

## 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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

Grant Recipient Details	
<b>Your name</b>	Roshani Rai
<b>Project title</b>	Documentation, promotion and awareness of vital medicinal and aromatic plant species (MAPs) of Langtang Region, Nepal.
<b>RSG reference</b>	10943-1
<b>Reporting period</b>	
<b>Amount of grant</b>	£5913
<b>Your email address</b>	Roshani53@yahoo.com
<b>Date of this report</b>	28 <sup>th</sup> September 2013

**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 identify and document the various species of MAPs in Chilime and Gatlang VDCs			*	It was successfully achieved although the result was not as encouraging from conservation point of view as most of the MAPs were disappearing and the ones available were also limited to inaccessible areas.
To calculate the distribution, frequency and coverage of the MAPs		*		Coverage of the MAPs was not calculated.
To document traditional uses of the MAPs recorded.			*	It was successfully completed.
To aware local students about the local MAPs, their traditional uses and conservation.			*	It was successfully conducted.
To aware the local community about the existing MAPs, their traditional uses and conservation.		*		Though the study was successful in educating the local people through facilitation whereas it was difficult to spread the message through poster as the poster was printed only in English. This was the main obstacle in achieving the concerning objective.
To assist artificial propagation of the vital MAPs species.		*		Most of the species were inaccessible for collection however the seeds were collected from the local people who had stored it for future usage.

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

It was realised during the course of the study that the poster should have been printed in Nepali language rather than English, which would have been easier for the local people to understand. As the poster was understood by students and other educated individuals only.

The project did not face any major difficulties however frequent transportation strikes –'Nepal Bandas' hampered the pace of the work.

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

1. A total of 51 prominent MAPs species were identified in the study area which consisted of predominantly herbs (60%), followed by shrubs, trees and climbers. These MAPs available in the area were recorded during the participatory resource mapping.

They are listed as below:

S.N.	Scientific Name	Family	Nepali Name
1	<i>Abies spectabilis</i>	Pinaceae	Thingresalla/Gobresalla
2	<i>Taxus wallichiana</i>	Taxaceae	Lothsalla
3	<i>Asparagus racemosus</i>	Liliaceae	Kurilo
4	<i>Dactylorhiza hatagirea</i>	Orchidaceae	Pachaule
5	<i>Centella asiatica</i>	Umbelliferae	Ghodtapre
6	<i>Anaphalis contorta</i>	Compositae	Bukiful
7	<i>Artemisia indica</i>	Compositae	Titepati
8	<i>Eupatorium adenophorum</i>	Asteraceae	Kalijhar, Kalo banmara
9	<i>Berberis asiatica</i>	Berberidaceae	Chutro
10	<i>Cannabis sativa</i>	Urticaceae	Ganja
11	<i>Gaultheria fragrantissima</i>	Ericaceae	Dhasingre
12	<i>Lyonia ovalifolia</i>	Ericaceae	Angeri
13	<i>Rhododendron anthopogon</i>	Ericaceae	Sunpati
14	<i>Swertia chiraita</i>	Gentianaceae	Chiraito
15	<i>Rheum australe</i>	Polygonaceae	Padamchal
16	<i>Aconitum orochryseum</i>	Ranunculaceae	Bikhuma
17	<i>Aconitum ferox/spicatum</i>	Ranunculaceae	Bikh
18	<i>Rubia manjith</i>	Rubiaceae	Majito
19	<i>Zanthoxylum armatum</i>	Rutaceae	Timur
20	<i>Bergenia ciliate</i>	Saxifragaceae	Pakhanbhed
21	<i>Neopicrorhiza scrophulariiflora</i>	Scrophulariaceae	Kutki
22	<i>Daphne retusa</i>	Thymeleaceae	Lokta
23	<i>Girardinia diversifolia</i>	Urticaceae	Allo sisnu
24	<i>Urtica dioica</i>	Urticaceae	Sisnu
25	<i>Valeriana jatamansii</i>	Valerianaceae	Sugandhwal
26	<i>Nardostachys grandiflora</i>	Valerianaceae	Jatamansi
27	<i>Acorus calamus</i>	Acoraceae	Bojho
28	<i>Amaranthus spinosus</i>	Amaranthaceae	Kande lundo
29	<i>Fraxinus floribunda</i>	Oleaceae	Lakuree
30	<i>Hippophae salciifolia</i>	Elaeagnaceae	Daale chuk
31	<i>Onychium japonicum</i>	Dennstaedtiaceae	Gajar unyu
32	<i>Vitex negundo</i>	Verbeanceae	Simali
33	<i>Zanthoxylum armatum</i>	Rutaceae	Bhale timur
34	<i>Artimesia vulgaris</i>	Asteraceae	Titepati

