and all of the groups' absolute ethanol and deep frozen collections will be molecular bar coded and available online. Online species data and figures of the Western Ghats and Nepalese snail faunas have been prepared and can be added to an updated version of our Sri Lankan snail species database web arrangement http://www.nhm.ac.uk/jdsml/research-curation/research/projects/tropical-land-snails/taxa.dsm after the hard copy versions have been published. This is because of the need to meet publication of the <i>International Code of Zoological Nomenclature</i> criteria when designating primary types (neotypes and lectotypes) and avoid confusion over validity of designations. Furthermore, collections made for the Frozen Ark will be molecular bar-coded and included on the Frozen Ark database http://www.frozenark.org/dna-database. This particularly applies to the Vietnamese snail fauna because of the success of our joint surveys and agreements in place that allow samples to be held in the UK.</p>
<p>Output 5 Publication of research papers and conservation strategies.</p>	<p>Publications of research papers on distribution, faunal origins, status and conservation</p>	<p>The taxonomic/systematic papers referred to in output 3 overlap with research output and publications including conservation strategies. For example, establishment of the new snail family Diapheridae introduced both new family and species level taxa but also involved extensive research in comparative morphology and molecular phylogenetics.</p>
<p>Output 6 Dissemination of outputs on WWB and through media.</p>	<p>Access available to project web site; publication/presentation of media coverage</p>	<p>Online information technology and initiatives have progressed a great deal since this Darwin Initiative project was planned and we have been able to integrate our outputs with relatively new initiatives such as the Encyclopaedia of Life, Bar Code of life and the Frozen Ark database. Considerable media coverage has been achieved as detailed in previous reports and section 4.4.</p>
<p>Output 7 Build specimen reference collections.</p>	<p>Collections established in partner countries</p>	<p>Significant national collections have been established in India, Nepal, Malaysia, Thailand and Vietnam, both of morphological material and DNA tissue samples. Additional SE Asian material, including that from Laos, is held in the collections at Chulalongkorn University.</p>
<p>Output 8 Contribute material to Frozen Ark</p>	<p>Contribution of material to Frozen Ark</p>	<p>Because of restrictions on the export of material, India, Nepal and Thailand hold their own DNA collections in country. Duplicate tissue collections of Malaysian and Vietnamese samples are held both in-</p>

		country and in the UK depositories of the Frozen Ark at the NHM and the University of Nottingham.
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Annex 2 Project's final logframe, including criteria and indicators

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
Goal: 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 <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 			
Purpose To develop a long-term relationship between the NHM and Chulalongkorn University, establishing Chulalongkorn University as a regional centre of land snail expertise.	Setting up land snail projects in South and Southeast Asia that are supported regionally and with long-term cooperation from the NHM. Establish reference collections, national databases and a regional database, provide training, develop research output with raised standards, publish local snail guides. Develop and publish conservation strategies based on snails as key indicators.	Outputs from survey based projects in India, Nepal, Thailand, Laos, Cambodia and Vietnam: establishment of reference collections; publication of results in peer-reviewed journals; publication of field and other guides. Web access to regional database and other outputs.	1. Political problems may limit activity in some of the associate partner countries. 2. Significant further increases in fuel prices and costs of international flights would result in adjustments to international travel arrangements.

<p>Outputs</p> <p>1. Illustrated species lists for six countries.</p> <p>2. Field guides for six countries.</p> <p>3. Taxonomic revisions.</p> <p>4. Compilation of national databases and regional database.</p> <p>5. Publication of research papers and conservation strategies.</p> <p>6. Dissemination of outputs on WWB and through media.</p> <p>7. Build specimen reference collections.</p> <p>8. Contribute material to Frozen Ark – new objective</p>	<p>1. Publication of illustrated species lists for regions covered in project in India, Nepal, Thailand, Laos, Cambodia and Vietnam.</p> <p>2. Publication of six field guides. Suitable for use by schools, universities and naturalists.</p> <p>3. Publication of taxonomic revisions.</p> <p>4. Web access to regional database.</p> <p>5. Publication of research papers on distribution, faunal origins, status and conservation.</p> <p>6. Project web site, media coverage.</p> <p>7. Collections established in partner countries.</p> <p>8. Contribution of material to Frozen ark</p>	<p>1. Published illustrated colour species lists.</p> <p>2. Publication of six coloured field guides.</p> <p>3/5. Submission for publication of taxonomic revisions and research papers (minimum of 12 papers: revised objective from partners).</p> <p>4. Database available on web.</p> <p>6. Access available to project web site; publication / presentation of media coverage.</p> <p>7. Collections held in institutes.</p> <p>8. Material held in Frozen Ark collections.</p>	<p>Collaboration with Thailand is well established and proven to be robust and reliable. Some of the subsidiary partner countries are politically unstable and adjustments may have to be made, contracting activities in some countries, expanding in others.</p> <p>Partnerships in subsidiary countries hold up.</p>

