

# Annual Progress Report

(2072/073 - 2015/016)



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Government of Nepal  
Ministry of Forests and Soil Conservation  
Department of Plant Resources

**National Herbarium and Plant Laboratories (NHPL)**

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2073



Secretary (MFSC), Dr. Uday Chandra Thakur, awarding the NHPL Chief on the occasion of Plant Resources Day, Chaitra 29, 2072



Flora Writing Training (Inauguration Ceremony with the DG Rajdev Prasad Yadav)



Photography Session by the DDG-Sanjeev Kumar Rai



Receiving Orchid Holotypes from Dr. Bhakta B. Raskoti



*Musa balbisiana* (Wild Banana) collected from Palpa



Maintenance of the Plant Conservation House

# CITES Listed Plants of Nepal

## Appendix I (Restricted for Trade Worldwide)



*Paphiopedilum insigne* (Wall. ex Lindl.) Pfitz.



*Paphiopedilum venustum* (Wall. ex Sims) Pfitz.

## Appendix II (Regulated Trade; Export Permit Required)



*Rauvolfia serpentina* (L.) Benth ex Kurz.



*Podophyllum hexandrum* Royle



CACTACEAE spp.



*Cyathea* spp. Wall.



CYCADACEAE spp. Giff.



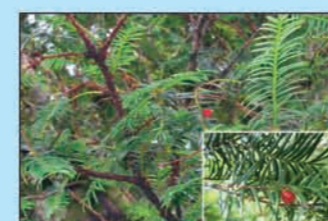
*Dioscorea deltoidea* Wall.



*Euphorbia* spp.



ORCHIDACEAE spp.



*Taxus wallichiana* Zucc.



*Nardostachys grandiflora* D.C.

## Appendix III (Regulated Trade from Nepal)



*Meconopsis regia* G. Taylor.



*Magnolia liliifera* var. *obovata* Hook.f. & Thoms



*Gnetum montanum* Markgr.



*Podocarpus neriifolius* D. Don



*Tetracentron sinensis* Oliv.

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## FOREWORD

The National Herbarium and Plant Laboratories (NHPL) has been engaged in the country wide plant exploration, description, identification, nomenclature and publication (in the form of Keys, Enumerations, Regional and Local Floras, and Fascicles) since its establishment in 1961. Additionally, it is the national pioneer institute to develop plant tissue culture protocols with sand rooting technology since 1976. It serves as a 'National Reference Centre' on scientific identification of plants that supports researchers, students and traders for both academic and judicial process. The National Herbarium has been listed and recognized internationally as KATH Herbarium in *Index Herbariorum* (IH) which is published by New York Botanical Garden, USA. Moreover, the NHPL is one of the members of Global Taxonomic Initiative (GTI) Steering Committee Nepal, 2007.

Long term research and knowledge generation is a vital element of biodiversity conservation initiatives. In this regard, one of the priority actions of the 'Nepal National Biodiversity Strategy and Action Plan: 2014-2020' aims to develop knowledge generation through '*Flora of Nepal*' publication by 2020. So, it is time to plan and implement on Human Resources Development and Management through capacity building and motivation along with modern infrastructures facilities.

It is my pleasure to publish the 'Annual Progress Report' for information dissemination as means of communication and transparency. I believe it will provide additional background for effective planning, implementation, monitoring and evaluation in the coming fiscal year.

In this connection, I would like to express my sincere thanks to Mr. Rajdev Prasad Yadav, Director General of the Department of Plant Resources (DPR), Kathmandu for guiding and supporting the program.

I would like to thank to the researchers who provided the herbarium specimens to enrich the KATH and hope this number will increase in coming days. I would like to appreciate Assistant Research Officers namely Mr. Ganga Datt Bhatt, Mr. Tirtha Raj Pandey and Mr. Dhan Raj Kandel for presenting the report on time. Similarly, I would like to thank to the chief of all sections (Hem Raj Paudel, Lilaram Tharu, Rita Chhetri, Gaurav Parmar, Rajendra Acharya, Amrit KC, Krishna Dahal and Yaksha Kumar Basnet) and all the staff of the NHPL for hard work to fulfill the program targets.

Finally, I will be grateful for your valuable feedbacks for the future improvement.

Thank you!



**Ramesh Basnet**  
Chief,  
National Herbarium and Plant Laboratories (NHPL)  
Godawari-5, Lalitpur, Nepal

**15.7.2016**

## Abbreviation and Acronyms

%	-	Percentage
APG	-	Angiosperm Phylogeny Group
asl	-	above sea level
BAP	-	Benzyl Amino Purine
CDB	-	Central Department of Botany
CITES	-	Convention on International Trade in Endangered Wild Species of Fauna and Flora
cm	-	centi metre
DDG	-	Deputy Director General
DG	-	Director General
DPR	-	Department of Plant Resources
DPRO	-	District Plant Resources Office
<i>et al.</i>	-	and others
GSPC	-	Global Strategy for Plant Conservation
GTI	-	Global Taxonomic Initiative
ID	-	Identity
KATH	-	National Herbarium, Nepal
KSL	-	Kailash Sacred Landscape
KSLCDI	-	Kailash Sacred Landscape Conservation and Development Initiative
m	-	metre
MAPs	-	Medicinal and Aromatic Plants
MFSC	-	Ministry of Forests and Soil Conservation
mol/L	-	molecules per litre
MS Excel	-	Micro Soft Excel
MS	-	Murashige and Skoog
NAA	-	Naphthalene Acetic Acid
NBG	-	National Botanical Garden
NHPL	-	National Herbarium and Plant Laboratories
NRs.	-	Nepalese Rupees
S.No.	-	Serial Number
TU	-	Tribhuvan University
UK	-	United Kingdom
UNDP	-	United Nation Development Program
USA	-	United States of America
VDC	-	Village Development Committee