35	<i>Gnapahlum spp</i>	Asteraceae	Bukiful
36	<i>Juniperus indica</i>	Cupressaceae	Dhupi
37	<i>Litsea citrata</i>	Lauraceae	Siltimur
38	<i>Rhododendron arboreum</i>	Ericaceae	Gurans
39	<i>Rubia cordifolia</i>	Rubiaceae	Manjitho
40	<i>Rumex nepalensis</i>	Polygonaceae	Halhaley
41	<i>Viscum articulatum</i>	Loranthaceae	Harchur
42	<i>Xanthoxylum acanthopodium</i>	Rutaceae	Bokey timur
43	<i>Bergenia purpescens</i>	Saxifragaceae	Lek pakhanbhed
44	<i>Brassiopsis mitis</i>	Araliaceae	Chuletro
45	<i>Delphinium himalayi</i>	Ranunculaceae	Nirmasi
46	<i>Arisaema flavum</i>	Araceae	Sarpako makei
47	<i>Fritillarea cirrhosa</i>	Liliaceae	Kakoli
48	<i>Satyrium nepalense</i>	Orchidaceae	Gamdol (Tamang language)
49	<i>Taraxacum officinale</i>	Asteraceae	Tukiful
50	<i>Astilbe rivularis</i>	Saxifragaceae	Budho-okhati
51	<i>Smilax aspera</i>	Smilacaceae	Kukurdaino

Roots, rhizomes, tubers, bark, leaves, flowers, fruits, pollen, young shoots and whole plants were used to prepare different medicinal formulations, but the most frequently used plant parts were roots followed by leaves, whole plant parts and fruits. Most of the plants were collected for their underground parts i.e. roots rhizomes and tubers (41%), while some were collected for leaves (15%) and the rest for other plant parts. Most of the documented species are collected from the wild whereas very few of them like *Swertia chiraita* are cultivated. These MAPs species are used in dried and/or fresh form immediately and are also collected and stored for future use.

Most of the people participating in the interview and discussions during the study mentioned that they used the medicinal species for cough and cold, digestive problems, fever and headache, skin infection whereas they consulted with traditional healers for complex ailments such as chest pain, menstrual disorders, respiratory problems and eye problems.

On consultation with traditional healers, it was found that following species were used to treat certain ailments in their respective formulation.

S.N.	Scientific Name	Use
1	<i>Aconitum ferox/spicatum</i>	Root paste is used for joint pain, fever headache, cuts and wounds.
2	<i>Acorus calamus</i>	Rhizome is used for cough and cold and throat pain.
3	<i>Amaranthus spinosus</i>	Root paste is applied on cuts and wounds.
4	<i>Artemisia indica</i>	Leaf paste is applied on cuts and wounds.
5	<i>Asparagus racemosus</i>	Tuber paste is used for fever, stomach-ache and diarrhoea.
6	<i>Berberis asiatica</i>	Cambium paste is used for treating rheumatism.
7	<i>Berginia ciliata</i>	Whole plant juice to heal indigestion, fever and diarrhoea.
8	<i>Cannabis sativa</i>	Plant paste is used for stomach problems.