Activities	Activity Milestones	Assumptions
<p>Conduct field surveys, establish reference collections, establish database, analyse data, publish research, prepare illustrated species lists in printed and electronic form. Prepare field guides: communicate information on web and gain media coverage.</p>	<p>Year 1. Launch project with training workshop at Chulalongkorn University with international partners.</p> <p>Years 1 and 2: run field programs.</p> <p>Years 1, 2 and 3: two members of Thai group spend two months per year working on identifying material (includes Laotian, Cambodian and Vietnamese) at NHM.</p> <p>Year 2: Indian and Nepalese partners work up their collections in London.</p> <p>Year 2: publish illustrated species lists.</p> <p>Year 3: publish illustrated guides to snails in the Western Ghats, India, Thailand and areas covered in surveys in Nepal, Laos, Cambodia and Vietnam. Submit a minimum of twelve papers to be published in peer-reviewed journals, covering subject areas presented in proposal, including conservation, and including results from work in Sri Lanka. Database to be available on web.</p>	<p>This is an ambitious project and we recognise that capacities for participation vary greatly in different partner countries and assume that Defra will allow contraction in some areas and expansion in others if appropriate.</p>

Annex 3 Project contribution to Articles under the CBD

Project Contribution to Articles under the Convention on Biological Diversity

Article No./Title	Project %	Article Description
6. General Measures for Conservation & Sustainable Use		Develop national strategies that integrate conservation and sustainable use.
7. Identification and Monitoring	40	Identify and monitor components of biological diversity, particularly those requiring urgent conservation; identify processes and activities that have adverse effects; maintain and organise relevant data.
8. In-situ Conservation		Establish systems of protected areas with guidelines for selection and management; regulate biological resources, promote protection of habitats; manage areas adjacent to protected areas; restore degraded ecosystems and recovery of threatened species; control risks associated with organisms modified by biotechnology; control spread of alien species; ensure compatibility between sustainable use of resources and their conservation; protect traditional lifestyles and knowledge on biological resources.
9. Ex-situ Conservation		Adopt ex-situ measures to conserve and research components of biological diversity, preferably in country of origin; facilitate recovery of threatened species; regulate and manage collection of biological resources.
10. Sustainable Use of Components of Biological Diversity		Integrate conservation and sustainable use in national decisions; protect sustainable customary uses; support local populations to implement remedial actions; encourage co-operation between governments and the private sector.
11. Incentive Measures		Establish economically and socially sound incentives to conserve and promote sustainable use of biological diversity.
12. Research and Training	40	Establish programmes for scientific and technical education in identification, conservation and sustainable use of biodiversity components; promote research contributing to the conservation and sustainable use of biological diversity, particularly in developing countries (in accordance with SBSTTA recommendations).
13. Public Education and Awareness	10	Promote understanding of the importance of measures to conserve biological diversity and propagate these measures through the media; cooperate with other states and organisations in developing awareness programmes.
14. Impact Assessment and Minimizing Adverse Impacts		Introduce EIAs of appropriate projects and allow public participation; take into account environmental consequences of policies; exchange information on impacts beyond State boundaries and work to reduce hazards; promote emergency responses to hazards; examine mechanisms for re-dress of international damage.
15. Access to Genetic Resources		Whilst governments control access to their genetic resources they should also facilitate access of environmentally sound uses on mutually agreed terms; scientific research based on a country's genetic resources should ensure sharing in a fair and equitable way of results and benefits.