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## Introduction

**The National Herbarium and Plant Laboratories (NHPL)** is situated at the base of Phulchoki Hill (85°22' 59.4" E; 27°35'38.2" N and 1515 m asl) in the South East corner of Kathmandu Valley. It was established in 1961 as a Botanical Survey and Herbarium under the Department of Medicinal Plants (DMP). Later, it was renamed as NHPL, a central level office - under the Department of Plant Resources (DPR), Ministry of Forests and Soil Conservation. The NHPL has been indexed as the 'KATH' Herbarium in 'Index Herbariorum (IH). It is the government body with a mandate of country-wide exploration, collection, scientific identification and preservation of plant specimens. Since its establishment, several plant expeditions have been conducted all over Nepal from its own capacity as well as from collaboration with foreign institutions to publish 'Nepal Flora'. It is the pioneer and largest herbarium in Nepal having more than 1,63,500 preserved specimens including 87 Type Specimens and more than 700 museum specimens. So, it has been a source of information to botanists, students, researchers, conservationists, planners and traders. Furthermore, there are over 26,500 backlog specimens waiting for identification, mounting and housing. The institute is one of the members of the Global Taxonomy Initiative (GTI) Steering Committee, 2007. It is supported by twelve technical and two administrative sections (Account and Administration) for the smooth running of its functions.

**Phanerogams Section** documents flowering plants of Nepal and publishes them in the form of different fascicles, Catalogues, local and regional floras that ultimately support the publication of Flora of Nepal. In this connection, the section organizes plant expeditions in different parts of the country to collect herbarium specimens. It has contributed in the publication of many books on Nepalese floral diversities including '*Flora of Phulchoki and Godavari (1969, 1974)*', '*Flora of Kathmandu Valley, (1986)*', '*Flora of Langtang, (1976)*', '*Phanerogams of Nepal (2001)*', '*Catalogue of Nepalese Flowering Plants Vol. I, II, III and supplement 1, (2010, 2011, 2012 and 2015 respectively)*', several fascicles, manuals and keys and so on. This section also provides plant identification services to students, researchers and other concerned people and organizations. The herbarium has adopted the classification system put forth by G. Bentham and J.D. Hooker (1862-1883) for the arrangement of its specimens.

**Cryptogams Section** conducts researches on Algae, Fungi, Lichen, Bryophytes and Pteridophytes. The Mycology unit documents fungi including mushrooms found in Nepal. It has published many books on fungi including '*Catalogue of Fungi of Nepal, 2014*', which describes 387 species. Pteridophyte unit has published two outstanding books on pteridophytes- '*Pteridophytes of Nepal (2002)*' and '*Ferns and Fern-allies of Nepal, Vol.1 (2015)*'. The latter book documents 580 taxa of pteridophytes found in Nepal.

**Economic Botany Section** documents wild plants of economic importance. It has a museum where more than 700 plants specimens of various uses have been maintained for disseminating knowledge to the visitors. Besides, it carries out economic mapping of plants and documents ethno-botanical uses of indigenous plants practiced by different ethnic groups of the country.

**Ecology and Environment Section** studies different biotic and abiotic factors that control distribution and diversity of vegetation of Nepal. It also carries out quantitative vegetation analysis in a particular area of Nepal.

**Cytology Section** facilitates the identification of plant species based on chromosome study (shape, size and number) and its karyotype analysis.

**Plant Genetic Resources Section** manages the germ plasm conservation of important species of plants. For this, *ex situ* and *in situ* collection of live plant is maintained at the conservation plots within the premises of the NHPL.



**Tissue Culture Section** has the first Tissue Culture Laboratory in Nepal which was established in 1976. Tissue culture is a tool to propagate rare and endangered plant in large scale. It is a cost effective method of rapid propagation of plant species having superior traits. This section has developed protocol of over 116 species of plants including ornamental, vegetable, tree and fruits, so far. This section has also conserved culture of some valuable plant species. This laboratory has been providing information service to the students, researchers and public regarding practical aspects of tissue culture.

**Anatomy Section** is involved in identification of plant species, detection of adulteration in wood, timber, fiber. It has so far studied the wood anatomy of more than 145 plants of the country. It provides services to different organizations and people regarding the anatomical features of wood samples for proper identification. Now, there are more than 200 wood samples and about 2700 reference slides in the wood 'Xylarium'.

**Medicinal Plant Section** documents and domesticates Medicinal and Aromatic Plant species (MAPs). It also develops agro-technology for these plants. Besides, it conducts feasibility study for their commercialization.

**Floriculture Section** develops cultivation and propagation technology of wild, native ornamental plants for commercialization. However, preference is given on the indigenous plants.

**Plant Protection Section** studies about plant diseases and their control mechanisms.

**Plant Breeding Section** has been established to increase quality and productivity of economic plants by using different plant breeding techniques such as artificial pollination, chemical treatments and radiation.

**Digitization** is the preparation of digital copies of herbarium specimens for long term conservation and utilization of herbarium. It is important to have digital copies and associated database for the establishment of online virtual herbarium that is accessible to distant users. For this, the NHPL has digitized images of more than 9000 specimen sheets with (standard colour chart having 24 colours, scale and barcode). After completion of the work, botanists or researchers may have opportunity to access our specimens from any part of the world. Besides, it will help for long term preservation of the specimens as it protects the valuable information on herbarium sheets that may be lost in the event of natural disasters (earthquakes, fire etc) and physical destruction during specimen sheet handling as well.

