# 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** | Phurpa Wangdi |
| **Project title** | Ecosystem services valuation of Community Forests of Sarpang Dzongkhag: An assessment for conservation and livelihood |
| **RSG reference** | 18514-1 |
| **Reporting period** | 12 months |
| **Amount of grant** | £4,975 |
| **Your email address** | phurpawangdi22@gmail.com |
| **Date of this report** | 25/10/2017 |

**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 |
|---|---|---|---|---|
| 1. Habitat Mapping (Based on vegetation analysis)<br>• Identification of potential site for wildlife<br>• Development of reference site<br>• Phytosociological studies<br>• Replication of habitat | | | ▮ | Identification of Potential site; The identification of potential site for wildlife in a CF was identified based on reviewing the documents filed by the Gewog Forest officials and hearing from the village. The reconnaissance survey was conducted to confirm the existence of wildlife through faecal presence and animal tracks (e.g. footprints).<br>Vegetation analysis: The reference site was developed after confirming the reference community forest (CF). The phytosociological assessment was carried out in reference CF laying the quadrats sizes of 10 x 10 m, 5 x 5 m and 1 x 1m for trees, shrubs and herbs respectively and analytical characters was computed following standard methods given by Curtis & McIntosh (1950). The Shannon-Weiner and Simpson diversity indexes of reference community is 3.56 and 27 respectively and Raunkiaer's frequency distribution is 36>9>5≠3 >0. The forest community is composed by 55 tree, 21 shrub and eight herb species.<br>Habitat Mapping; Those variables represented the reference CF as least disturbed ecology for wildlife with even distribution (abundance) of food in the entire CF showing non-localised competition for food resources. The phytosociological variables/analytical characters was also computed in the rest of the 10 CFs. Based on the analytical characters of CFs, the mapping was done looking at similarity of floral |

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| | | | | species, diversity, frequency distribution and presence of water. The research found that Tashithang, Samdrupcholing and Juenphen CFs can be replicated to reference with ecological restoration of similar floral composition. Tareythang B, Chakgari and Dangling CFs have least difference to reference CF and can host the same wildlife as confirmed in the field survey. The project recommends Tareythang B, Chakgari and Dangling CFs to keep ecologically undisturbed. Lingar, Gaden and Tirkhola CFs cannot be replicated due to nature of soil and altitude. |
| Livelihood assessment <br>• Quantitative Forest Resource Assessment <br> • Assessment of Non Wood Forest Product (Priority ranking) <br> • Economic valuation of Market Value <br> • Economic valuation of Non-Consumptive use value <br> • Volumetric analysis of water discharge | | | | Quantitative Forest resource assessment; The standing timber stock in the CFs was quantified measuring the DBH (diameter at breast height) of the trees considering the diameter greater than 3 ft (>ft), straightness and damage. The volume of timber was quantified for each tree species and later added up for all species to measure total timber volume in the CF. <br> Dungmin CF has the highest harvestable standing timber stock with total DBH of 257.78 ft$^2$ in a sampled area (21 trees species). The other CFs having reserved standing timber stock are Tareythang B (68 ft$^2$) and Tirkhola (165 ft$^2$). Samdrupcholing and Tashithang CFs have good stock of timber (*Schima wallichii* species) which are harvestable in future. Other CFs have plantation of timber species such as *Michelia champaca*, *Tectona grandis* and *Dalbergia sissoo*. <br> Assessment of Non Timber Forest Product (Priority ranking): CFMGs were interviewed for the ranking of NTFPs using five parameters; marketing demand, household benefit, availability, regeneration potential and time consumed for |

harvesting. The ranking was obtained based on consolidated scoring of priority legend; High, Medium and low.

Seven CFs have collected NTFPs (provisioning services) since CF inception. Tashithang Samdrupcholing and Tareythang B CFs should grows *Bambusa nutans* (score - 4.9/12, 10.4/42 in respective CFs) and *Thysanolaena maxima* (score - 4.1/12, 8.63/42 in respective CFs) as it will have market demand, household benefit, availability and quick regeneration potential. Villagers of Tirkhola and Chakgari should focus on fuel wood because those depend on fuel wood as main source of heating and cooking energy.

