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	Ichchha Thapa
Project title	Ecological exploration of endangered tree fern for community based conservation in Panchase mountain ecosystem, Nepal
RSG reference	20100-1
Reporting period	October 2016-November 2017
Amount of grant	£4960
Your email address	ichchhathapa12@gmail.com
Date of this report	October, 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
To initiate community rapport for their active participation in the project				Preliminary field visit helped us to attract the interest of communities and related stakeholders towards tree ferns, and the regular field visits and communication thereafter especially with the local leaders and civil societies helped us with their active participation in developing the community based conservation strategy for tree fern as well as generating their interest and ownership of the strategy.
To understand the status, use and associated threats of tree ferns in Panchase area via field surveys				Social survey along with direct observation helped us understand the use of tree ferns by local communities and associated threats. Similarly, forest ecological survey informed the current status of tree ferns and its habitat in Panchase Protected Forest Area. It is further intended to continuously monitor the plots with maximum number of tree fern saplings for scientific study purpose as well as it could be established as an indicator for assessing the impact of the project in future. It is expected to attract the attention of local authority and other related stakeholders by publishing our findings about status, use of tree ferns and threats for tree ferns in near future.
To explore the suitable habitat of tree ferns in Panchase Area				The mostly preferred habitats by tree ferns in the Panchase area were identified and categorised in different suitability scales by preparing tree fern habitat suitability map and interestingly landslides were observed in the field in areas where tree ferns were found thus preparation of susceptibility map which will be

				correlated with habitat suitability map to know the threats to tree fern habitat due to landslides. We are intending to publish the findings in scientific journal.
To make the local communities conscious about the tree ferns and its importance through awareness raising campaigns				Students and teachers from few local schools with important tree fern areas were trained informally on ecological monitoring, which helped in getting them close with tree ferns. An awareness raising poster was also developed focusing on tree importance, current threats, tree fern availability, suitability maps and finally what can be done for its conservation. Then, it was finally disseminated in the communities. As the tree fern had close relation in people's livelihoods so, its strict conservation would never be successful. Thus, from the post-project monitoring, the need to aware communities on wise use of tree ferns stood crucial.
To develop a Community-based tree fern conservation strategy				Keeping in mind the knowledge generated through the project, the need of a guiding tool for local stakeholders on the different initiatives required for effective conservation of tree ferns, a community-based tree fern conservation strategy for Panchase area was developed with active participation from the local stakeholders.

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

The local elections scheduled by the Government in May and June of 2017 with relative to the recent political restructuring in Nepal impacted on the smooth implementation of projects for awareness campaigns and workshops near the end of the project. The Election Commission issued an election code of conduct which entailed meetings, trainings and community events would not take place prior the election date and 1 week after it as well. Thus, we had to shift our meetings and awareness campaigns in August 2017 after the monsoon and the workshop for early September 2017.

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

Outcome 1: The habitat preference of tree ferns in Panchase area was determined

From the preliminary field visit and available secondary literature, an Aspect, Slope and Elevation (ASE) availability map was developed using statistical index method. This was a preliminary habitat suitability model from which areas with higher suitability were sampled for further studies. Higher availability of tree ferns was observed in north to east facing slopes of 40° to 60° gradients and elevation ranging from 1000 m to 1500 m above sea level.

Then, a comprehensive ecological survey was done through purposive sampling in the areas with higher suitability. We were able to record 62 mature tree ferns with and 53 saplings of tree ferns in 11 sampling plots. Plots with significant number of tree fern saplings have been marked for future monitoring the regeneration status as well as for further studies. Majority of the tree ferns were found in moist, shady and deep ravines in the banks of the streams. Few were found in open and dry places as well but were stunt in growth compared to the ones in moist and shady areas.

Major threats observed in the plots were:

1. Construction of roads and trails nearby and through its habitat affecting the proper growth and development of saplings and even lopping down of the tree fern on the way.
2. Disposal of solid wastes such as plastics, papers, bags around its habitat disturbing its natural population.
3. Logging of tree fern for fencing and haphazard cutting of its fronds for fodder for livestock result in the degradation of tree fern individuals.
4. Natural hazards like flood, landslides as one of the threats for degrading natural habitat of tree fern.