The **Library** is one of the best libraries in Nepal for botanical information especially for the Flora. It has a collection of 3100 books and 2100 copies of important journals.

The **Administration Section** looks after the routine works on personal administration of 43 staff. Out of them 18 are Technical Officers (Botany) belonging to 12 Sections, one Administration Officer and one Account Officer, led by Senior Research Officer (Gazetted Second Class/Technical). The financial administration is the responsibility of the Account Section.



## Summary of the Programs and Achievements

S.No.	Program/ Section	Responsible Officer	Places	Remarks/Achievements
1	Annual Report Publication	Ganga Datt Bhatt Tirtha Raj Pandey Dhan Raj Kandel	NHPL	<b>Publication and distribution to the Stakeholders</b>
2	Population Status review of Endemic Plant of Nepal	Tirtha Raj Pandey Ganga Datt Bhatt	Manang	<b>Data collection on <i>Oxytropis williamsii</i> at three localities of Manang</b>
3	Plants reported from Nepal but not deposited in Herbarium	Rita Chhetri Tirtha Raj Pandey	NHPL	<b>Phanerogams -23 species Pteridophytes – 3 species Algae – 1 (<i>Prasiola formosana</i>)</b>
4	Identification, Nomenclature and Housing of Plants	Rita Chhetri Dhan Raj Kandel Tirtha Raj Pandey	NHPL	<ul style="list-style-type: none"> <li>● Family rearranged - 51</li> <li>● Housing – 3,656 specimens</li> <li>● Sheet Repair - 55</li> <li>● Alcohol treatment - 1485</li> <li>● Data Entry - 2940</li> <li>● Poisoning - 132 cabinets</li> </ul>
5	Sorting, Mounting, Identification, Housing of Backlog specimens	Rita Chhetri	NHPL	<b>Identification of specimens up to species level – 2,413 Sorting up to the family level – 3,679 specimens</b>
6	Phanerogams	Rita Chhetri Tirtha Raj Pandey	NHPL	<b>Mounting-5,233 specimens</b> (Pteridophytes=496 Gymnosperm=84, Dicot =4083, Monocot=570) <ul style="list-style-type: none"> <li>● Labelling-707 specimens</li> <li>● Alcohol Treatment-1,485 specimens</li> <li>● Herbarium repair-55 specimens</li> <li>● Pressing and Drying-1314 specimens</li> <li>● New to Science-3 species (Holotype)</li> <li>● New to Nepal-12 species</li> <li>● New to KATH-26 species (among them 3 are Pteridophytes)</li> </ul> Wood laminated images of Luca Ghini, Carolus Linnaeus, George Bentham and Joseph Dalton Hooker at the entrance of Dicot Section
7	Digitization	Tirtha Raj Pandey	NHPL	<b>Digitization of herbarium specimens-4,025 Herbarium Barcode Tag Print-2,000</b>
8	Pteridophytes	Dhan Raj Kandel	Kaski, Mugu	<b>Collection of 49 species</b>
9	Economic Botany/Museum	Amrit K.C.	Dolakha, Kaski, Terai	<b>10 specimens</b>
10	Ecology and Environment Section	Ganga Datt Bhatt	NHPL, Langtang, Rara, Makwanpur	<b>Distribution study of <i>Urtica</i> species in Nepal Adaptation study of 7 alpine plant species</b>
11	Plant Genetic Resources	Hem Raj Paudel	NHPL, Baglung, Dolpa	<b>Germplasm conservation of two endemic species <i>Hypericum cordifolium</i> &amp; <i>Delphinium himalayai</i> Vegetation study</b>
12	Medicinal Plants	Lila Ram Tharu	Dolakha, Makwanpur	<b>10 MAPs species collected and under study for agro-technology</b>
13	Mycology	Rajendra Acharya	Bardia, Palpa	<b>73 - specimens collected</b>
14	Anatomy	Rajendra Acharya	Palpa, Mugu	<b>18 - Wood samples collected</b>
15	Tissue Culture	Gaurav Parmar	NHPL	<b><i>Dendrobium</i> species</b>
16	Spirit Collection	Amrit K.C.	Kaski, Parbat	<b>11 specimens</b>
17	Study on impacts of climate change with the helps of wood structure and wood rings	Rajendra Acharya	Dolpa	<b>Wood ring collection of <i>Juniperus</i> species</b>
18	Flora Publication Training and infrastructure development	Rita Chhetri Tirtha Raj Pandey	NHPL	<ul style="list-style-type: none"> <li>● 5-Days Training provided to 16 contributors for Nepal Flora publication</li> <li>● 10 Herbarium Collection Bags prepared</li> <li>● 300 Notebooks published</li> <li>● 40 Books Binding and Repairing</li> </ul>
19	Traditional Knowledge Documentation	Amrit K.C. Hem Raj Paudel Gaurav Parmar	Dolakha Gorkha Mustang	<b>Uses of 41, 22 and 32 species documented in the stated places respectively</b>
20	Purchase of Books	Lilaram Tharu	NHPL	

## Population Status Review of Endemic Plant of Nepal

### Introduction

Endemic plants are among the threatened groups of plants in Nepal owing to their restricted distribution and growing pressure on their habitat arising either due to anthropogenic activities or to changing climate. In this context, it is imperative to ensure their survival which demands their conservation.

Manang district is rich in terms of endemism in Nepalese flora with more than 18 species reported so far. As per the annual program 2072/073 of Phanerogams section, this field visit was carried out with the aim of studying endemic plants in their natural habitats and collection of herbarium specimens.