Article No./Title	Project %	Article Description
16. Access to and Transfer of Technology		Countries shall ensure access to technologies relevant to conservation and sustainable use of biodiversity under fair and most favourable terms to the source countries (subject to patents and intellectual property rights) and ensure the private sector facilitates such assess and joint development of technologies.
17. Exchange of Information		Countries shall facilitate information exchange and repatriation including technical scientific and socio-economic research, information on training and surveying programmes and local knowledge
19. Bio-safety Protocol		Countries shall take legislative, administrative or policy measures to provide for the effective participation in biotechnological research activities and to ensure all practicable measures to promote and advance priority access on a fair and equitable basis, especially where they provide the genetic resources for such research.
Other Contribution	10	Smaller contributions (eg of 5%) or less should be summed and included here.
Total %	100%	Check % = total 100

Annex 4 Standard Measures

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Code No.	Description	Total to date
Established codes		
1A	6 Thai PhD students 1 Nepalese PhD student 1 Indian PhD student	8
1B	Thai PhDs awarded	2
2	Nepalese MSc awarded 2 Indian MSc awarded 2	4
4A	Number of undergraduate students receiving training 1.Thailand 600 [5 lecturers in 3 universities plus 1 professor average 20 students each = 120 students per year. Plus 50 students on short courses from year 3 2. Nepal 20 per year 100	570
4B	Students on mollusca courses in Sri Lanka, India, Nepal and Thailand	50
4C	Nepalese MSc biology students taking courses in	136

	malacology and taxonomy	
4D	Number of training weeks provided	Approx 200
6A	People receiving training on workshops and field trips. Approx 100 each year across all country projects	500
6B	Training weeks provided	25
7	Training manuals and information posters	3
8	Weeks spent by project staff in host countries	90
9	Action plans incorporated in publications and pest reports	3
10	Field guides	5
11A	Papers published in peer reviewed journals	31
11B	Number of papers submitted to peer reviewed journals	16
12A	Computer databases for all project partners now abandoned following MTR. SE Asian database will be hosted in Thailand	
13A	Collections set up in India, Nepal, Malaysia and Vietnam (Department of National Parks and Vietnam National Museum of Nature) and collections for Laos, Malaysia and Vietnam established in Thailand	8
13B	Enhancement of national collections in Thailand and India and regional SE Asian collections in Thailand	2
14A	National workshops/seminars specifically on project	11
15A	Press releases	12
15B	Local press releases	6
16A	Project agenda publication in <i>Natural History Journal of Chulalongkorn University</i> newsletter objectives not followed up by project partners who favoured replacement by online news/discussion group at SnailAsia@googlegroups.com	1 + online news/ discussion site with regular items / updates
16B	Copies of <i>NHJCU</i> distributed to libraries in Thailand and internationally	No direct measure of online hits but large number of enquiries generated from website viewers
16C	UK news circulation	Online access as above
17A	Regional dissemination Networks established	1 Asian network established via SnailAsia@googlegroups.com and informal direct contacts
17B	Networks enhanced	Network for Thai research group centred at Chulalongkorn University and extending to previous Chulalongkorn post docs now lecturers in other Thai universities
18A	Number of national TV programmes/features	5 in Thailand

19A	Local radio broadcasts in India and Nepal	4
20	£1, 316 of equipment supplied to Nepal at start of project	£1,316
22	Number of permanent field plots set up in Sri Lanka and India	9
23	<p>Value of resources raised from sources other than Darwin</p> <p>Funding awarded to Dinarzarde Raheem:</p> <p>[2012 > Belgium Science policy Office Fellowship EUR30,000pa]</p> <p>2011: Rufford Small Grant £5888; British Ecological Society (BES) £2500; The Malacological Society of London £1500</p> <p>2007: BES £2500; The Malacological Society of London (£1000);Percy Sladen Memorial Fund (£500)</p> <p>NHM funding awarded to FN £20,000 British Council Award PI CW £30,000 Total additional UK funding: £58,000</p>	<p>Additional UK funding £58,000 Project partners have not provided details of their (substantial) additional funding.</p>

Annex 5.