Finally, using 117 locations (where tee ferns were located either single or in groups), the GPS points marked during field visits, ecological survey and secondary data, habitat suitability maps for tree ferns in Panchase area (278 km^2) was developed. Here 88 locations were used for modelling and 29 locations were used for validation of model. The map depicted five categories of habitat suitability classes as: most suitable (10.9% of total area), more suitable (31.8%), suitable (34.3%), less suitable (20.2%) and least suitable (2.8%). The result showed 70.55% of prediction accuracy with validation of 66.75% of habitat suitability map. Thus, areas of most suitable class will be recommended for strict conservation whereas more suitable and suitable areas will be the potential areas for tree fern cultivation in the near future for its conservation.

Outcome 2: The interest of communities on tree fern conservation both at local and regional level was generated

Besides ecological survey, social and key informant surveys were also carried out, which found that majority of the respondents were found to be familiar with the tree

ferns, however they were unaware of its importance and conservation status. Communities were found following unsustainable practices using tree fern fiddlehead parts highly for food purpose followed by its fronds for fodder for livestock, very few for medicine and even logging tree fern for using its trunk as traditional gate (*tagaro*). The preference compared to other wood is due to a myth that it is resistant to decaying. Awareness level on the significance of tree ferns in terms of its ecological role that tree ferns create favourable environment for better growth of seedlings of other plant species, while in terms of ethno-botanical, economical and other indigenous respects was found very least, which showed that the communities lack strong rationale for conserving tree fern.

Based on the findings of the perception and knowledge of the communities on tree fern, we developed conservation poster and conducted five community workshops. In the workshops, there was a total 150 participants representing individuals from schools (students and teachers), youth clubs, local leaders, forest user groups, civil societies, Panchase Protected Forest Councils and newly elected local government representatives.

We disseminated the fact that the tree fern has been in existence for millions of years, even before the existence of the humans in the planet and is under protection by the national and international laws, which was very fascinating for them. We also informed about the pre-project monitoring on the current threats and issues related to tree fern and encouraged them to think on what could be done for its conservation and sustainable management.

During the workshops, the members from protected forest councils and the civil societies stressed on creating much awareness on wise use of tree fern at the local level as it will not be a good idea to completely restrict them for using tree fern parts. Until now, the Panchase Protected Forest Council does not have any specific actions focused on tree fern conservation. Although the tree fern species are protected, they admitted that the species lack enough attention from both government and non-government agencies.

Two university students were interested and were provided standard grants from the project funds to conduct their dissertation researches on tree fern for their partial fulfilment of their degrees. One undergraduate student has already defended her thesis entitled "Socio-economic uses of tree fern and threats to its habitat: A case study from Panchase Area, Nepal". While, the other graduate student has defended his thesis proposal entitled "Regeneration Status and Germination Viability of Tree Fern (*Cyathea Spinulosa* Wall Ex. Hook.) in Panchase Mountain Ecosystem, Nepal" and will begin his thesis very soon.

Outcome 3: A community based conservation strategy for tree fern in Panchase area was developed and disseminated

The main goal of the project was to bring together local communities, local authorities and experts with evidence provided by the science to develop a community based tree fern conservation strategy in Panchase Protected Forest

Nepal. The information from the field surveys, workshops and post project assessment were used and a draft strategy was designed. Then, a workshop was held in Pokhara, adjoining city to Panchase. We invited representatives from the three district chapters of the Panchase Protected Forest Council, school teachers, local leaders, forest user groups, civil societies, youth clubs, newly elected local government individuals and experts from the Tribhuvan University in order to discuss the draft strategy and receive their feedback for any revisions.