The specific objective of present study is to study the population status of *Oxytropis williamsii* (an endemic plant) in Manang District.

### Study Area

Present study includes the majority of Marsyangdi Valley lying within the Manang district. Collection of herbarium specimens were initiated from Chame (2664 m), which is district headquarters of Manang and continued up to Lake Tilicho, which is the highest lake in the world situated at an altitude of 5010 m. To document the data for the analysis of population status of *Oxytropis williamsii*, three experimental plots were designed at Pisang, Manang (Braga) and Khangsar Villages which are located at 3200 m, 3400 m and 3600 m altitude respectively.

### Observation & Conclusion

During the field work, sample plot of 20 x 20 m<sup>2</sup> was laid at each of the three sites and data regarding the coverage, slope, and inflorescence numbers and length were recorded and data analysis is underway.

## Herbarium specimens added as New to KATH

In 1976, *Catalogue of Nepalese Vascular Plants* was published and then four Volumes (*Catalogue of Nepalese Flowering Plants Vol-1, 2,3 and Supplement - I*) in 2010, 2011, 2012 and 2015 respectively have been published which include the brief information about collection details of Phanerogam species preserved in the Herbarium. Similarly, '*Ferns and Fern-allies of Nepal (2015)*' includes the Pteridophyte species preserved at KATH. Each year the species not listed on previous catalogues are added to the main collection, and such species are called New to KATH'. In this regard, 23 species of phanerogams and 3 species of pteridophytes are added in KATH Herbarium this year; details of which are given below:

### Pteridophytes

#### THELYPTERIDACEAE

1. *Thelypteris lebeufii* (Baker) Panigrahi  
Jhapa, Jalthal, 26°28.453'N 87°59.124'E, 90 m, T.R. Pandey, L.R. Tharu & A. KC 20156112, 25.6.2015
2. *Thelypteris rectangularis* (Zoll.) K. Iwats  
Kaski, N. side of Sarankot Hill, Pokhara, CRFJ with J.C.B.F.-J., Franco Andries & Ajay Singh 35468, 8.4.2015

### ELAPHOGLOSSACEAE

3. *Bolbitis tibetica* Ching & S. K. Wu  
Kaski, Chamere Gupha, D. R. Kandel, K. Dahal, D. Baral, Y. Acharya & S. K. Lamsal 502,  
9.11.2015, KATH

### Phanerogams

### ALISMATACEAE

4. *Caldesia parnassifolia* (L.) Parl.  
Ghoda Ghodi Lake, Kailali district, 154 m 2015.6.10 G. D. Bhatt, D. R. Kandel and M. S. Thapa  
Magar 013

### AMARYLLIDACEAE

5. *Zephyranthes citrina* Baker (New record for Nepal; pub. in *Bull. Dept. Pl. Res.* No. 38; 14-15, 2016)  
Chhatauna, Sarlahi district, 81 m, 2015.10.19, G. Parmar 20151019.

### COMPOSITAE

6. *Senecio echaetus* Y. L. Chen & K. Y. Pan (New record for Nepal; pub. in *Pleione*, 8 (2): 508-512,  
2014)  
Ghoda Tabela, Rasuwa district, 2725 m, 2011.10.12, S. Joshi SJ1955.
7. *Synotis managensis* S. Joshi, K. Shrestha & D. Bajracharya (New to Science, Pub. in *Pleione*, 7  
(2): 539-543, 2013)  
On the way to Khansar, Manang district, 3432 m, 2012.09.22, S. Joshi SJ1010 (**Holotype**).

### CYPERACEAE

8. *Schoenoplectus articulatus* (L.) Lye  
Near Puraini Tal, Banke district, 160 m, 2016.01.21, G. D. Bhatt & D. R. Kandel 20161004.

### GRAMINEAE

9. *Eragrostis cilianensis* (All.) Vign. Ex Janch. (New record for Nepal; pub. in *Bull. Dept. Pl.  
Res.* No.38; 12-13, 2016)  
Dunai, Dolpa district, 2000 m, 1982.10.03, K. R. Rajbhandari & K. J. Malla 6932.
10. *Puccinellia himalaica* Tzvel. (New record for Nepal; pub. in *J. Jap. Bot.* 90 (4), 2015)  
Jomsom, Mustang district, 2700 m, 1983.07.21, K. R. Rajbhandari 8078.

### LAMIACEAE

11. *Dracocephalum tanguticum* Maximowicz|  
Muktinath, Mustang district 3600 m, 2015.10.6 H.R. Paudel, R. Ranjitkar, P.M. Yadav and G.P.  
Gautam 015

### ORCHIDACEAE

12. *Epipogium japonicum* Makino (New Record for Nepal)  
Kuldi, Kaski district, 2300 m, 2007.10.12, B. B. Raskoti 001267.
13. *Gastrochilus nepalensis* Raskoti (New to Science)  
Deurali to Kande, Kaski district, 2350 m, 2007.03.22., B. B. Raskoti 00745 (**Holotype**).
14. *Goodyera nankoensis* Fukuyama (New Record for Nepal)  
Khoping Pokhari, Taplejung district, 2000 m, B. B. Raskoti 009123.