9	<i>Eupatorium adenophorum</i>	Leaf juice is used for cuts and wounds and reducing swelling in mumps.
10	<i>Fraxinus floribunda</i>	Bark infusion is used body pain.
11	<i>Hippophae salciifolia</i>	Fruit juice is used for cough, diarrhoea and menstrual disorder.
12	<i>Nardostachys grandiflora</i>	Whole plant juice is taken to treat headache and high-altitude sickness.
13	<i>Neopicrorhiza scrophilariiflora</i>	Dried rhizomes soaked overnight in water and the water used during cough, cold, dysentery, diarrhoea, headache, stomach ache, throat pain and fever.
14	<i>Onychium japonicum</i>	Used for skin problems.
15	<i>Rheum australe</i>	Root juice is taken for fever, indigestion, diarrhoea and stomachache.
16	<i>Rhododendron anthopogan</i>	Flowers are chewed for treating stomach ache.
17	<i>Rubia manjith</i>	Root paste is applied over scabies and other skin diseases.
18	<i>Swertia chiraita</i>	Whole plant juice is used to treat fever, cold and headache.
19	<i>Gaultheria fragrantissima</i>	Leaves and immature fruits are consumed to treat gastric problem. Oil from seed is massaged to get relief from body pain.
20	<i>Valeriana jatamansi</i>	Rhizome paste is applied on cuts and wounds and joint problems. It is also chewed to heal throat pain.
21	<i>Vitex negundo</i>	Seed paste is used for worms.
22	<i>Zanthoxylum armatum</i>	Fruits are crushed and taken for stomach ache and indigestion.
23	<i>Gnapahlum spp</i>	Root juice used orally in indigestion and stomach ache.
24	<i>Juniperus indica</i>	Burning scent of fruit powder is inhaled to reduce headache and blood pressure. Dried fruit powder is used with tea and milk to get relief from cough and cold in high altitude.
25	<i>Litsea citrata</i>	Dried fruits chewed during nausea.
26	<i>Rhododendron arboreum</i>	Fresh or dried petal chewed diarrhoea, blood dysentery and throat pain. Young leaves are chewed to get relief from headache.
27	<i>Rubia cordifolia</i>	Leaf and root juice used during fever, stomachache and dysentery. Root juice is applied in cuts and wounds.
28	<i>Rumex nepalensis</i>	Root paste is massaged to relieve body pain, cure scabies and on scalp to reduce hair loss. Leaf extract is used in cuts, wounds and swellings.
29	<i>Viscum articulatum</i>	Root paste is applied in fractured bones.
30	<i>Xanthoxylum acanthopodium</i>	Fruits and stem barks used in indigestion and tooth decay. Decoction of fruit juice used in cold and stomach ache.
31	<i>Brassiopsis mitis</i>	Dried roots is used orally in dysentery.
32	<i>Dactylorhiza hatagirea</i>	Rhizome paste is used in cuts and wounds.
33	<i>Abies spectabilis</i>	Leaf juice used in asthma and bronchitis.
34	<i>Taxus wallichiana</i>	Dried leaves used in asthma, bronchitis, epilepsy and headache.
35	<i>Centella asiatica</i>	Leaves ingested for urinary problem (urination stopped) and acidity.
36	<i>Girardinia diversifolia</i>	Root juice is used for treating gastritis and constipation. Juice from leaves is used headache, fever and joint pains.