All the participants stressed on developing Panchase Protected Forest as a learning centre for tree fern and a continued annual monitoring of tree fern populations by involving the students from the local schools and colleges as a part of their extra-curricular activities. One of the school teacher also emphasised on genetic study and tissue culture of tree fern for conducting an experiment to cultivate tree fern. Representative from the Machhapuchhre Development organisation - a local NGO also suggested for the ex-situ conservation of the tree fern to be led by the Panchase Protected Forest. Local government official was highly motivated and provided commitment to use the strategy to the extent possible in order to aid in tree fern conservation in Panchase Area.

Finally, we also discussed on searching for opportunities to institutionalise the developed community based tree fern conservation strategy by the local governments so that the strategy won't be limited in the document and the goals and targets in the strategy could be achieved.

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

We involved students and teachers from the local schools in ecological monitoring of tree fern in the field, which have helped to build local capacities and created interest. We also worked with Machhapuchhre Development organization, a local NGO and youth clubs where they provided us the logistical support and involved in the community workshops, for which they received reasonable allowances. Besides, the local community based organizations have owned a community based conservation strategy for tree ferns, which they can use and propose to work for tree fern conservation with the government and non-government organizations working in the area.

5. Are there any plans to continue this work?

Yes, we plan to continue this work. This project has created a foundation by developing local interest, which is an enabling environment for future to build on the impacts with greater synergy for tree fern conservation. We can now focus on initiating efforts to institutionalise the strategy by the local and national level government. Further, we also want to educate local communities on wise use/harvest of tree fern fronds for conservation and sustainable management of tree ferns.

In the medium-term, we are looking for an attempt for tree fern cultivation, establishing nurseries and testing its viability to grow in the agricultural land. By doing this, we want to link it with the economy of the local communities as different literatures have reported the logs of cultivated tree ferns as a good substrate for orchid cultivation.

While, in the long-term, we envision expanding our research in areas documented with tree fern presence across Nepal and the Himalayas.

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

We have shared our results with the communities, schools, local government authorities and experts from the Tribhuvan University through workshops. After the finalisation of the strategy, we will provide its printed copies to the concerned stakeholders of the project area.

We are excited to share our work in "RSG Nepal Conference 2018" that is going to be held in January here in Kathmandu, Nepal.

We have been developing articles from the findings of the project about the current status, use, threats and understanding of tree fern for publishing in national newspaper and a scientific journal article on tree fern habitat modelling.

We are looking forward for the field work and findings from a dissertation research of the graduate student on regeneration status and germination viability of tree fern supported by this grant and disseminates the result to scientific community as well as in the Panchase area.

We endeavour that the knowledge from this research will provide avenue for initiating cultivation of tree fern and establishing tree fern nurseries. Also we also look forward to develop a tree fern database portal where the information about tree fern will be shared in online.

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 Rufford Foundation grant was used from the end week of October, 2016 to September, 2017.

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 £ sterling = 134.024 Nepalese Rupees (October 15, 2016)

Item	Budgeted Amount	Actual Amount	Difference	Comments
Travel	250	430	(-180)	We had to do additional two trips than planned earlier
Food and Accommodations	900	1150	(-250)	As the number of trips and number of days in trip increased, the cost of food and accommodation also increased
Equipment and Supplies/Services	520	350	170	We decided to spend less on field equipments and bought few ecological tools and gears while borrowed most of them from the University
Trainings and Workshops	2000	1965	35	We didn't provided meeting allowance to the community members instead chose to provide them with good and sufficient food
Awareness Raising Materials	600	400	200	We developed a poster for awareness raising and didn't published pamphlets as a local NGO already had a pamphlet on basic information on tree fern
Publications	520	525	(-5)	Instead of spending on publications of articles, we decided to use this fund to support dissertation grants for two students which covers their travel, food, accommodation, printing thesis and other miscellaneous costs
Expert Services	170	150	20	It included travel, food and accommodation cost of two experts from University for workshop on revising community based strategy
Total	4960	4970	(-10)	

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

The important next steps are to build on the knowledge and foster relationships that we established through this project with diverse communities.

First of all, the education to communities on different ecosystem services that tree ferns have been providing stands crucial and most importantly educating them to use tree ferns wisely for their sustainable livelihoods and the ecosystems.