Publications

No.	Type (eg journals, manual, CDs)	Detail (author, year, title)	Publishers (name, city)	Available from (eg contact address, website)
1	Journal	Sutcharit, C. and Panha, S. 2011. Neotype designation and re-description of the vanishing tree snail, <i>Amphidromus (Amphidromus) mundus</i> (Pfeiffer, 1853) (Pulmonata: Camaenidae),	<i>The Raffles Bulletin of Zoology</i> 59 : 23-27.	-
2	Journal	Tan, S.K., Chan, S.Y. and Panha, S. 2011. A new subspecies of <i>Aphidromus (Amphidromus) atricallosus</i> from Singapore (Mollusca: Gastropoda: Camaenidae).	<i>The Raffles Bulletin of Zoology</i> 59 : 39-46.	
3	Book chapter	Aravind, N.A. and Naggs, F. 2011. snailing in the canopy.	<i>Canopies of South Asia</i> . Ed Ganesh, T. Devy, M.S. and Tripaty, A. ATREE, Bangalore.	
4	Booklet	Raheem, D.C. Budha, P. Naggs, F. Preece, R.C. 2010. <i>An illustrated guide to the land snails of Nepal</i> .	The Natural History Museum, London	
5	Abstract	Naggs, F, Raheem, D.C. 2010. A decade of Darwin Initiative projects in Asia.	<i>Tropical Natural History Supplement 3</i>	
6	Session Abstract	Raheem, D.C., Tattersfield, P. 2010. Community ecology of tropical forest land snails	<i>Tropical Natural History Supplement 3</i> : vii	
7	Session Abstract	Naggs, F. Wu, M. and Panha, S. 2010. The systematics of Asian land snails	<i>Tropical Natural History Supplement</i>	

			3: x
8	Abstract	Naggs, F. and Raheem D. 2010. A decade of Darwin Initiative projects in Asia	<i>Tropical Natural History Supplement</i> 3: 100
9	Abstract	Razali, N.M, Yasin, Z, Naggs, F. Panha P. and Shau Hwai, A.T. 2010	<i>Tropical Natural History Supplement</i> 3: 101
10	Abstract	Budha, P, Backeljau, T. and Naggs, F. Systematics of land snails in Nepal Himalaya: challenges and future opportunities	<i>Tropical Natural History Supplement</i> 3: 102.
11	Abstract	Sutcharit, C. Tongkerd, P, Prasankok, P. Kong-Im, B-O. Yasin, Z. Shau-Hwai, Naggs F and Panha, S. 2010. The land snail genus <i>Rhiostoma</i> Benson, 1860.	<i>Tropical Natural History Supplement</i> 3: 105.
12	Abstract	Raheem, D. Naggs, F. 2010. Community ecology of South Asian land snails, an overview.	<i>Tropical Natural History Supplement</i> 3: 221.
13	Abstract	Aravind, N.A. Rajashekar, K.P. and Madhyastha, N.A. 2010. A review of ecological studies on patterns and processes of distribution of land snails of the Western Ghats, India.	<i>Tropical Natural History Supplement</i> 3: 222
14	Journal	Sutcharit, C., Naggs, F. and Panha, S. 2010. A first record of the family Cerastidae, with a description of a new species (Pulmonata: Orthurethra: Cerastidae).	<i>The Raffles Bulletin of Zoology</i> 58: 251-258.
15	Journal	Sutcharit, C., Naggs, F., Wade, C.M., Fontanilla, I. and Panha, S. 2010. The new family Diapheridae, a new species of <i>Diaphera</i> Albers from Thailand and the position of the Diapheridae within a molecular phylogeny of the Streptaxoidea (Pulmonata: Stylommatophora).	<i>Zoological Journal of the Linnean Society</i>, 160: 1-16.
16	Journal	Bangon Kongim, B. Sutcharit, C. Tongkerd, P Tan Shau-Hwai, Quynh, N.X. Naggs, F. and Panha, S. 2010. Karyotype Variations in the Genus <i>Pollicaria</i> (Caenogastropoda: Pupinidae)	<i>Zoological Studies</i> 49: 125-131
17	Journal	Panha, S. and Sutcharit, C. and Ngoc Can, D. 2010. An anatomical note on <i>Moellendorffia eastlakeana</i> (Mollendorff, 1882) a camaenid land snail from Vietnam (Gastropoda: Pulmonata: Camaenidae).	<i>The Nautilus</i> 124: 20-24.
18	Journal	Nakadera, Y., Sutcharit, C., Ubukata, T., Utsuno, H., Panha, S. and Asami, T. 2010. Enantiomorphs differ in shape in opposite direction between populations.	<i>Journal of Evolutionary Biology</i> 23: 2377-2384
19	Journal	Sutcharit, C and Panha, S. 2010. Taxonomic re-evaluation of <i>Chloritis bifoveata</i> (Benson 1856) and <i>C. diplochone</i> Möllendorf 1898 (Pulmonata: Camaenidae).	<i>Journal of Conchology</i> 40: 277-285
20	Journal	Kongim, B., Sutcharit, C., Tongkerd, P. and Panha, S. 2009. Karyotype differentiation within the elephant snail, <i>Pollicaria mouhoti</i> (Pfeiffer, 1862). (Caenogastropoda: Pupinidae).	<i>The Natural History Journal of Chulalongkorn University</i> 9: 201-208.
21	Journal	Prasankok, P., Sutcharit, C., Tongkerd, P. and Panha, S. 2009. Biochemical assessment of the taxonomic diversity of the operculate land snail, <i>Cyclophorus fulguratus</i>	<i>Systematics and Ecology</i> 36: 900-906.