Economic valuation of Market Value: The valuation was done using environmental framework developed by De Groot et al., 2002. Although market economic value of all CFs is very less (Nu. 0.199 million/USD 30165), the suitability to grow the NTFPs is very high. For example, Samdrupcholing and Tashithang CFs can grow *Thysanolaena maxima* and *Bambusa nutans* and CFs such as Dungmin, Dangling, Chakgari, Tirkhola and Tareythang B CFs can manage for *Piper longum* collection.

Economic valuation of Non-Consumptive use value: The contingent economic value of all the community forest is Nu. 16.11 million /USD 247,846 for the period of 2016-2017. The value of forest will increase when people starts to benefit more. Therefore the current economic value can be a baseline information to see the trait of benefit of forest (increase or decrease of benefit) in following years.

Volumetric analysis of water discharge: Quantity of water

| | | | | discharge was measured using „Velocity Area Method" using floater. The total water discharge is 76.5 ft$^3$ sec$^{-1}$ for the estimated population of 1500 to cater the services of irrigation and drinking. Samdrupcholing, Dangling and Dungmin, Lingar, Juenphen, Rijug, Tirkhola CFs should maintain good green cover in the catchment area to recharge aquifer for drinking and irrigation of fields. Rijug and Samdrupcholing CFs have to take care of water source as the flow rate is minimal and consumption is higher. Tirkhola, Dangling and Dungmin CFs serve as catchment area, therefore catchment area should be maintained with good green cover. |
|---|---|---|---|---|
| Awareness campaign | | | | Awareness was raised amongst the local community about the CF and ecosystem services. The management of CF using the principle of ecosystem services approach. The distribution of pamphlets was done amongst the participants to proliferate the knowledge of ecosystem services. Positive feedback was obtained particularly on ranking of NWFP which led villagers to selectively grow the plants serving wide range of purposes. The knowledge on how CF forest benefits in aquifer recharge for irrigation and drinking water also played significant role in the campaign. The habitat mapping gave an idea to forest officials about the conservation of CFs for wildlife by knowing the degree of forest diversity requirement to host the wildlife. |

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

The unforeseen obstruction encountered was not knowing the defined boundaries of the CFs which led to difficulty in sampling within the defined area. The problem was tackled by carefully looking at colour marks and posts covered by bushes. The

signs for boundaries were rechecked with map in CF management plan book. The other obstacles were to keep safe from human-wildlife conflict (*Elephas maxima* and *Ursus thibetanus laniger* harbour in the CF) while going deep in forest to locate the sampling point. Since transect is generated randomly and making access through transect line was difficult. Beside aforementioned problems the research team did well in all other field activities.

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

i. Habitat mapping: The replication of identified reference CF to other CFs aided to conservation of IUCN red list species. The project defined the degree of diversity and frequency distribution required to host the wildlife in other degraded CFs. Analytical characters and diversity index of species enabled to know about the prerequisite requirement to harbour wildlife and directed the managers to keep habitat from anthropogenic disturbances. Replicating the habitat in other CF gave more space and food availability to animals and enabled other CFs to conserve wildlife that has not provided before. Studying the community dynamics told about bio-coenosis and helped to direct managers to restore forest similar to reference. The increase of habitat size through replication of CF helped to reduce human-wildlife conflict.

ii. Forest resource management: The productivity of CF (growing stock) was calculated and helped charting out the CF management plan through identifying the timber species and its volume to harvest keeping in balance to diversity required for wildlife. Vegetation analysis helped to add timber species in the existing timber checklist and broadened the scope of timber production in future. The density and abundance of plants with economic importance were calculated to see its potential for monetary benefit.

Economic valuation of market values showed forest productivity to generate monetary benefit besides telling whether the villagers were harvesting forest product based on quantitative value in the forest. The NTFP were identified and researched its market demand, household benefit, regeneration potential and availability. Based on these parameters, the ranking was obtained to direct the villagers focus on specific NTFP which would benefit in wide range.

iii. Awareness: Awareness on ecosystem services was raised amongst the local community about the CF and ecosystem services. The management of CF using the principle of ecosystem services approach. The distribution of pamphlets was done amongst the participants to proliferate the knowledge of ecosystem services.