Secondly, we see great opportunity in institutionalising the community based tree fern conservation strategy developed from this project at the local, federal and national level.

We also feel that if we can test cultivating tree fern, it will give a new dimension to find efforts for both conservation and economic benefits to communities for tree fern logs while also conserving orchids.

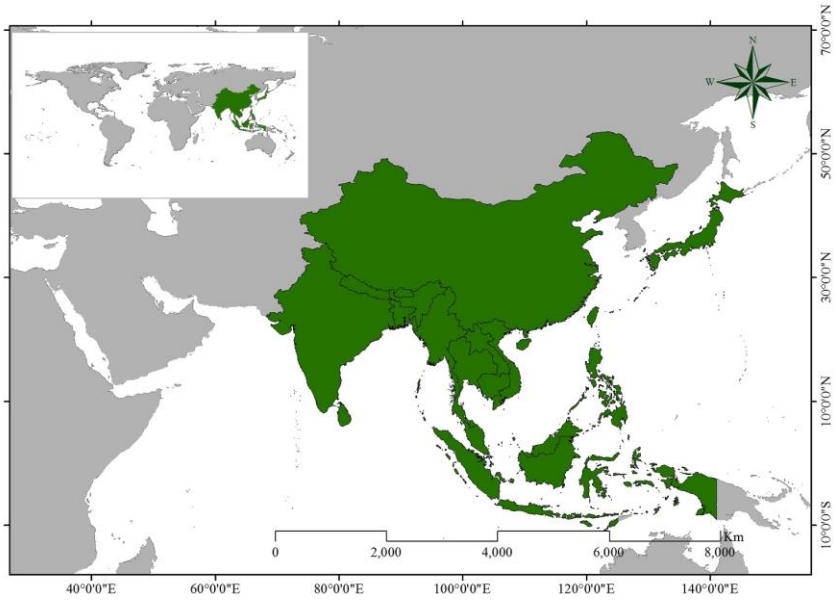
We would like to expand the research in exploring tree fern across Nepal and the region (in a long term) to contribute in filling up the large gaps in tree fern database and knowledge in Nepal and the region.

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?

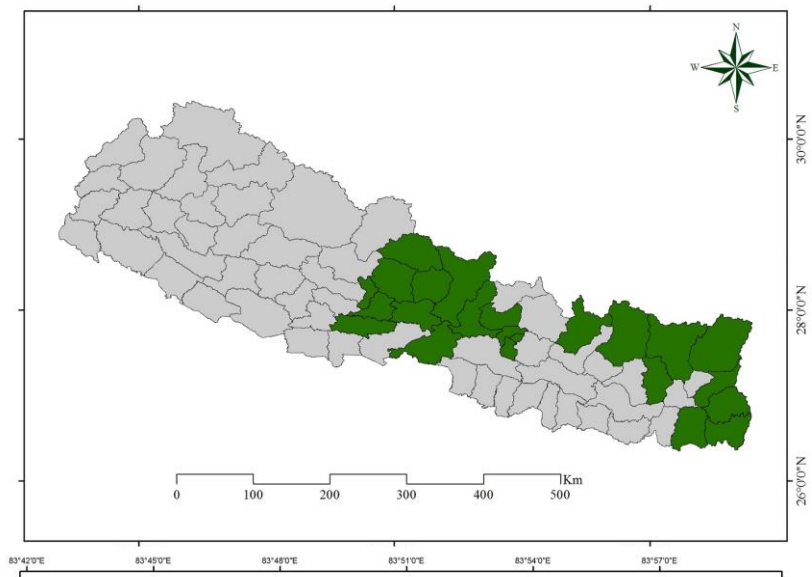
Yes, the RF logo was used in the presentations used for the workshops, conservation awareness poster and the strategy developed. The RSGF have always been acknowledged and gratified for any events that we conducted related to the project.