37	<i>Urtica dioica</i>	Decoction of the root is taken to reduce fever. Cooked leaves are taken in case of diabetes.
38	<i>Hippophae salciifolia</i>	Ripe berries are used toothache, joint pain and menstrual disorders.
39	<i>Vitex negundo</i>	Leaf juice is used stomach ache.
40	<i>Daphne retusa</i>	Seeds are taken for stomach ache.
41	<i>Aconitum ochrochryseum</i>	Used as antidote for <i>A. ferox/spicatum</i> poisoning.
42	<i>Lyonia ovalifolia</i>	Leaves are crushed into a paste and massaged to get relief from body pain.
43	<i>Anaphalis contorta</i>	Paste made out of leaves and flower heads is used for cuts wounds and boils.
44	<i>Artemisia vulgaris</i>	Heated shoot part is placed on the affected part to treat rheumatic pain.
45	<i>Delphinium himalayi</i>	Roots are used to reduce pain, diarrhoea, fever and cough.
46	<i>Arisaema flavum</i>	Rhizome juice is used in earache and skin diseases.
47	<i>Fritillaria cirrhosa</i>	Bulbs used for relieving cough.
48	<i>Satyrium nepalense</i>	Dried tuber powder is used as an energizing tonic.
49	<i>Taraxacum officinale</i>	Root juice is taken to cure jaundice and kidney disorder.
50	<i>Astilbe rivularis</i>	Dried stem is consumed by women during pregnancy and after delivery.
51	<i>Smilax aspera</i>	Root juice is applied to cure rheumatic pain.

The information regarding the usage of such medicinal plants are limited to the traditional healers only, who do not share it with the local people as they firmly believe that the effectiveness of the medicinal value can be maintained only by maintaining its secrecy. It was also observed that the younger generation in the community are totally unaware about such traditional healthcare; they are more attracted in modern medicine. As this knowledge transferred verbally from older generation to younger generation, it is disappearing due to migration of the younger people, lack of interest and time, declining population of older generation and the effective outreach of modern health care.

The preparation methods for MAPs that are used for remedies of various ailments are as follows:

1. Paste: Fresh plant parts are crushed and used.
2. Juice: Plants parts are crushed/squeezed and filtered by clothes. In addition, water is also used for dilution.
3. Chewing: Fresh plant parts are chewed and directly ingested.
4. Infusion: Plant parts, both dried and fresh are soaked in water for a few minutes and the resulting liquid used.
5. Decoction: Plant parts are boiled in water and extract is used.
6. Powder: Plant parts are dried and ground in a mortar and used.

It was observed that MAPs were available in relatively difficult terrains such as cliffs, crevices and areas more than 500 m away from the trails. Inventory data for the MAPs species was collected during May-July 2012 conducting inventory following IUCN Guidelines. A total of 20 inventory plots were established vertically between 2000-4000 m with five horizontal plots in every rise of 500

m. Occurrence of MAPs were recorded along nested squared quadrates; 10 m x 10 m (trees), 5 m x 5 m (shrubs) and 1 m x 1 m (herbs). Each individual herb, shrub and tree MAPs species inside the quadrate were counted. Frequency and density of the MAPs trees, shrubs and herbs here studied and analyzed in their respective quadrates in each plot.

The analysis for the density and frequency were done along four altitudinal zones.

#### **Altitudinal Zone 1: 2000-2500m**

In this altitudinal range, a total of six trees, nine shrubs and 14 herbs with medicinal values were observed. The highest density (0.87 trees/100m<sup>2</sup>) and frequency (25%) was found for *Abies spectabilis*. In case of herbs, *Rumex nepalensis* presented the highest density and frequency in this range (1.13 plants/m<sup>2</sup>, 20%).

#### **Altitudinal Zone 2: 2500-3000m**

Altogether four tree species, seven shrubs and 11 herbs species were observed in this altitudinal range. *Rhododendron arboreum* had the highest density and frequency among the trees in this altitudinal range (1.10 trees/m<sup>2</sup>, 25%) Among the herbs, *Delphinium himalayi* was observed to have the highest density and frequency (0.28 plants/m<sup>2</sup>, 10%).

#### **Altitudinal Zone 3: 3000-3500m**

A total of two tree species and five herbs species with medicinal values were observed in this range. Shrubs were not observed in this range though the trees looked like shrubs as they were bushy. *Juniperus indica* presented the highest density in this range (0.35 trees/m<sup>2</sup>, 20%) whereas *Aconitum ferox/spicatum* had the highest density and frequency (0.61 plants/m<sup>2</sup>, 15%).

