

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. 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	Sailesh Ranjitkar
Project title	Establishment of plant diversity monitoring site for climate change studies in Kanchenjunga Conservation Area, Eastern Himalaya
RSG reference	45.10.09
Reporting period	12 months
Amount of grant	£5,174
Your email address	sailesh.ranjitkar@gmail.com ; sailesh@mail.kib.ac.cn
Date of this report	2 nd February 2011

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
Establishment of long-term observation site, with all necessary data from vegetation and soil			Yes	Permanent plots were established and measured twice times within duration of 8 months.
Observation of phenology events in <i>Rhododendron arboreum</i> for first season			Yes	Regular observation was done every 15 days for 8 months for recording change in phenophase.
Train two persons for phenological observation			Yes	One local resident of Ghunsa (<i>Mr. Pemba Tsering Sherpa</i>) was trained to record phenological data. Necessary supply (camera, manual, etc.) for recording data was also provided to him, which will be used for community later. Another one (<i>Mr. Milan Poudel</i>) from district headquarters was also trained. He had monitored work in the project site regularly and helped to communicate with Mr. Pemba, which was not possible otherwise due to lack of facility even of telephone service in the study site.
Tree core collection from rhododendron and other species			Yes	Tree core collected during first field visit was used to determine age group of tagged trees in the observation sites. The cores were insufficient for chronology development for climatic history reconstructions therefore during consecutive field more cores were collected.
Awareness programme among school students			Yes	Programme cannot be conducted in the school at Ghunsa, only we arrange meeting and orientation to the teacher and students of local school (<i>Shree Ghunsa Ni.Ma.Vi.</i>). In village we visit several house and inform about our research. The awareness programme was successfully conducted among students from different 50 schools collaborating with Conservation Concern Nepal and EDEN at Khwopa college.

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

The funding was received when we were already in field. I have used money loaned from our university for equipment and first field, which was later paid back from the fund. The exchange rate of sterling pound was £1 = NPR 125 when expenditure was estimated during proposal developed, later it was decreased to £1 = NPR 107 during fund was received. I have to cut down some allocated budget and some items to balance the budget. Thanks to my research assistants, they helped me with subsidised budget.

Some other unforeseen difficulties arose during the project are –

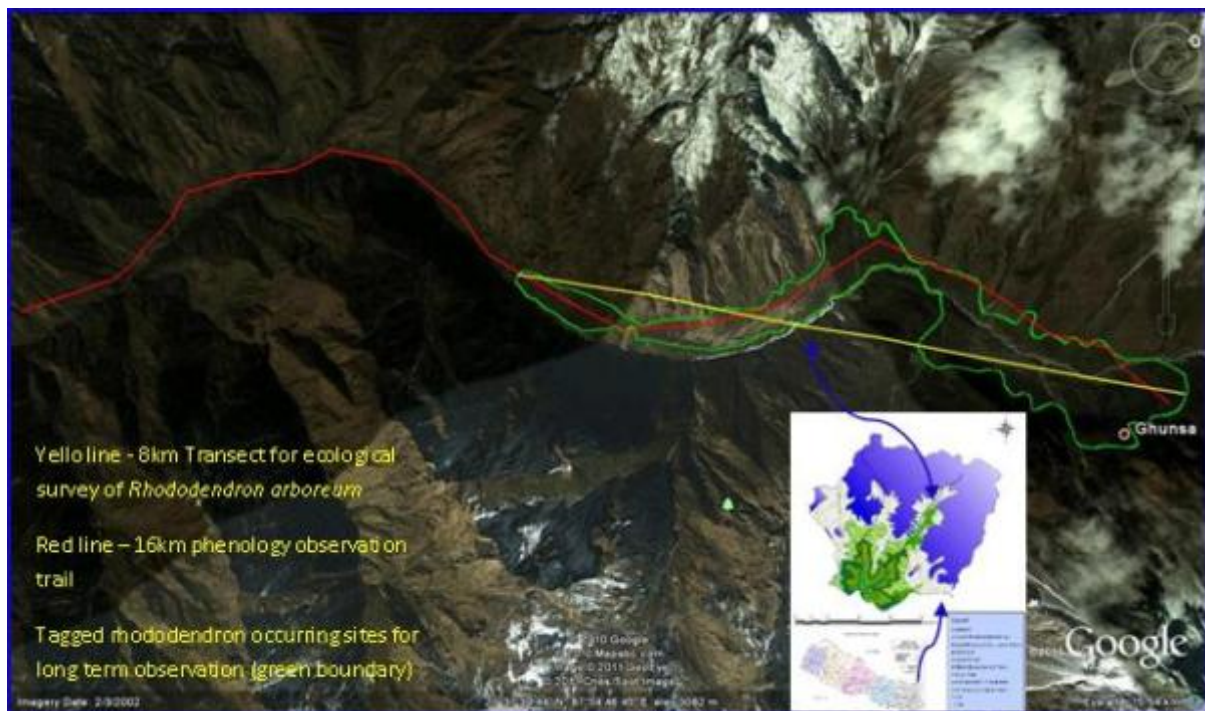
- 1) There are always lots of challenges while working in the mountain region. During our work we have faced some difficulties due to geographical condition and natural calamities. We got lost in active landslide. I slipped off costing my laptop in backpack get partially damaged. But no other major damage was there to team member.
- 2) I have mentioned about enrolling local CBO which was not possible as there was no relevant CBO active in the study area, instead of CBO I got collaborated with Eco club at local school (*Shree Ghunsa Ni.Ma.Vi.*) for phenological recording and taking care of temperature loggers. One of the loggers installed in the site was found not working properly and need to get repaired and recover the data. New logger was already installed in January 2011, which was supported by ICRAF China.

