The Rufford Small Grants Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Stephen Mahony
Project title	A Herpetological Bioinventory Survey of Tripura, Northeast India.
RSG reference	09.12.06
Reporting period	July 2007- August 2009
Amount of grant	£ 5000
Your email address	stephennmahony2@gmail.com
Date of this report	11/09/2009

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Document as many herpetofaunal species as possible and observe general population densities, using a combination of transects and interviews.			**X**	A total of 70 species were documented in the state of Tripura: 23 frog, 1 caecilian, 17 lizard, 29 snake and 1 tortoise species. 46 species represent possible new state records. Population densities were approximated based on numbers of individuals observed and reports from locals.
Determine micro-habitat requirements of the species by assessing variables like vegetation, temperature, humidity etc.			**X**	Detailed field notes were taken for all species documented which will be presented in a forthcoming scientific publication, nearing completion.
Measure extent of exploitation by: a. Recording signs of hunting and estimating the proportion of exploitation within neighbouring villages.		**X**		Hunting was found to be restricted to opportunistic encounters and subsistence utilization as food, or sometimes as pets for tortoises. Rarely reliable information could be obtained about neighbouring villages not visited.
b. Collecting information on trade practices like methods of collection and major markets by interviewing trappers.			**X**	Open trade of reptiles and amphibians is restricted to turtles, apparently available from several fish markets in rural areas of western Tripura that could not be visited. Local trappers rarely openly sell excess bounty in villages, except when large species are caught, such as

				large turtles and pythons. Collection techniques are opportunistic and basic.
Promote public awareness both within the scientific community, national and international public and at the local level	.		**X**	One scientific publication in an internationally respected, peer review journal has recently been published. A further two are currently in press, scheduled for publication in 2009. Results from the survey will be presented shortly in another peer reviewed publication. A formal presentation was made to the MS students of Wildlife Biology and Conservation course, National Centre for Biological Science, Bangalore, India. A species inventory has been presented to the Tripura Forest Department for utilisation in local level awareness programs. Ten informal awareness talks/presentations were made at popular areas of congregation in villages nearby surveyed areas.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

My hotel room was broken into in a town resulting in the theft of credit/bank cards and sound recording equipment. The equipment was retrieved by the police but broken. Money was not lost however 2 months of monsoon season field work was wasted as I was restricted to the capital city awaiting new cards in the post. A subsequent visit during a following monsoon season was made to compensate for the lost field time.

An unnoticed apparently common intestinal parasite infection presumably from eating fruit in the jungle led to mild malnutrition which required a couple of months recovery time. The local people periodically drink a locally prepared concoction made from various medicinal plants for “clearing out the system”, innocently not considering that this practice and medicinal drink may not be available outside of Tripura. Words of warning to

all outsiders working in jungles, its better to politely decline offers of fruit by friendly villagers.

Museum work carried out in the Zoological Survey of India (national museum) was hampered in many cases by the badly degraded condition of important reference specimens. Luckily in most cases representative specimens were also provided to the Natural History Museum, London during British occupation and these specimens are still in excellent condition. Originally unexpected and thus not budgeted in the original research proposal, it was essential to make two visits to London for carrying out the necessary comparisons. It was possible to save money during field work mostly thanks the great hospitality of the local people at many of the surveyed localities. This saved money covered the flights from Ireland, accommodation during one visit (I stayed with family during the other), and food in London. The additional costs of local transport had to be self financed though.

3. Briefly describe the three most important outcomes of your project.

Results from the field:
At least 70 distinct species of reptiles and amphibians were recorded during the field work, of which at least 43 represent new state records. The actual number of species is not currently stable as at least 4 "species" are suspected to represent more than one cryptic species within the populations found. Difficult species complexes were identified in the species: *Calotes* "*versicolor*", *Cyrtodactylus* "*khasiensis*", *Hemidactylus* "*bowringii*", *H.* "*brookii*", *Hylarana* "*nigrovittata*", *Xenophrys* "*parva*" and in the genera *Philautus*, *Hylarana* and *Fejervarya* whereby the populations could not be identified with confidence to the species level. These questionable species require further research to determine if they are new to science or representing valid synonyms of their respective super species. This survey identified firsthand the presence of seven dangerously venomous snake species and from second hand evidence of photographs a further three species, when previously there was only one reported from the state.