11. Any other comments?

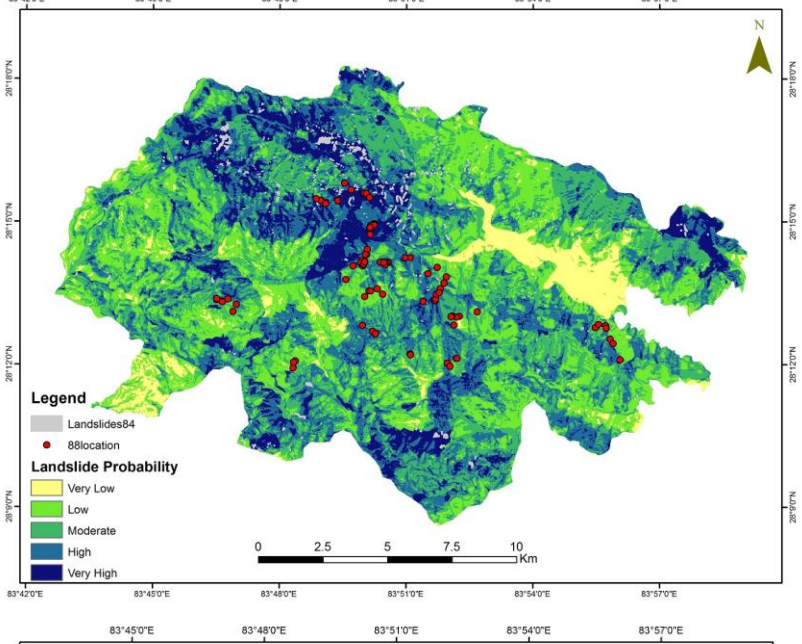
The project has been considered as an interesting project as most of the people are not familiar with the tree fern. Most of them have initial thoughts of fern growing on a tree. We are so gratified to have this opportunity provided by the Rufford Foundation to generate knowledge and interest in local communities and university students for tree fern conservation. We will definitely notify the RF and share the publications from the project. We look forward receiving support from RF to achieve our future endeavours in the conservation of the tree fern species in Nepal and the region.



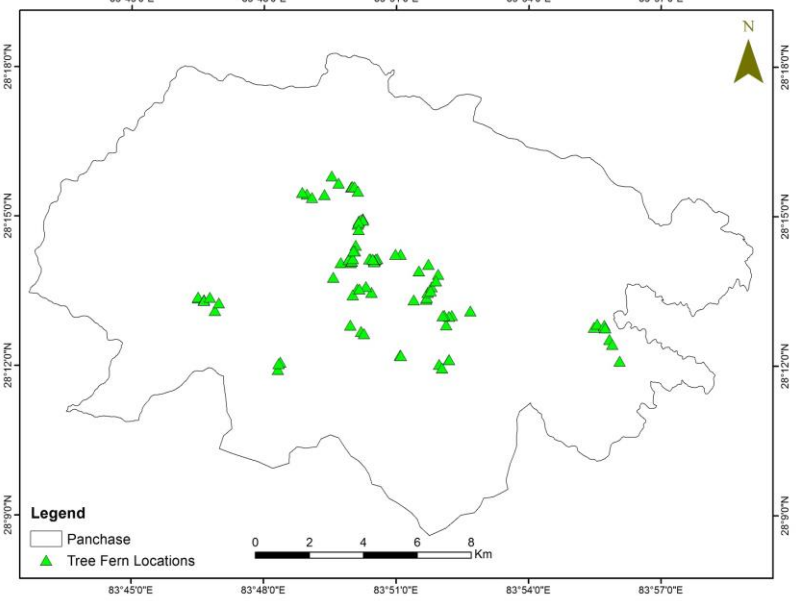
Map showing Tree Ferns Distribution in the World