I need to take it to Beijing, China for repair and recovering, which will be done in March 2011. The repair cost was/will be used from ICIMOD fund.

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

At this stage of research three most important outcomes of the project are:

- a. Establishment of permanent monitoring site (Map-1), with well trained phenology data recorded from local community for long-term phenological study is the major achievement of the research. During the research period we convinced local community school to participate in the recording of phenology events of the plant species around the settlement area. Recording phenology events is not new in European countries but it is first time in Nepal. This is the beginning, and we expect it will last for longer period. Two reason for this expectation is
 - (1) chosen school have Eco-club with active members and they are looking for some programme to study nature and environment, so they are interested in this research; every year new students are joining the club therefore for each year there is no lack of human resource for observation;
 - (2) the school has boundary with the forest area, so it is not a big problem to keep record of flowering time.



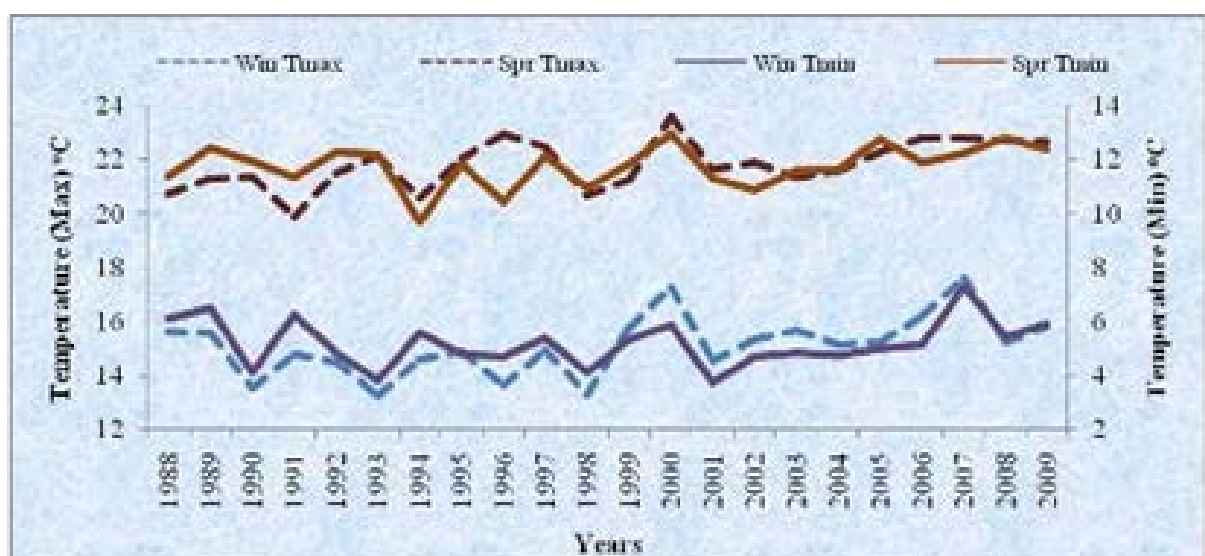
Map – 1: Study sites in Kanchenjunga Conservation Area