Results from museum work:
As most of the published literature regarding amphibians and reptiles from northeastern India are historical records from 1800's to early 1900's, in order to accurately identify many of the species found during the field surveys it was necessary to carry out a considerable amount of museum/specimen collection based work in India and London. This comparative research resulted in several important discoveries of additional new species and systematic problems of species closely related to those found in Tripura. In order to better understand the identities of the Tripura species, these systematic problems required to be properly addressed and rectified through scientific publication. Thanks to the support of the RSGF on this project, the following topics are covered in

recently published and in press scientific papers

1. The description of two new species of lizards, a Bent-toed gecko (*Cyrtodactylus*) from Myanmar and an agamid, Flat-backed japalura (*Japalura*).
2. Elevation of a subspecies of Bent-toed gecko to full species status.
3. The generic reallocation of two poorly known agamid lizards, including the proposed synonymisation of a genus that was previously poorly defined.
4. The Khasi Hills bent-toed gecko (*Cyrtodactylus khasiensis*) is removed from the reptile checklist of Myanmar where it has been incorrectly considered present since 1935.
5. The redescription of two poorly known *Japalura* agamids and a *Cyrtodactylus* gecko from Myanmar, all known only from descriptions made in the early 1900s.

Education/Public awareness:
The international scientific and conservation aware community can benefit from the three scientific peer reviewed publications currently in press and published, clarifying several long standing taxonomic issues and describing new poorly known species from the neighbouring Indian state of Mizoram and nearby country of Myanmar. A fourth paper will be published shortly on the diversity of reptiles and amphibians from the state of Tripura which is hoped to be made available for open access online to everyone interested in the regional herpetofauna. Further publications are in preparation on specific taxonomic problems discovered during this research project. A formal presentation for MS students of a leading Indian university and many informal local level public awareness talks and photographic demonstrations were performed for highlighting the importance of preserving the habitat and fauna of this biologically rich region.

4. Briefly describe the involvement of local communities and how they have benefited from the project (if relevant).

The considerable knowledge acquired during this project dramatically increases opportunities for future research on this subject for local scholars. The local communities where the presentations were held appeared to have a very different attitude towards the animals that they previously disregarded or feared, after the clarification of their many superstitious beliefs and myths. Based on the very positive responses in these villages, most attending people agreed for the most part that preserving these animals reduces their need for pesticides and dramatically increases the health of the ecosystem. This knowledge is vital for increasing ecotourism in the state, bringing further financial benefits to the local areas. Identification and documentation for the first time, of the venomous snake species will enable hospitals in Tripura to be better prepared to treat the patients of snake bite, thus inevitably saving lives.

5. Are there any plans to continue this work?

Yes. Further yearly expeditions are planned to further document as much of the remaining species as possible. Ongoing research is underway on clarifying the taxonomic status of species found during this project and further publications of new species are expected as the data gets thoroughly analysed. The herpetological surveys are expected to be expanded to cover other states of northeast India which are expected to have even higher potential diversity than Tripura.

6. How do you plan to share the results of your work with others?

In addition to the numerous local awareness presentations/demonstrations already completed, the results of this survey will also be presented at an Amphibian conservation conference currently in planning (funding recently approved), to a guest list of the most highly regarded international herpetologists and conservationists. The aim of this seminar is to identify areas in India which have a high diversity of amphibian species, who's existence may be under threat.

The following publications are published/in press in internationally respected, peer reviewed scientific journals:

1. **Mahony, S.** 2009. A new species of *Japalura* (Reptilia: Agamidae) from northeast India with a discussion of the similar species *Japalura sagittifera* (Smith, 1940) and *Japalura planidorsata* (Jerdon, 1870). Zootaxa. 2212:41–61.

2. **Mahony S.** 200X. Redescription and species elevation of *Cyrtodactylus khasiensis tamaiensis* (Smith 1940) and description of a new species allied to *Cyrtodactylus chrysopylos* Bauer 2003 from Myanmar (Reptilia: Gekkonidae). **(in press).**

3. **Mahony, S.** 200X. Systematic status of the Agamid *Japalura kaulbacki* Smith 1937 and the monotypic genus *Mictopholis* Smith 1935 (Reptilia: Agamidae). **(in review)**

Publication "2" of the above list will be made available for open access after publication. Open access will not be available for publications "1" and "3" due to copyright restrictions of the journal. However, for anybody who does not have access to subscriptions of these journals and are interested to read my publications, PDF copies will be available to all email requests to stephenmahony2@gmail.com

Further publications will be submitted for review shortly and will also be made available.

An open access detailed project report of Tripura amphibians and reptiles, including photographs of many species will be made available shortly and will be directly linked to my RSG project web page. This report will also include chapters clarifying popular myths and superstitious beliefs heard during my time in Tripura, surround Indian states and Bangladesh.

7. Timescale: Over what period was the RSG used? How does this compare to the anticipated or actual length of the project?

