

The Rufford Foundation

Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. 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. Please note that the information may be edited for clarity. 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	Jigme Wangchuk
Project title	Aquatic biodiversity assessment in Phobjikha valley
RSG reference	16434-1
Reporting period	October, 2015
Amount of grant	£5000
Your email address	jwanghuk@uwice.gov.bt
Date of this report	3 rd November, 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
Document the diversity of macroinvertebrates			yes	Identified 48 species of macroinvertebrates at family level from nine different orders. Four species were identified only up to order level which adds up to 13 taxa at order level. Identification demands specialist for different orders, the identification to further lower level was constrained by lack of expert/identification keys of the country.
Compare the diversity differences between the post and pre-monsoon			yes	There were no significant differences in diversity between the seasons. However there were 40 species at family level during post monsoon and 46 species during pre-monsoon.
Engage the students and field staff in sampling the freshwater diversity			yes	Staffs of territorial forest division, national park and students from College of Natural Resources were actively involved in the consecutive seasons (post and pre-monsoon). Total of 12 personnel from different professional as were involved for the survey
Preservation of specimens in the laboratory			yes	The identified specimens were preserved (1057 vials) in the laboratory for future references in UWICE laboratory
Awareness and information dissemination			yes	The research findings were presented to the students of College of Natural Resources, and poster was prepared and presented during 3 rd Bhutan Ecological Society symposium in Capital city, Thimphu on 28 th to 30 th August, 2015
Paper publication		yes		The paper has been accepted to be published in Bhutan Ecological Society's annual journal. It is in the process of reviewing by the national and international reviewers which will be published by December, 2015.
Procurements of equipment for the research			yes	One dissecting scope with eye piece, Global Positioning System, waders, digital camera ice cube trays, forceps required for the aquatic

				survey were procured which can be also used in the subsequent research and trainings. Other accessories (ethanol, vials, hand lens, were also bought and used during the research)
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The post-monsoon sampling was conducted late autumn, where the sampling was difficult with the extreme cold weather. However the sampling team were dedicated and committed who also possess the patience and ethics in carrying out the sampling. The entire team member put their best to contribute towards the success of the project. We had to prepare the fire to warm ourselves and peruse the specimens as determined.

The residents in the study area were bit sceptic of taking the laboratory samples for identification. Local resident believe that killing is the sin and since such study was not carried out in the past, people hypothesised it will harm their livelihood as local deity will be angered. This hypocrisy was convinced to the local people that unknowingly anthropogenic activities threaten and results loss of aquatic biodiversity that plays important role in cleansing the water for drinking and agriculture. The magnified macroinvertebrates was shown to the local people; many were surprised to experience over 200 to 300 individuals of different species that thrives in 25 cm x 25 cm area. Farmers around said they would have killed many through use of fertiliser and pollution in the agriculture field. This information has instilled for the local people, henceforth that they will minimise or refrain from polluting the stream to cultivate merits.

Identification was challenging as we have no identification keys and experts within the country for this regions. Various identification keys from Hindu Kush Himalayan regions and keys from Alberta were used for validating the identity of species. Many of the species was identified at family level and some up to order level. Freshwater ecologist and experts from Austria, and Montana was consulted for confirming the identification. Since the validation of genus and species require to sent out the specimens to their respective institutions which is not permissible by law. However we were able to confirm the identity of specimens at 100% family and order level through online validation through various keys. We also agreed to collaborate the research in future particularly on identification.

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

3.1 Documented the baseline list of macroinvertebrates.

The study had documented over 48 families of macroinvertebrates from 13 orders. The test H' (Shannon Diversity Index) had showed no significant differences between the seasons. Over 1500 samples, representative of each morphotypes for both the seasons were collected

from every sampling site and preserved in the Laboratory for future references and also educational purpose in the institute.

3.2 Train the sampling team and inculcate experiences from the field of aquatic sampling.

This study was cordially carried out involving students from College of Natural Resources, Territorial Division and national park. Total of 12 staff were adequately learnt the sampling techniques and identification of macroinvertebrates though it was challenging. They committed that field sampling will be confidently convened independently in future in their respective place of work.

3.3 Symposium, presentation and publication

The results were presented to students and faculty of College of Natural Resources and forestry personnel from Department of Forest and Park Services in the country. The poster was presented during the 3rd annual Bhutan Ecological Society (BES) held in Capital of Bhutan, Thimphu. The audience were from different colleges, schools within Thimphu, different organisations in the country. This was deemed best forum as the symposium has been witnessed by the different background of experts and created an environment to learn each other on different fields of science presented experts. For publication I have applied the Bhutan Ecological Society (BES) and now it is in the process of review by the national and international committee. The report will be published by December 2015 in annual Journal of BES.