- b. We understand peak timing of flowering in *Rhododendron arboreum* and its tuning with temperature and soil properties. We were able to develop simple regression model relating temperature and flowering period in *Rhododendron arboreum*. This result will help for further work and developing simulation model on phenology of this temperate species.

Some of charts prepared based on our research are presented herein with brief description.

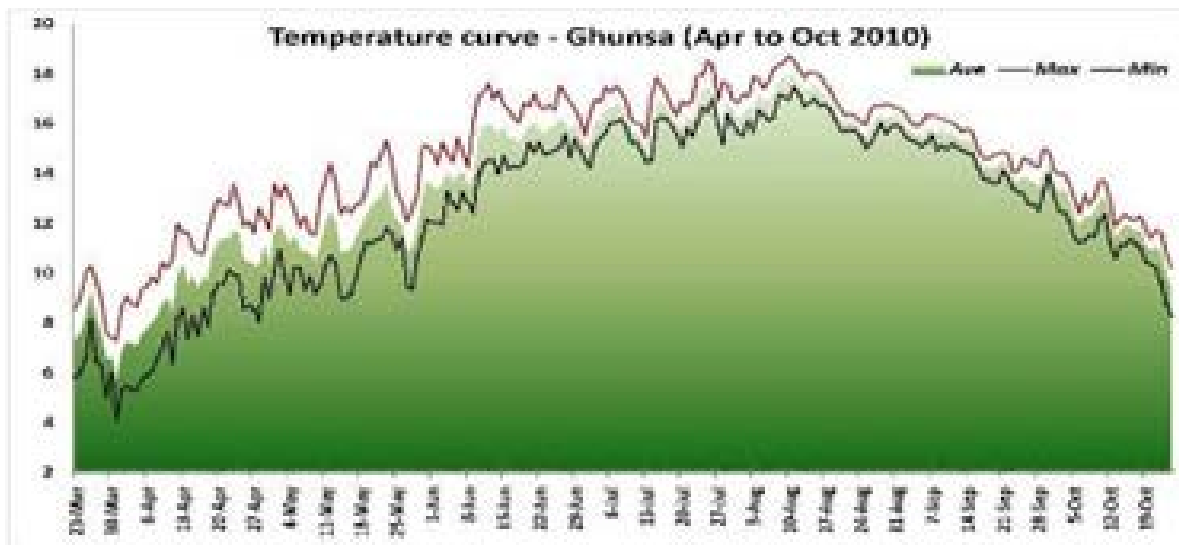
Chart 1: Spring and winter temperature anomaly from 1988 to 2009 in Taplejung

Temperature is rising in both spring and winter.