I had originally anticipated that the project duration would extend over a ten month period from May 2007 - March 2008 (six months - field work, four months - analysis, report writing). The funding was released in July 2007 after which time the project work was initiated from August, 2007 and thus expected to finish in early July 2008. The theft of credit/bank cards prevented access to funds for two important months of the monsoon field season, thus continuation of the field survey had to be postponed to the following monsoon season, 2009. A project extension of one year was required and kindly granted by the RSGF to complete the proposed field work. Time spent outside of the field season was dedicated to extensive museum work, literature aquisition and review to identify the large number of species encountered and to write the scientific publications.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. 1£ = $6.035

Head	Budgeted Amount	Actual Amount	Difference	Comments
Fellowships, Allowances & Wages				
Fellowship for Researcher @ Rs. 6800 per month x 10 months	791	791	0	Researcher fellowship was utilized only during time spent in the field and during museum visits.
Field Assistant wages @ Rs. 3800 per month x 6 months	265	205	+60	Often befriended locals insisted on joining in the field, outright refusing payment or compensation of any kind.
Food Allowance for researcher @ Rs. 4500 per month x 10 months	523	550	–27	Money was saved on food in the field by eating with families as a

				guest. But higher cost of food during museum visits to London increased expected expenses.
Subtotal	**1579**	**1546**	**+33**	
Travel, Accommodation & Equipment				
Rail fare from field base to Chennai & back @ Rs. 4000 return trip X 2	94	47	+47	only one visit to Chennai was necessary.
Vehicle/driver (including meals) hire charges @ Rs. 30800 per month x 4 months of survey	1433	1070	+363	less than three months were required, public transport was accessible for remaining time.
Accommodation @ Rs. 600 per day x 182 days, 200/day for 120 days	1546	1815	–269	Some expenses could be saved in India but the most basic accommodation during the London museum visit increased expenses
Two budget return flights to London for museum work (from Ireland)		109	–109	Two originally unexpected visits to London Museum were necessary for comparative studies to identify species from the field work
Subtotal	**3073**	**3041**	**+32**	
Consumables				
Film rolls, stationery. communication	116	104	+12	
Others (Indian visa, batteries, torches, gas etc)	116	224	–108	The cheaper batteries budgeted were not powerful enough, thus the more expensive Duracell were required to run equipment. Unavoidable humidity

				destroyed one set of torches and protective footwear was required for one long term tracker.
Medical / Miscellaneous expenses	116	85	+31	Malaria prophylaxis was cheaper than expected in Tripura and no expensive medical complications were faced.
Subtotal	**348**	**413**	**–65**	
TOTAL	**5000**	**5000**		

9. Looking ahead, what do you feel are the important next steps?

To assume that the checklist of Tripura herpetofauna is complete would be a definite underestimation of the true diversity in this little studied state. New additions were being added to the checklist from the first to the last day of field work. Indeed, areas that were extensively surveyed for an extended period still produced numerous additions when visited the following season. Future field work is essential for realising this true diversity. One vital step will be to clarify the taxonomic status of the many unidentifiable species found. The quickly vanishing natural habitat in this state is of special concern as these species may represent new species with limited biogeographical ranges, thus their existence may be seriously threatened. Without clarifying the taxonomic status of these species, they cannot be protected. The major factor inhibiting progress in conservation orientated education in the state is the lack of basic information of what species are present in Tripura. In order to adequately discourage superstitions and local myths, the species from which the superstition originate still need to be accurately identified in some cases.

10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes, I used the RSGF logo at the beginning and end of all public presentations mentioned above. It was not possible to use the logo on the scientific publications, however RSGF is clearly and gratefully acknowledged in all, as the grant issuing body for the research carried out. Due to the taxonomic importance of these publications they will be available indefinitely in museums, universities and libraries around the world as documents of historical importance. Some papers will also be made available for open access online.

A proposed expanded project report briefly discussing all 70 species (and including photographs of many) will be linked to my RSG page shortly and will certainly have the RSGF logo.

11. Any other comments?

The raw data acquired during this project will provide essential information for further research projects for years to come not just within Tripura but equally applicable for surrounding states and countries. There are a very many people who have given their generous support on this project, by providing valuable literature, sharing taxonomic knowledge, permitting me to examine specimens in their care, reviewing/proof reading manuscripts, preparing for and planning field trips, assistance while in the field and many other activities that resulted in the success of this project. I would like to thank the following people for the parts they played, big or small; Abhik Gupta, Rom Whitaker, S. D. Biju, Rachunliu G. Kamei, Ashish Thomas, Joyeeta Chakraborty, Kavita Singh, Robin Suyesh, Ashok Captain, Barry Clarke, Colin McCarthy, David Gower, G. Ramakrishna, B.H.C.K. Murthy, Kaushik Deuti, Saibal Sengupta, Jayaditya Purkeyashta, Mark Holmes, M. Mofizul Kabir, M. Kamrul Hasan, Mushfiq Ahmed, M. Firoz Ahmed, Abhijit Das, Nikhil Whitaker (MCBT), Kelvin P. Lim, George R. Zug, Indraneil Das, Thomas Zeigler, Aaron M. Bauer, Frank Glaw, Jakob Hallermann, Ulrich Manthey, Nicholas Arnold, Peter Praschag, Saibal Sengupta, Ashok Captain, Harry V. Andrews and Tengberth Sangma, and finally all of the herpetologists who provided copies of their publications.