15. *Habenaria davidii* Franchet (New Record for Nepal)  
Way to Bhandar, Solukhumbu district, 2150 m, *B. B. Raskoti* 00756.
16. *Habenaria wolongensis* Lang (New Record for Nepal)  
Thame, Solukhumbu district, 2800 m, *B. B. Raskoti* 00987.
17. *Herminium chloranthum* Tang & Wang (New Record for Nepal)  
Jharkot, Mustang district, 3800 m, *B. B. Raskoti* 00139.
18. *Herminium kamengense* Rao (New Record for Nepal)  
Sidhuwa to Chitrye, Dhankuta district, 2200 m, *B. B. Raskoti* 00357.
19. *Herminium longilobatum* Hegde & Rao (New Record for Nepal)  
Sete, Solukhumbu district, 2500 m, *B. B. Raskoti* 01299.
20. *Liparis campylostalix* Reichenbach (New Record for Nepal)  
On the way to Bichpani, Doti district, 3000 m, *B. B. Raskoti* 008378.
21. *Odontochilus nandae* Raskoti & H. Kurzweil (New to Science)  
Panchase forest, Kaski district, 2400 m, *B. B. Raskoti* 119.
22. *Peristylus calcaratus* (Rolfe) Hu (New Record for Nepal)  
On the way to Mai Pokhari, Ilam district, 2000 m., *B. B. Raskoti* 009123.
23. *Phreatia elegans* Lindley (New Record for Nepal; Pub. in *Pleione*, 9 (2): 365-368, 2015)  
Chapakot VDC, Makwanpur, Kaski district, 1600 m, 2014.08.09, *P. Bhandari & A. Bhandari* P721.
24. *Platanthera roseotincta* (Smith) Tang & Wang (New Record for Nepal)  
Lamajura, Solukhumbu district, 3400 m, *B. B. Raskoti*.
25. *Plantanthera yadongensis* Jin & Jin (New Record for Nepal)  
Puiyan, Solukhumbu district, 2800 m, *B. B. Raskoti* 00937.

#### RANUNCULACEAE

26. *Aconitum naviculare* (Bruhl) Stapf  
Thorang Phedi, Manang district, 4450 m, 2015.09.30, *M. B. Rokaya* MF30920150002

## Management, preservation and housing of herbarium specimens

### Introduction

A herbarium is a store house of dried and pressed plants which are arranged according to any recognized system of classification and available for study or reference. Since the establishment of National Herbarium and Plant Laboratories (NHPL), it has been carrying out study, survey and collection of plants from different parts of the country. These collected plant species are dried, pressed, mounted on herbarium sheets, identified, well managed and housed in the herbarium. About 1,63,500 specimens have been housed in the herbarium and more than 20,000 specimens are to be mounted and housed. These housed herbarium specimens are permanent record of plants so these need proper and regular curation and management for longtime preservation. The National Herbarium has been carrying out regular curation activities to preserve the herbarium specimens.

## Results

- 3,160 angiosperm specimens and 496 pteridophyte specimens were housed in the herbarium.
- 1,485 mounted herbarium sheets were treated with alcohol to remove fungal infestation.
- Poisoning of stored Herbarium specimens was carried out in all the cabinets.
- Naphthalene ball pockets were kept in all cabinets of Herbarium.
- Data base entry of 2,940 herbarium specimens completed.
- Herbarium specimens of 51 families were properly reshuffled to their respective cabinets.
- 55 detached herbarium specimens were repaired and housed.
- Regular cleaning and preservation of herbarium species was done.

## Sorting and identification of the backlog specimens

### Introduction

The National Herbarium and Plant Laboratories, since its establishment in 1961, have preserved a large number of plant specimens collected from various places in Nepal. Most of them have been identified, mounted, well arranged and housed in the Herbarium. However, numbers of specimens are still waiting for identification. They are the backlog specimens in the herbarium. These specimens are valuable specimens and have to be properly sorted out and identified. These specimens after identification will be very much useful for Nepal Flora publication. Dr. Keshab Raj Rajbhandari, a senior taxonomist, was invited for this task.

### Results

A total of 3,679 specimens were sorted under 115 families and additional 1,743 specimens were identified up to species level. Moreover, 670 herbarium specimens deposited in herbarium by students were confirmed up to species level. The results are presented in Table 1:

**Table 1: List of families and number of specimens sorted and identified**

S.No.	Family	Number of Specimens sorted up to family	No. of specimens identified
1	Acanthaceae	17	2
2	Aceraceae	29	11
3	Actinidiaceae	4	3
4	Agavaceae		1
5	Alismataceae		1
6	Alangiaceae	39	
7	Amaranthaceae	8	3
8	Amaryllidaceae		2
9	Anacardiaceae	28	18
10	Annonaceae	4	
11	Apocynaceae	2	24
12	Aquoifoliaceae	58	3
13	Araceae	13	34
14	Araliaceae	102	8

15	Aristolochiaceae		20
16	Asclepiadaceae	18	
17	Asparagaceae		2
18	Balsaminaceae	9	1
19	Begoniaceae	3	
20	Berberidaceae	28	6
21	Betulaceae	40	30
22	Bignoniaceae	15	9
23	Bombacaceae		1
24	Boraginaceae	56	10
25	Bruseraceae	1	
26	Butomaceae		1
27	Buxaceae	7	1
28	Cactaceae	1	
29	Campanulaceae	18	9
30	Cannabinaceae		8
31	Cannaceae		1
32	Capparaceae		1
33	Caprifoliaceae	96	20
34	Caryophyllaceae	22	6
35	Celastraceae	40	4
36	Combretaceae	15	13
37	Compositae	103	15
38	Convolvulaceae	13	4
39	Coriariaceae	5	5
40	Cornaceae		11
41	Crassulaceae	27	2
42	Cruciferae	14	
43	Cucurbitaceae	16	
44	Cupressaceae	16	33
45	Cycadaceae		3
46	Cyperaceae	14	4
47	Daphniphyllaceae		10
48	Dioscoreaceae	2	
49	Dipsacaceae	2	2
50	Dipterocarpaceae		8
51	Ebenaceae	4	
52	Elaeagnaceae	5	8
53	Elaeocarpaceae	9	5
54	Ephedraceae	2	6
55	Ericaceae	92	295
56	Eriocaulaceae	12	
57	Euphorbiaceae	159	31
58	Fagaceae	114	169
59	Flacourtiaceae	26	10
60	Gentianaceae	83	7
61	Geraniaceae	11	