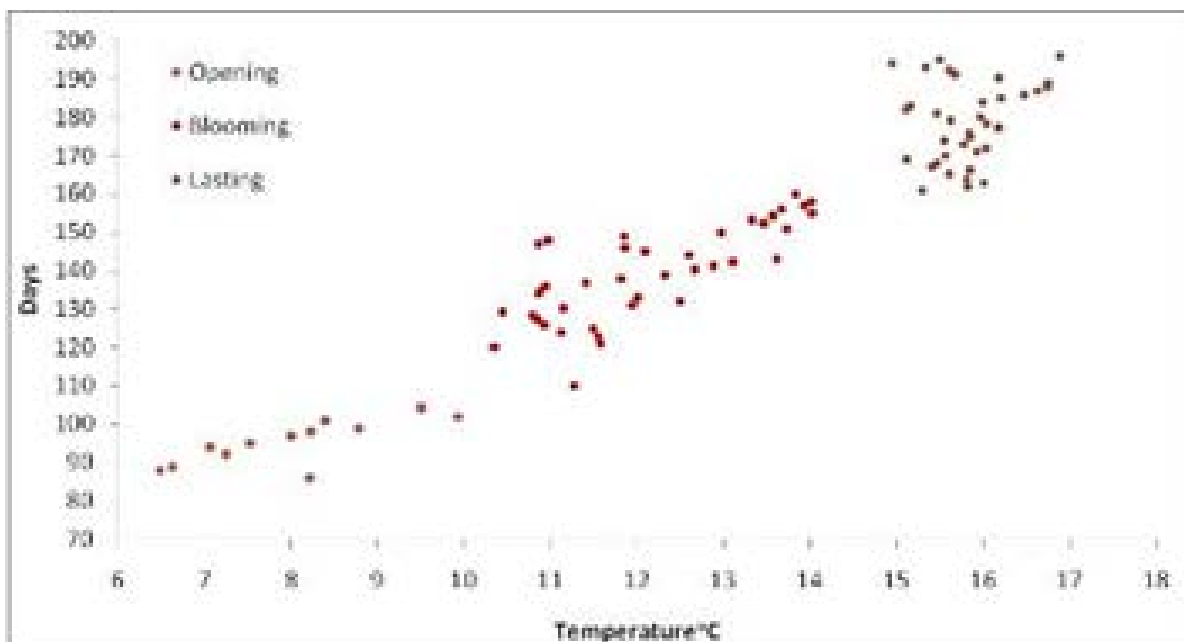
During observed period +1.19°C and +0.95°C for spring and winter respectively at Phungling, Taplejung.

Chart 2: Daily temperature of Ghunsa



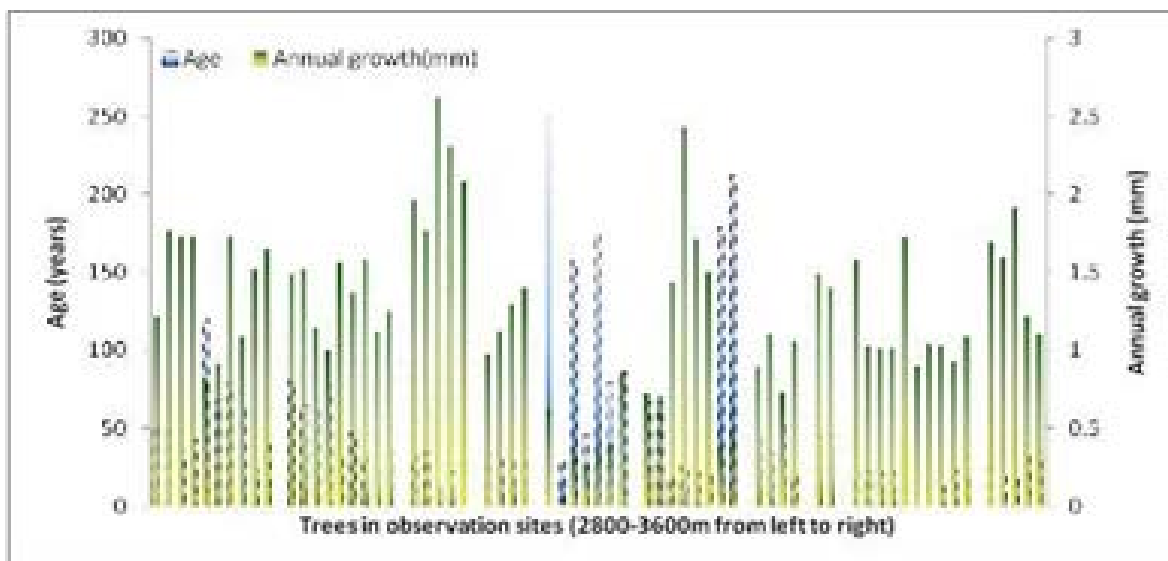
Temperature logger installed at Ghunsa records daily temperature data. The data was averaged for maximum, minimum and average and plotted.