		(Gastropoda: Cyclophoridae), from Thailand. Biochemical	
22	Journal	Raheem, D.C. Naggs.F. Chimonides, J. Preece, R.C. Eggleton, P. 2009. Fragmentation and pre-existing species turnover determine land-snail assemblages of tropical rain forest	<i>Journal of Biogeography</i> 36: 1923-1938
23	Booklet	Panha, S. Sutcharit, C. Tongkerd, P. & Naggs, F. 2009. <i>An illustrated guide to the land snails of Thailand</i>	Biodiversity research & Training Program, Bangkok, Thailand
26	Booklet	Raheem, D.C. Naggs, F. Aravind, N.A. & Preece, R.C. 2009. <i>An illustrated guide to the land snails of the Western Ghats of India</i>	The Natural History Museum, London
27	Journal	Raheem, D.C., Naggs F., Preece, R.C., Mapatuna, Y., Kariyawasam, L., and Eggleton, P. 2008. Structure and conservation of Sri Lankan land-snail assemblages in fragmented lowland rainforest and village home gardens.	<i>Journal of Applied Ecology</i> 45: 1019-1028.
28	Book	Sutcharit, C. and Panha, S. 2008. Land snail in Khao Nan National Park [In Thai].	Bangkok Printing LTD. Bangkok. 112 pp
29	Journal	Budha, P.B., and Naggs F. 2008. The Giant African Land Snail <i>Lissachatina fulica</i> (Bowdich) in Nepal.	<i>The Malacologist</i> 50: 19-21.
30	Journal	Raheem, D. 2008. Persistence and conservation of Sri Lankan rainforest snails in a landscape of fragmented forest and modified habitats.	<i>The Malacologist</i> 50: 26-27.
31	Journal	Sutcharit, C. and Panha, S. 2008. Taxonomic re-evaluation of the two land snails <i>Sarika diademaq</i> (Dall 1897) and <i>Sarika asamurai</i> (Panha 1997)	<i>The Raffles Bulletin of Zoology</i> 56: 95-100.
32	Journal	Tumpeesuan, S. and Panha, S. 2008. First record of the genus <i>Schistoloma</i> Kobelt 1902 (Prosobranchia: Pupinidae) in Thailand.	<i>The Natural History Journal of Chulalongkorn University</i> 8: 65-67.
33	Journal	Prathapan, K. D. Priyadarsanan Dharma Rajan, T. C. Narendran, C. A. Viraktamath, K. A. Subramanian, N. A. Aravind and J. Poorani. 2008. Death sentence on taxonomy in India.	<i>Current Science</i> 94: 170-171.
34	Journal	Aravind, N. A., K. P. Rajashekhar and N. A. Madhyastha. 2008. Micro mollusks of the Western Ghats: Distribution and Threats.	<i>Zoosymposia</i> 1: 281-294.
35	Published article	Budha, P. 2008. Snails as an important aspect of biodiversity [in Nepali].	<i>Baigyanic Jagat</i>
36	Published article	Budha, P. 2008. Afriki Sankhekira Aatanka [Nepali].	<i>Nepal Weekly</i> Phalgun 5, 2064 BS, page 45.
37	Journal	Sutcharit, C., Naggs, F. and Panha, S. 2007. Systematic review of the land snail genus <i>Neocepolis</i> Pilsbry, 1891 (Pulmonata: Camaenidae) from North Vietnam.	<i>Journal of Natural History</i> 41: 619-631.
38	Abstract	Aravind, N.A. Rajashekhar, P. Madhyastha, N.A. 2007. Micro-molluscs of the Western Ghats: distribution and threats.	<i>World Congress of Malacology Antwerp, Belgium.</i> p.11