62	Gesneriaceae	48	5
63	Gramineae	9	16
64	Grossulariaceae	30	
65	Hippocastanaceae		1
66	Hydrocharitaceae	1	
67	Hydrangeaceae	47	
68	Hypericaceae	22	
69	Hypoxidaceae	1	
70	Icaciginaceae		1
71	Iridaceae		2
72	Juglandaceae	1	15
73	Juncaginaceae		5
74	Labiatae	58	23
75	Lardizabalaceae		4
76	Lauraceae	123	16
77	Lecythibiaceae		3
78	Leguminosae	250	44
79	Lentibulariaceae	3	
80	Liliaceae	57	37
81	Linaceae	1	8
82	Loranthaceae	27	1
83	Lythraceae	2	17
84	Magnoliaceae	14	14
85	Malvaceae	23	4
86	Marantaceae	1	
87	Melastomataceae	21	
88	Meliaceae	32	20
89	Menispermaceae	8	3
90	Moraceae	69	12
91	Myrsinaceae	38	15
92	Myrtaceae	17	
93	Najadaceae	4	
94	Oleaceae	18	3
95	Onagraceae	13	3
96	Orchidaceae	25	27
97	Orobanchaceae	2	
98	Oxalidaceae	1	6
99	Palmae	4	5
100	Pandanaceae		2
101	Papaveraceae	59	1
102	Pedaliaceae		4
103	Phytolacaceae		6
104	Pinaceae		49
105	Piperaceae	8	7
106	Plantaginaceae	2	



107	Polygalaceae	2	7
108	Polygonaceae	13	104
109	Pontederiaceae		1
110	Primulaceae	85	7
111	Proteaceae		13
112	Ranunculaceae	121	10
113	Rhamnaceae	30	4
114	Rosaceae	267	29
115	Rubiaceae	152	53
116	Rutaceae	58	10
117	Sabiaceae	33	
118	Salicaceae	77	11
119	Santalaceae	1	1
120	Sapindaceae	4	2
121	Sapotaceae	2	
122	Saurauiceae		17
123	Saururaceae		5
124	Saxifragaceae	34	16
125	Schisandraceae	5	11
126	Scrophulariaceae	33	9
127	Smilacaceae	17	
128	Solanaceae	21	7
129	Sonnerataceae		5
130	Stachyuraceae	4	
131	Staphyleaceae	1	
132	Sterculiaceae	7	3
133	Symplocaceae	67	1
134	Tamaricaceae		1
135	Taxaceae		20
136	Tetracentraceae	3	28
137	Theaceae	5	20
138	Thymelaeaceae	22	30
139	Tiliaceae	33	
140	Toriceliaceae		5
141	Ulmaceae	10	23
142	Umbelliferae	10	2
143	Urticaceae	43	17
144	Valerianaceae		17
145	Verbenaceae	11	4
146	Violaceae	7	2
147	Vitaceae	49	1
148	Zingiberaceae	11	3
	<b>Total</b>	<b>3679</b>	<b>1743</b>

## Flora Writing Training for Nepal Flora Contributors

### Introduction

Flora is a taxonomic treatment of plants of a given geographical area. It provides comprehensive account of information which is accumulated over time from the field, herbarium specimens and literature organized in a scientific way. The works on Nepal Flora started with the establishment of Department of Plant Resources. NHPL, one of the central offices of Department of Plant Resources is working on the exploration and documentation of plant resources of Nepal. The main activities of National Herbarium are plant collection, their identification and publication which ultimately supports for flora of Nepal publication. National Herbarium serves as an invaluable storehouse of plant specimens and reference material for flora writing.

Nepal Flora will be published in ten volumes. Out of ten volumes, Volume 3 and Companion volume had already been published. Nepal is playing a lead role for publication of Volume 10 (Part 1 & 2). To make the publication valid and justified in international scientific community, it needs train and enhance the capacity of Nepal Flora contributors. According to the Annual Program (2072/073) of National Herbarium, "Nepal flora publication and capacity building for flora writing", was organized from 2073/02/02 to 2073/02/06 (May 15-19, 2016). Both theory and practical classes were conducted during the training. The theory class aimed to provide basic and advanced knowledge of plant taxonomy and the practical classes focused on the key preparation, photography and digitization. Theory classes were conducted at NHPL whereas practical at National Botanical Garden.

The programme was inaugurated by chief guest Mr. Rajdev Prasad Yadav (DG, DPR) and chaired by Mr. Ramesh Basnet (Chief, NHPL). Similarly, Ms. Rita Chhetri, as training coordinator conducted the programme. Mr. Tirtha Raj Pandey (Asst. Research Officer, NHPL) gave welcome speech and brief introduction about the activities and schedule of the training. Then after Mr. Subash Khatri (Scientific Officer, DPR) gave remarks on the recent update of flora of Nepal activities. He also gave best wishes for the success of the training. Similarly, Mr. Rakesh Kumar Yadav (Monitoring Officer, DPR) also put his remarks. Ms. Sushma Upadhaya (DDG, DPR) also gave her remarks and best wishes for the success of training. Chief Guest Mr. Rajdev Prasad Yadav (DG, DPR) made his remarks on the program. He gave his speech about the recent activities, plan and policies over the flora of Nepal. He also gave information about the progress and financial approach made by DPR on the upcoming budget for Flora of Nepal. Finally, the concluding remark was given by Chairperson Ramesh Basnet, Chief, NHPL and the opening ceremony was concluded.