Chart 3: Temperature anomaly and flowering activity at Ghunsa area



Average temperature recorded was plotted against days of rhododendron blooming. Suitable temperature for blooming was found to be between 11oC to 14oC.

Chart 4: Age and annual growth in millimetre of rhododendron trees in observation sites



Age and annual growth in rhododendrons representative collection from observation sites. Site at 3100m was found having oldest stand of rhododendron trees. People believe this part of forest is devoted to forest deities therefore they do not harvest anything from there as a result forest is well protected.

- c. Awareness programme on ‘climate change and phenology’ among school students from project site and city area, altogether students from more than 50 schools had participated in the program. Dissemination of project output through poster, which was designed and printed after survey among school students based on their understanding and presented to scientific community during the “International Conference on Biodiversity and climate change, 2010”. The printed material was designed in such a way that even a layman can understand the relation between temperature and flowering phenomenon of *Rhododendron arboreum*.

Some pictures from awareness programme



Ms. N M Sujakhu (COCON) and Mr. S Ranjitkar (Researcher) presenting concept of global climate change, phenology and significance of project and Participants – students and teachers.



Volunteers (EDEN) explaining parameters to record phenological data, temperature and rainfall



Feedback from student. Group photo.



Meeting with teacher and students at Ghunsa and household visit at Phungling, Taplejung

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

Local people are given knowledge about temperature anomaly and plant growth which is new knowledge for them. In long term we will be able to understand temperature and plant growth in the project site. We have installed temperature loggers in the site, which will be handover to KCAP and local school. We are expecting that knowing climatic condition and its impact on plant will help local people/farmers to understand the temperature plant growth relationship. We are expecting this will contribute to address problem of low agricultural production in the study area.

Beside this, local community got benefit directly with project as all necessary accommodation were used from local resources as well as local resident were used during research period based on per day payment. Local residents hired during research period were field assistants, helpers and porters; also, field assistant were trained with phenological data recording and ecological survey of forest along with knowledge of utilisation of available plant resources in other part of the country and community benefit with those resources. These are knowledge share and benefit to local community related to or non-related to current project.

5. Are there any plans to continue this work?

We will continue this research, especially observation of the phenophase and temperature anomaly. If eligible I would like to apply RSGF for second grant to work in the major agricultural crop in this region. During work in the field we learn people there are facing the problem of decline in the agricultural production.

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

We have/will share results of our research in two ways

- 1- Scientific publications/presentations: Presented a poster in the International Conference on Biodiversity, Livelihood and Climate Change in the Himalayas, 2010 December 12-14; organised by Central Department of Botany, Tribhuvan University.

Field data will be thoroughly analysed after getting data for next season and will be published in some reputed journal after peer review.

- 2- General publications: During the working period we have conducted awareness programme among the school and college level students on climate change, its effect on plant diversity and our research. After getting feedback from teachers and students we have designed poster to distribute in various education institutes and interested sectors in Nepal.

The final project report and other material submitted/submitting to Rufford will be available for general viewer, this is also a way of disseminating results (the report will not contain detail scientific outputs as I need to publish in scientific journal; after published it will be submitted to Rufford).

Beside that we are trying to get a column in one of the national newspaper, to cover story of our project, if published more people will know about our research and its importance.

Posters prepared during different occasion was presented here, please note poster for general public was prepared in *Nepali (high quality version in photos for RSGF folder)*



Poster presented at Conference. Poster prepared for general public

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

RGS was used in actual period from March 2010 to January 2011. I have proposed RSGF to establish long-term monitoring site and disseminating our findings through awareness programme. We have successfully established and re-monitor ecological parameters at the sites as well as also monitor the phenological activities in *Rhododendron arboreum* for first season. After completion of the field data collection we conduct "climate change and its impact on plant growth and phenology" among school students and teachers. It starts earlier as we have to locate suitable sites with chosen species, before it starts flowering as we have to record phenological activity. During first field, observation sites were setup, tree cores were collected to know age of trees within the sites, soil sample were collected, and temperature loggers were setup. During second field trees within observation sites were measured, more core were collected for developing chronology for climatic analysis, more soil sample were collected for C, N analysis as well as meeting set with local school teachers and students. The actual length (for first season observation regarding phenological observation and awareness program) is close to anticipated.

