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	Sonali Saha
Project title	**Capacity building for freshwater ecosystem conservation in northeastern India**
RSG reference	15364-1
Reporting period	
Amount of grant	1810
Your email address	bamboohydraulics@gmail.com
Date of this report	June 8, 2015

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
To train 40 students and 12 faculty members in basics of forest/wetland hydrology, with special focus on local and regional/global factors affecting water availability and quality.			Fully achieved	We had a two-day series of lectures, demonstrations and workshops where faculty members from international institutes and local universities taught, exchanged ideas and worked with 45 students from 6 different colleges of Shillong.
Demonstrating methods to assess stream water quality and watershed ecosystem health			Fully achieved	We organized a day-long fieldtrip to conduct stream surveys and link stream ecosystems to the surrounding catchment land cover. Students were trained in methods of hydrological and water quality monitoring including parameters such as stream flow, temperature, dissolved oxygen and turbidity. Aquatic invertebrates were sampled and the concept of biomonitoring was explained, i.e. how the presence of different families of insect larvae reflects water flow and quality conditions instream, and how these insect larvae are important to maintain water quality and food sources for stream fish.
Conduct survey of aquatic macroinvertebrates in pristine and impacted catchment streams in Meghalaya; begin creating a simple field guide at the order/family level, and develop guidelines for further surveys to develop a stream ecosystem bio monitoring tool for Meghalaya.		Partially achieved		With help of local specialists we conducted surveys of aquatic macroinvertebrates during the course workshop. As a result of this course we developed a biomonitoring network, whose members subsequently carried out three distinct stream sampling projects over 2014-2015. The team members belong to three colleges in Shillong. Reports were completed and submitted. To share photographs and sitings of invertebrates, we are using the existing platform of India Biodiversity Portal, and have started a special section on aquatic macroinvertebrates of Meghalaya. The teams plan to carry out more surveys when time permits. One issue is obtaining high-resolution photographs of sampled invertebrates, which requires the use of macro lenses. A Facebook page has also been set up for exchange of information.

Module 3-Introduction to GIS using the open source Quantum GIS software. Audience: undergraduate students and some faculty			Fully achieved	A 3 day GIS workshop was held with a computer per participant. Lectures on GIS concepts (the use of geospatial data in environmental and resource management, vector and raster data processing, cartography) followed by hands-on exercises on creating maps from a variety of data (GPS data, georeferencing old images, remote sensed images, using Google Earth, global datasets). Students completed their projects.
One of the project goals of was to compile the datasets and share with India Water Portal, Govt. of Meghalaya department of environment and forests.	Not achieved			We have started the collaboration, but have yet to collect long-term data.

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

1. Cancellation by one of the invited specialists on aquatic macroinvertebrates of Meghalaya due to personal reasons. We engaged another researcher from a local college in Shillong to help out.
2. There was issue with electricity at times, especially while GIS module was underway, but really everything worked very smoothly.
3. The initial surveys for aquatic macroinvertebrates also requires close-up high resolution photographs in order to show these insect larvae in good detail ; and the cameras owned by most groups do not have an adequate capability for such images. Hence groups have to borrow cameras, which could be an added challenge. For continuation of this work, I am considering having a camera in one of the institutions that can be borrowed by groups locally, who are part of the biomonitoring network.

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

1. We trained 60 undergraduate students from the Indian northeast region in concepts and methods in freshwater ecosystems monitoring and ecohydrology. As a result of this course, several students were inspired to undertake stream biomonitoring projects in Shillong and other areas. These research projects have the potential to elevate the conservation status of several of Meghalaya's natural areas. In addition,25 students and six faculty members participated in a 3-day intensive course on QGIS, an open source geographic information system program. This was the first time these undergraduate students were exposed to GIS, mapping and geospatial data.
2. We formed a biomonitoring network with students, non-profit organizations and faculty members from at least three states in Indian northeast: Meghalaya, Assam, and Manipur to get data on freshwater macroinvertebrates, fishes, and basic environmental parameters, required for conservation planning. The members of the team completed three different projects on stream sampling in and around Shillong are, the reports of which were sent as updates to RSGF.
3. Most significantly, under the common theme of ecosystem conservation and water resource management, the course brought together faculty and students from six colleges in Shillong, representatives from various government institutions (Soil and Water Conservation, Meghalaya

Pollution Control Board, Forest Department, State Administration) and NGOs (Grace City) and individuals interested in local environmental issues such as pollution in Barapani Lake. This network provides a foundation for future training, research and information dissemination activities that can better guide water and soil resource management actively keeping ecosystem services in mind.