### 'Training Schedule'

#### Day: 1 (2073.2.2, Sunday)

10:30-11:00      **Registration**  
11:00-1:15      Opening Ceremony

#### Refreshment

2:00-3:30      Herbarium Preparation, Identification and Citation for Taxonomic account  
(*Prof. S. Rajbhandary*)  
3:30-5:00      Herbarium management in the context of KATH (*Chief-NHPL, R. Basnet*)

#### Day: 2 (2073.2.3, Monday)

10:00-11:30      Tips for Flora Writing (*Prof. K. K. Shrestha*)  
11:30-1:00      Application of APG Classification system in Taxonomic account (*Prof. M. Siwakoti*)

**Break**

- 2:00-3:30 Cladistic Analysis and Dendrogram (*Dr. J. P. Gajurel*)  
 3:30-5:00 Flora Description methods- Family, Genus and Species  
 (*Senior Taxonomist, Dr. K. R. Rajbhandari*)

**Day 3 (2073.2.4, Tuesday)**

- 10:00-11:30 Application of Checklist in Flora writing (*Scientific Officer, Dr. N. Joshi*)  
 11:30-1:00 Importance of Protologue and Type Specimens in Flora Writing  
 (*Associate Prof. S. Vaidya*)

**Break**

- 2:00-3:30 Best Practice in Carpological Collection and Preservation (*Prof. N. Pradhan*)  
 3:30-5:00 Biogeography of Himalayan Plants with reference to Nepal Flora Vol.10  
 (*Senior Scientist, Dr. R. C. Poudel*)

**Day 4 (2073.2.5, Wednesday)**

- 10:00-11:30 Importance of Botanical illustration in Flora Writing (*N. Joshi Pradhan*)  
 11:30-1:00 Field Visit for herbarium and data collection practically

**Break**

- 2:00-5:00 Practical Application of Digitization and Photography (*DDG-DPR, S. K. Rai*)

**Day 5 (2073.2.6, Thursday)**

- 10:00-1:00 Key preparation using Database from Excel to MS Access for Flora Writing  
 (*Dr. J. P. Gajurel*)

**Break**

- 1:00- onwards Closing Ceremony and Certificate Distribution

**Participants**

16 participants participated in the training, details are provided in the list below:

S.No.	Name	Organization
1	Ms. Rose Shrestha	Department of Plant Resources (DPR)
2	Ms. Sangeeta Swar	Department of Plant Resources (DPR)
3	Ms. Kalpana Sharma (Dhakal)	Department of Plant Resources (DPR)
4	Mr. Dipak Lamichhane	National Botanical Garden (NBG)
5	Ms. Srijana Shah	National Botanical Garden (NBG)
6	Mr. Kamal Bahadur Nepali	National Botanical Garden (NBG)
7	Mr. Madhu Shudan Thapa Magar	District Plant Resource Office (DPRO), Kailali
8	Mr. Rajesh Tamang	District Plant Resource Office (DPRO), Makawanpur
9	Mr. Ganga Datt Bhatt	National Herbarium and Plant Laboratories (NHPL)
10	Mr. Hem Raj Paudel	National Herbarium and Plant Laboratories (NHPL)
11	Ms. Rita Chhetri	National Herbarium and Plant Laboratories (NHPL)
12	Mr. Dhan Raj Kandel	National Herbarium and Plant Laboratories (NHPL)
13	Mr. Gaurav Parmar	National Herbarium and Plant Laboratories (NHPL)
14	Mr. Tirtha Raj Pandey	National Herbarium and Plant Laboratories (NHPL)
15	Mr. Rajendra Acharya	National Herbarium and Plant Laboratories (NHPL)
16	Mr. Amrit K.C.	National Herbarium and Plant Laboratories (NHPL)

## Results

Sixteen contributors contributing in Flora of Nepal Volume 10 Part 1 were participated during the training. The capacity and skill of the contributors were enhanced by the training. The knowledge and ideas of the contributors on taxonomic literatures, type specimens and protologues, different databases, keys preparation, botanical art/illustration, photography etc were revised and upgraded.

## Overview of technical sessions

### 1. Herbarium Preparation, Identification and Citation for Taxonomic account

The main objective of this session was to introduce the participants about the importance of good herbarium collection and the best techniques for the preparation of herbarium. Prof. Dr. Sangeeta Rajbhandary gave her valuable lectures related to this topic and Flora of Nepal. Plant collections are essentials for scientific research because they serve as *voucher specimens*. So, care should be taken during the collection of plants and plant parts in the field. A good-quality plant collection requires considerable advance preparation and a lot of efforts. Since one may have only one chance to collect in a particular area, so, it should be ensured that all details are followed carefully. Dr. Rajbhandary further focused upon the good collection practices, importance of photography and herbarium preparation for writing taxonomic account of flora. She also guided the participants about the ethical values to be adopted during the plant collection. Further, a brief discussion on plant collecting materials, how to write field note, field photographs, plant pressing and drying and mounting of herbarium specimens was done. She also highlighted the importance of type specimens, different databases and literatures concerned for writing flora.