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.

Total Grant Received (5174.00 GBP @ 107.00 during received time)

Item	Budgeted Amount	Actual Amount	Difference	Comments
Remuneration				
• Researcher	100.00	100.00	-	<i>Only one field assistant from research site was hired and paid for phenological observation, another one from district headquarter was hired and paid with budget allocated for researcher and field support.</i>
• Research associate	600.00	600.00	-	
• Field Assistant (From April to November 2010)	720.00	360.00	360.00	
• Administrator/ Accountant (From March to Dec 2010)	500.00	500.00	-	
• Consultant fee for professional services (Auditing)	100.00	100.00	-	
• Awareness Campaign	400.00	397.20	2.80	
• Material necessary for recording phenological data for longer period	350.00	318.09	31.91	
Field support				<i>Transportation was found more expensive than it was expected during proposal development and we also needed to pay for travelling and mobilising of field staff /assistants/ volunteers.</i>
• Transportation + • Lodging and fooding	650.00 962.50	1,107.38 822.90	-457.38 139.60	

Field Equipments				
• GPS	130.00	287.78	-157.78	<i>GPS with more function was purchased.</i>
• Hanson Timber Marking Crayon	15.00	-	15.00	
• Temperature logger	400.00	483.18	-83.18	
				<i>Difference is due to drastic fluctuation in sterling pound to Nepalese exchange rate.</i>
Contingency	256.50	93.46	163.04	<i>This amount was used to balance some of above-mentioned items.</i>
Total	5,174.00	5,169.99	4.01	

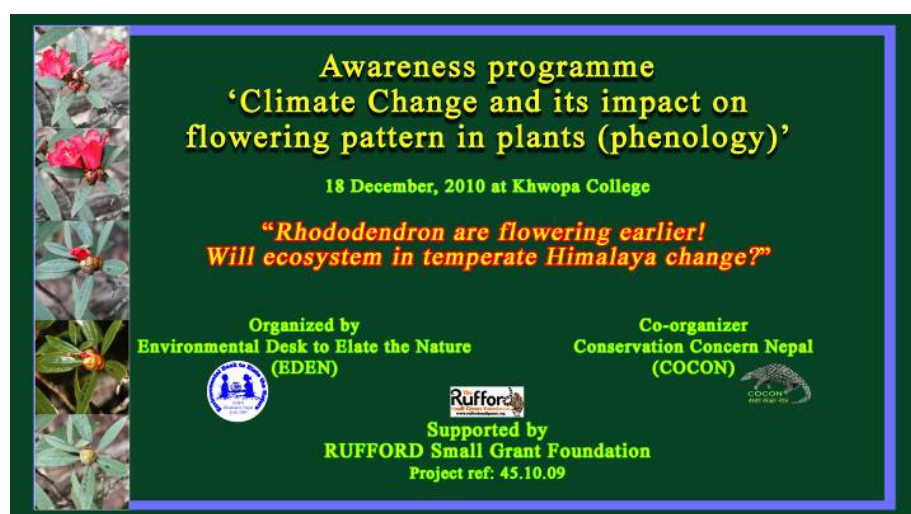
9. Looking ahead, what do you feel are the important next steps?

I have already mentioned that the phenological recordings will be used for my PhD research and this is initial stage of recording, I need to collect data for another season and correlate it with temperature anomaly. Therefore, the research will continue for another season and result will be disseminating through scientific and other popular publications. For another season I will use fund provided from ICIMOD for scientific survey.

Beside that I have initiated phenological recording with participation of eco-club at school in project site with Rufford fund and rural areas with help of Conservation Concern Nepal (COCON), non-profit organisation voluntarily working in sector of conservation education. We found potential topic to carry out further much related to current work and can use equipments we used/installed during current project period. Our team would like to apply RSGF for second grant, if applicable, after completion of the second phase of current research work in 2011/2012.

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?

RSGF logo was used on all of my presentations, posters, and my PhD progress report submitted to Chinese Academy of Sciences and presentation at Kunming Institute of Botany. Local people and staffs/rangers from conservation area knew that RSGF funded research.



Banner prepared for awareness program