39	Abstract	Budha, P. Backeljau, T. and Naggs, F. Distribution of terrestrial land snails in Nepal. 2007.	<i>World Congress of Malacology Antwerp, Belgium.</i> p. 27
40	Abstract	Fontanilla, I. Hudelot, C. Naggs, F. and Wade, C. 2007. <i>Achatina fulica</i> : its molecular phylogeny and genetic variation in global populations.	<i>World Congress of Malacology Antwerp, Belgium.</i> p. 63.
41	Abstract	Panha, S. Chirasak, S. Tongkerd, P. Prasankok, P. Zulfigar, Y. Tan, A. Ng, P. Clements, R. Moolenbeck, R. Maaseen, W. Naggs, F. and Asami, T. 2007. <i>Amphidromus</i> revisited: a fresh look at the conchologist's favourite land snail genus.	<i>World Congress of Malacology Antwerp, Belgium.</i> p. 163.
42	Abstract	Bangon, K. Tongkerd, P. Sutcharit, C. Yasin, Z. Tan, A. Panha, S. 2007. Karyotypes of land operculate snails genus <i>Pterocyclus</i> and <i>Rhiostoma</i> (Prosobranchia: Cyclophoridae) from Thailand and Malaysia.	<i>World Congress of Malacology Antwerp, Belgium.</i> p. 119.
43	Abstract	Tongkerd, P. Chirasak, S. Emmanuel, D. Jean-Jacques, J. and Panha, S. 2007. Phylogenetic relationships of the southeast Asian land operculate snails of the genus <i>Cyclophorus</i> (Prosobranchia: Cyclophoridae) using DNA sequence data.	<i>World Congress of Malacology Antwerp, Belgium.</i> p. 223.
44	Journal	Wade, C.M., Hudelot, C., Davison, A., Naggs, F. and Mordan, P.B. 2007. Molecular phylogeny of the helicoid land snails (Pulmonata: Stylommatophora: Helicoidea), with special emphasis on the Camaenidae.	<i>Journal of Molluscan Studies</i> 73 : 411-415.
45	Journal	Tumpeesuwan, C. Naggs, F. and Panha, S. 2007. A new genus and new species of Dyakiid snail (Pulmonata: Dyakiidae) from the Phu Phan Range, Northeastern Thailand.	<i>The Raffles Bulletin of Zoology</i> 55 : 363-369.
46	Journal	Pethiyagoda, R. Gunatilleke, N. de Silva, M. Kotagama, S. Gunatilleke, S. de Silva, P. Meegaskumbura, M. Fernando, P. Ratnayake, S. Jayewardene, J. Raheem, D. Benjamin, S. and Ilangakoon, A. 2007. Science and biodiversity: the predicament of Sri Lanka	<i>Current Science</i> 92 : 426-427
47	Journal	Prasankok, P. Ota, H. Toda, M. and panha, S. 2007. Allozyme variation in the camaenid tree snails <i>Amphidromus atricallosus</i> (Gould, 1843) and <i>A. inversus</i> (Müller 1774).	<i>Zoological Science</i> 24 : 189-197
48	Journal	Sutcharit, C. Ota, H. Toda, M. and Panha, S. 2007. Evolution of whole-body enantiomorphy in the tree snails <i>Amphidromus</i> .	<i>Journal of Evolutionary Biology</i> 20 : 661-672.
49	Journal	Naggs, F., Panha, S., and Raheem, D. 2006. Developing land snail expertise in South and Southeast Asia, a new Darwin Initiative project.	<i>The Natural History Journal of Chulalongkorn University</i> 6 : 43-46.
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