The positive feedback was obtained particularly on ranking of NWFP which led villagers to selectively grow the plants serving wide range of purposes. The knowledge on how CF forest benefits in aquifer recharge for irrigation and drinking water also played significant role in the campaign. The habitat mapping gave an idea to forest officials about the conservation of CFs for wildlife by knowing the degree of forest diversity requirement to host the wildlife.

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

The project was carried with involvement of people from Community Forest Management Group and forest officials. The prime involvement were during the vegetation analysis, and questionnaire survey. The experienced local naturalists were hired to know about the properties of plants (medicinal. vegetable etc.) and filed the checklist of those plants. The villagers were informed about the existence of plants with economic importance with quantitative characters to encourage the collection of forest products. Along with questionnaire survey, villagers were informed about ecosystem services provided by the CF and role of the people to balance the conservation and resource extraction based on project finding.

Awareness workshop was carried out with the help of gewog forest official and local leader on CF and ecosystem services. The focus were on balancing the conservation and resource extraction based on ecosystem services approach. The villagers gained knowledge of NTFP management based on priority ranking, forest productivity, and importance of CF as a catchment area. Of all project findings helped in making CF management plan.

**5. Are there any plans to continue this work?**

I propose to develop a long term research and conservation program focusing on the ecosystem services approach to balance the conservation and resource extraction as per the mandate of community forestry. The management of CF following the principle of ecosystem services would be a middle path for conservation and livelihood. The future plan would be re-assessing the sampled CF again to see the achievement of previous project. The similar project will be extended, if reassessment shows successful with the improved methodology. This will benefit villagers and widen the conservation.

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

1. The project will be also published in Bhutan Ecological Society (BES).
2. Presentation will be sent to Forest Research Institute, India.
3. Presentation to local communities and forest officials.
4. Pamphlets was made and circulated to important stakeholders.

**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 grant was used for the period of 12 months (01/11/2016 - 31/10/2017), as anticipated in the project schedule.

**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 |
|---|---|---|---|---|
| Field equipment; Measuring tape, Floater, Hammer, Rope | 250 | 280 | -30 | Price of Measuring tape and Hammer was above the estimated price. |
| GPS and Camera and altimeter | 280 | 300 | -20 | GPS price was above the estimated price. |
| Safety Kit | 75 | 50 | 25 | Basic medicine were brought from hospital giving free medical services |
| Field Gear | 100 | 120 | -20 | Tents price was above the estimated price |
| Books | 20 | 15 | 5 | The book was shopped online at cheaper price by £5 |
| Stationaries | 130 | 130 | - | Not much difference was noted as estimated price |
| Printing questionnaire and Pamphlets | 200 | 150 | 50 | Some villages are exempted from questionnaire survey, therefore questionnaire were printed as per required |
| Workshop | 650 | 700 | -50 | The meal cost was higher than estimated price |
| Awareness Programme | 1600 | 1550 | 50 | The hall charges was negotiated little lesser because, the awareness programme was for good cause |
| Transportation | 300 | 350 | -50 | Commuting in monsoon season was expensive |
| Wage | 600 | 650 | -50 | Additional foresters and local experts were hired for one day. |
| Accommodation | 720 | 700 | 20 | |
| Miscellaneous | 50 | 100 | -50 | Sometime refreshments were served as a courtesy during heavy work |
| **Total** | £4,975 | £5,095 | -120 | |

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

1. Re-assessment of forest after 5 years.

2. Replicate similar project in other community forests, if previous project is successful.

3. Continuing with conservation education and awareness to relevant stakeholders based on the principle of ecosystem services approach.

**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 pamphlets, presentation and in the questionnaire. The stakeholders expressed the gratitude to the Rufford Foundation for soliciting the grant to make difference in conservation and livelihood of the rural people.

**11. Any other comments?**

Bhutan has 600 community forests to cater socio-economy benefit and reduce poverty of 70% rural people that lives below $1.25 a day. Assessment of ecosystem services of community forest provided newer dimension to look at ecological, social and economic perspectives to empower rural communities and manage forests sustainably. The result of the project; habitat mapping, quantitative measurement of forest resource and economic valuation helped the CFMG to design CF management plan based on ecosystem services approach. This benefits IUCN categorised species to have wider habitat range and food availability besides helping rural people through increased forest productivity.