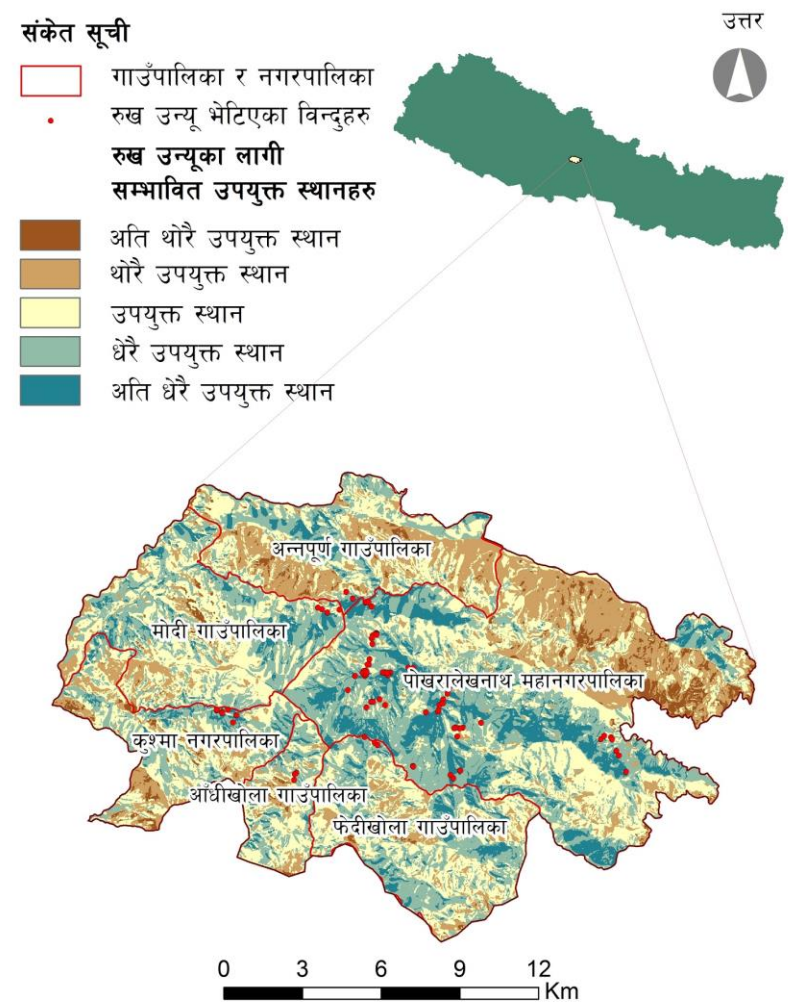
Map showing Tree Ferns Distribution in Nepal



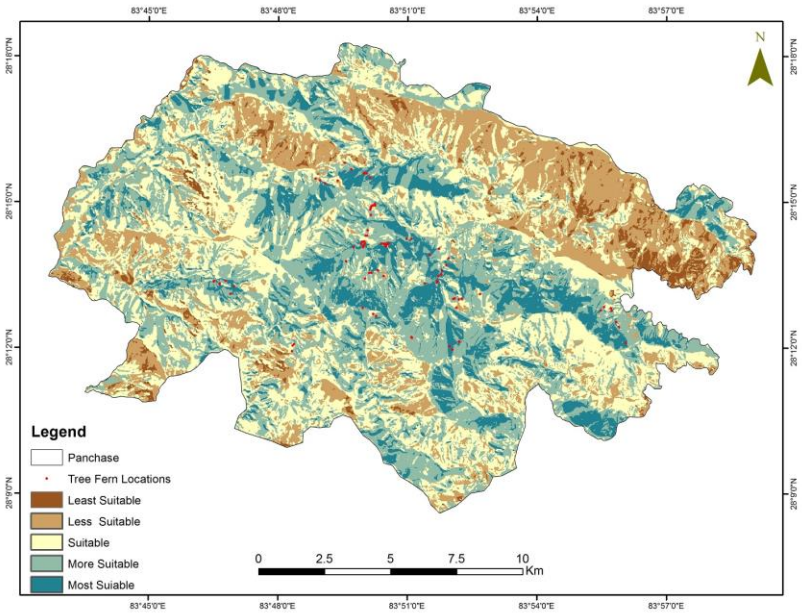
Landslides susceptibility Map with Tree Fern Locations in Panchase Area



Tree Fern Locations in Panchase Area



Tree Ferns Habitat Suitability Map for Panchase Area with index in Nepali Language



Tree Ferns Habitat Suitability Map for Panchase Area