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

Food and lodging has been hosted in local house. The local residents were benefited through homestay as we had paid the cost of food and logistic during the entire field survey period. Local guide from each locality was also hired to authenticate the establishment of plots for sampling. They were also paid daily allowance and travel allowance, rate as per the existing government rate. Seven household nearest to the sampling sites were identified for logistic. A local guide who involved during the sampling also participated as the main survey team. All the communities who involved in this project were paid for their services and more importantly created awareness and seen the real situation of aquatic biodiversity interdependences that supports human wellbeing.

5. Are there any plans to continue this work?

This project is the start. I have planned these plots will be reassessed after the interval of 5 or 10 years and study the changes. Further, increasing the sampling plot and effort to measure the diversity will validate the list of diversity continually. Collected specimens will be further identified to its genus and species level through the consultation with the experts from Hindu Kush regions and elsewhere. Additionally, I will also document the species present during two other season summer and winter, which will give stock of all round season diversity. This will enable to understand future impact of the diversity.

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

As stated in the outcome, the results were presented to the students and faculties during seminar and poster was also presented during the symposium of BES. The ultimate and important outcome of this project will be established in National annual Journal (BES). The copy of results will also be presented to RSPN (Royal Society for Protection of Nature) who conserves the study area. E-copy will be also uploaded in our institute website www.uwice.gov.bt.

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

The timely release of funding from RSG has been an intriguing to accomplish the project as planned and intended. Procurement of laboratory equipment such as dissecting scope, eyepiece, GPS and camera was delayed as the equipment has to come from outside country. The activity has been abled and adjusted as per the financial outlay and work plan.

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
Dissecting scope (Microscope) with eye piece	1300	1280	20	One dissecting scope and eye piece each was bought from US. The balance was adjusted acquiring camera
Digital Camera with micro capability	200	230	-30	Slight increase on cost of camera was attributed to additional cost to camera cover/bag
GPS	500	550	-50	The cost has been escalated by 50 from the time of proposing this project.
Safety gears (boots, rain gears, hand glove)	200	200	0	Safety gears were adjusted within the limited budget as planned from the local market.
Extension gears - raingears, rucksacks, boots and pack bags)	600	550	50	Only rain gear and boots were able to procure for the research team of 12 heads from the proposed amount.
Daily allowance for field Assistant	700	610	90	The daily allowance was just sufficient to complete the field work for post and pre-monsoon and 90 was adjusted for vehicle hire.

Stationeries and other equipment	300	250	50	Ethanol, ice cube trays, vials, forceps, pencils, measuring tape, ribbon, and kick nets were bought. The balance was adjusted on other deficit programme areas
Vehicle rental and maintenance	500	600	-100	The higher expenses were incurred due to hire of vehicle that has to ply in a very adventurous road (rough road). The distant from camp to sapling site was far apart and also had to pay for the halt charges
Food during the survey	300	375	-75	For benefits of local community, camping and food was hosted by local household with reasonable price yet, adjusted 75 extra expenses from the other charges.
Charges to porter/pony	200	155	45	Since the area was connected by rough road, porter was not used. Instead we used local guide and a porter to carry the field equipment and guide us to the site from the road end point.
Report writing, presentation and exit meeting	200	200	0	Working lunch was provided during the exit meeting for 15 participants. Presentation was made to the participants and also demonstrated the used of dissecting scope and keys to identify the specimens.
Total	5000	5000	0	

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

The sampling plot in the study area will be the permanent site which will be used as reference for future monitoring. To understand the changes after 5-10 years, the site has been identified as the permanent plot. The specimens collected will be further assessed and preserved in the laboratory enabling to compare the species diversity with present to the future study findings.

The study will also be extended to the other important areas that require the attention for management on aquatic system where the presently acquired equipment will be utilised fruitfully. Along with the study, public advocacy has been crucial as public perceive the clean drinking water and river comes as granted. Hardly few people irrespective of literate and illiterate, they have less understanding on the on presence of macroinvertebrates. I will be working towards exploring the diversity in the country and advocating public in this field hereafter beside the present study sites.

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

The logo was used in the poster presentation, seminar presentation and journal. Many young researchers inquired about the RSG funding. Many were interested and impressed to take up the research by seeking financial support from RSG.

11. Any other comments?

Unlike other countries, Bhutan has less records of biodiversity information as compared to neighbouring countries. It is difficult to get research funds on macroinvertebrates in Bhutan as our country has prioritised and limited fund for key species for conservation. Funding from the RSG has been encouraging to boost the young researchers from Bhutan. Over the years we see more researchers applying for grants and generating the information and disseminating results through presentation, symposium and publications. Such grants have always been potential for the researchers to establish baseline research information and discover the new species and understand the dynamism of anthropogenic activities in relation to climate change in future.