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

The majority of students in Meghalaya and other NE states come from close-knit tribal communities. On weekends many of them typically go to their villages that have longstanding sustainable community resource management traditions. One of the primary reasons for my colleagues and I to choose Meghalaya was to build capacity in the Indian northeast, a remote region very rich in natural resources but yet to be caught up technologically compared to other parts of India. Shillong is also a major educational centre for the entire Indian northeast. By reaching many students we actually trained individuals that are farmers and fishermen hailing from agrarian society and cultures. In addition, we hired local people from rural areas while doing fieldwork at Grace City, Umsning, 35 km northeast of Shillong.

5. Are there any plans to continue this work?

Yes, I just received a Fulbright Academic Achievement fellowship from the US Centre of International Studies to teach in St. Anthony's College, Shillong, India this year. I am planning on continuing the work that was started with the support from Rufford Small Grant Foundation and Shillong College, India. I have a long-term vision with regards to developing tools and collecting data, which can be used to make informed decision on sustainable use and conservation of freshwater ecosystems in Indian northeast. With the established biomonitoring group I plan to install a network of low-cost open source water quality and flow sensors/loggers to monitor environmental parameters that will relay real time data (eg. https://thingspeak.com/channels/16847) so that a database can be created and maintained. In conjunction with monitoring of physical parameters, data on fish and macroinvertebrate will be collected, and related to land cover of the catchments.

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

The data collected from this project are put on different institutional websites, for example. At. Anthony's college has put the entire biomonitoring report online their college website (http://www.anthonys.ac.in/biomonitoring.aspx). The materials used for teaching the workshop and courses were made available to students by compiling all the PowerPoints, data, and exercises on a flash drive and giving each student a flash drive at the end of the course. Continuous updates have been provided to RSGF to put on the website. I plan to develop a webpage/blog where the sensor data will be stored, one such website is ThingSpeak.com. Additionally, the work has been publicized

through social media (https://www.facebook.com/groups/1262897140511133/) and https://sites.google.com/site/tropicalecohydrology/about/meghalaya http://indiabiodiversity.org/group/aquatic_macroinvertebrates_of_meghalaya/show?pos=11

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

The RSG was used over a period of one year July 2014-2015, and we still need to compile report from one of the groups (Shillong College) which undertook biomonitoring in a local stream.

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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Fieldtrip to a catchment near Shillong	150	210		We had budgeted for 45 people but due to overwhelming response, we added 25 more students that meant hiring an extra bus.
Internet Connection for 1 week Shillong College	60	00	00	College had internet connection. Was not necessary
Travel for instructors	540	540		This was applied to involving more resource persons from Meghalaya
Supplies and equipment: Dissolved oxygen meter, turbidity tube, Current/flow meter	600	600		
Supplies: pens, stationary for all participants, USB flash drives for all participants,	40	220	180	60 from miscellaneous costs was put into this, and the amount left over from travel and supplies as well We hadn't planned buying USB flash drives for the participants, but they all wanted the pdfs and exercise, so we loaded the flashdrives and gave it to each participant
Travel and logistics for surveying 5 catchments in Meghalaya	300	240		We were able to fund two institutions, the third institution found its own funding, which worked out well.
TOTAL	**1810**	**1810**		

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

A long-term initiative to collect data on environmental flows, and stream/river biomonitoring must be initiated for conservation of watersheds and maintenance of freshwater ecosystem diversity. Long term data + information are required for

planning sustainable development in the area. Local communities, students, government and non-government organizations must be involved in such monitoring efforts, instrumentation, data collection and maintenance.

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, we used RSGF logo on invitations, program agenda, and certificates given the students, banners and PowerPoint presentations. RSFG received a lot of publicity during our work.

A local newspaper**, The Shillong Times** published an article http://meghalayatimes.info/index.php/front-page/26007-training-on-freshwater-ecosystem-conservation-in-north-east

11. Any other comments?

To summarize, many students and faculty mentioned that the course showed them a new approach to appreciating the links between ecosystems, environmental health and water. They appreciated the field trip and the GIS labs as these provided practical hands-on experience. This course has formed the foundation (of a group of colleges and institutions) to begin wider work in the region, towards participatory research that can provide scientific information for guiding resource management and ecosystem conservation policy in this biodiversity-rich region.

https://sites.google.com/site/tropicalecohydrology/about/meghalaya