#### **Altitudinal Zone 4: 3500-4065m**

Only tree species, bushy and dwarf *Rhododendron anthopogan* presented the highest density and frequency in this altitudinal belt (0.25 trees/m<sup>2</sup>, 15%). Whereas three herbs species with medicinal values were observed in this range. Among these, *Aconitum ferox/spicatum* had the highest density and frequency (0.71 plants/m<sup>2</sup>, 25%).

Though the resource mapping identified and listed 51 MAPs species from the study area, only about 50% of this number was observed during the field inventory. The major reason is that the available species were found in very high and inaccessible cliffs and slopes and at least 500 m away from the trails.

2. The study area is a prime location and passage for the pastoralists, who are illiterate. They practice nomadic transhumance, with 6 months in the village and 6 months in the study area. It was found that they have been haphazardly collecting MAPs in the study area since long without replenishing it back. They collect immature plants from the local habitats and do not leave any shoots. Primarily this is done to earn cash income.

As a result, the distribution of high value MAPs that have been the primary scope of this study, were limited to very high and inaccessible cliffs and slopes. Illegal mass collection of such MAPs has resulted to exploitation from natural habitat.

According to a local herder: *'We used to easily find Pachaule in these pasture while we were kids but now it is very difficult to spot one.'*

Therefore, overharvesting of such vital MAPs should be prohibited and monitored and immediate conservation and management approaches should be followed from the government, non-government and the private sector as well. Whatsoever, serious involvement these sectors was not noted in the study area.

3. The Government of Nepal has focussed on developing hydropower project in the study region. Lower Chilime Hydropower project is already in operation whereas Mid-Chilime Hydropower Project is under construction and initial assessment for the Upper Chilime Hydropower Project has been completed. This has opened up opportunities for the local communities to work in menial construction jobs on daily wages. It was very discouraging to see that they were more interested to work in the hydropower project than establish a MAP enterprise at the household or group-level. The MAPs groups which were established for the conservation and promotion of MAPs were found to be very passive.

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

Local communities have been involved in every step of this project: local assistants were hired during the fieldwork, a small-scaled community level nursery was established for the five high value MAPs chosen as the major scope of the study, formal classes on the conservation and promotion of the high value MAPs of these region.

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

As the study revealed how any development project would drain resources and their interest from any conservation project. *What are the local communities going to do once the construction of the hydropower project is completed?* The local communities are not equipped with the skills and knowledge, which would ensure them employment post-construction. Thus in order to provide a sustainable livelihood for these communities, there is a need for more elaborate awareness activities in favour of conserving and promoting the MAPs of Langtang region.

Also, a study on the value chains of the MAPs from this region is going to be another plan to continue this work.

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

I would like to publish the findings of this study in the form of an article at the national level and/or international level.

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

The RSGF was used from June 2012 – March 2013.



**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 (1GBP=NRs 119.19)
Inventory	2286	2287	-1	
Household Survey	762	751	11	
Literature Review	42	42	0	AACD
Research Tools	8	8	0	AACD
Transportation	13	75	-62	Had to reserve 4WD vehicles
Accommodation in field	1143	1120	23	
Poster Publication	231	217	14	
Workshops	339	345	-6	
Awareness Classes	59	50	9	
Meetings and Public Relation	84	82	2	
Nursery Establishment	288	260	28	Local people donated labour
Communication	42	42	0	AACD
Report Writing	84	84	0	AACD
Principle Investigator	522	522	0	
Camping Gear	186	186	0	
Stationary	84	84	0	
Equipment	322	322	0	
<b>Total</b>	<b>6495</b> RSGF: 5913 AACD: 582	<b>6477</b> Expenses incurred from RSGF: 5895 Surplus: 18	<b>18</b>	

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

Government and non-government sector should be urged to get involved in educating the communities on conservation and promotion of the MAPs in this region. The local communities should be provided with better alternatives for sustainable income generation activities at the local level; this can be either in the forestry sector or agriculture sector and these people need to be made aware to make wise choices. People should not be lured into short term income benefits now, which will harm their future and the ecosystem as well.

**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, the RSGF logo was used in a poster that was printed for using as a medium of awareness.