### 2. Herbarium Management in context of KATH

With the objective to introduce participants about the objectives and activities of KATH, this topic was discussed in the session. The valuable lecture was given by Mr. Ramesh Basnet (Chief, NHPL).

Mr. Basnet delivered the class on the structure and function of National Herbarium to all the participants. He further presented about the recent activities and research programmes carrying out in herbarium. Once collected plant materials dried, pressed, mounted and deposited in the herbarium, the collections are referred to as *herbarium specimens*. Such herbarium specimens can be stored for many years and are source of research materials. So, the presentation focused about the importance of herbarium specimens while writing taxonomic account of different genera. He further highlighted the different publications of NHPL. He also shared information on herbarium management practices adopted by different countries, mainly Tokyo University Herbarium (TI).

### 3. Tips for Flora Writing

Prof. Dr. Krishna Kumar Shrestha highlighted the different technical aspects of flora writing and their significance in flora accounts. He also explained the pitfalls of previous accounts and measures to avoid them. Prof. Shrestha, as one of the editors for Flora of Nepal discussed about the recent updates on the activities of Volume 10. He also showed the progress of editing of manuscript submitted by the contributors. During his lecture, Prof. Shrestha emphasized the points which should be revised by the contributors in their respective manuscript. He focused his presentation about the basic rules like use of basionym, synonym, author citation etc while writing flora.

#### **4. Application of APG Classification system in Taxonomic account**

Prof. Dr. Mohan Siwakoti (Head, Central Department of Botany, TU) presented his lecture on this topic. He elaborated about the Pre-Darwinian (Carolus Linnaeus, Bentham & Hooker System), Post-Darwinian classification system (Engler & Prantl, Bessey, Takhtajan, Hutchinson etc) as well as the modern classification system (APG Classification). He further focused on the APG Classification System and its importance and application in flora writing. He described about the consequent update of APG classification system from APG I to IV.

#### **5. Cladistic Analysis and Dendrogram**

Dr. Jyoti Prasad Gajurel gave his presentation on cladistic analysis and dendrogram. A phylogenetic analysis deals with careful analysis of number and choice of character in the taxa, coding of characters in taxa, making of data matrix, analyzing the data and interpreting the results. Dr. Gajurel described about the cladistic analysis, one of the approach of phylogenetic analysis. He further presented and discussed about differences of the phenogram, dendrogram and cladogram. The procedure, method and test for cladogram were also discussed in the class. Dr. Gajurel further clarified the participants about the procedures of Cladogram Construction by demonstrating on computer based software. He also described about DIVA GIS software to make the species occurrence data and map of the specimens.

#### **6. Flora Description Methods- Family, Genus and Species**

Dr. Keshab Raj Rajbhandari gave his valuable lecture on “Flora Description Methods- Family, Genus and Species”. He suggested all the contributors and participants to go thoroughly the Flora of Nepal Guidelines which briefly give all ideas and information about writing the taxonomic account. In this class the participants put their queries about the author citation, nomenclature and their concerned literatures. Dr. Rajbhandari described about the taxonomic treatment from the rank of family, genus, species and variety. He discussed about the key preparation and informed the participants that only dichotomous bracketed keys are included for all taxa treated in Flora of Nepal. He further described that the other information such as geographical distribution, voucher specimens, flowering and fruiting time, uses and other critical notes should also included in the flora.

#### **7. Application of Checklist in Flora Writing**

The main objective of this session was to introduce the participants about the importance of checklist in flora writing. Dr. Nirmala Joshi gave her valuable lectures related to this topic and Flora of Nepal. This session was interactive and informative.

Checklist is pioneer searchable database of plants. It can also be considered as summarized list of species and basic data files of species. Dr. Joshi stressed that one should prepare the checklist before writing the taxonomic account of any group. She also described about the different types of checklist which can be followed. She also informed that good checklist includes the scientific name, author citation, basionym, synonym, vernacular names, distribution, references, images etc. Furthermore, a brief discussion on checklist preparation method was done. She also highlighted the importance of checklist for writing flora accounts.

#### **8. Importance of Protologue and Type specimens in Flora writing**

Associate Prof. Dr. Sheetal Vaidya discussed about the importance of protologue and type specimens in flora writing. She suggested to all contributors and participants to study and consult type specimens and protologue for flora description.

Dr. Vaidya delivered information on the type specimens and protologue. She also shared information how to search type specimens and their protologue on different literatures and databases. During the presentation, Dr. Vaidya emphasized practically to search about the type specimens. She also provided the link of different online databases of ancient literatures, biodiversity heritage library, Wallich Herbarium Catalogue etc. She further gave information that most of the type collections of Nepal are deposited at Kew, Edinburgh, British Museum (BM) and we are unable to study those specimens. So, to have an easy access to those specimens, there should be appointment of Liaison Officer at that herbarium that can send the images of digitized specimens.

#### 9. **Best Practice in Carpological Collection and Preservation**

The main objective of this session was to introduce the participants about the preservation techniques of flower and fruit of flowering plants as well as the lower plants e.g. bryophytes. Prof. Dr. Nirmala Pradhan (Natural History Museum, Kathmandu) outlined the different aspects of this topic in detail.

Dr. Pradhan, a Bryologist presented a brief introduction on bryophytes, their characteristic, habit and habitats. She also shared information about the bryophytes of Nepal, their distribution along the altitude and their status and diversity. She further presented the collection techniques and preservation of bryophytes. Bryophytes can be collected by dry and wet. Dry specimens are prepared for herbarium and wet collections are preserved as museum specimens which are valuable for further study. Further, she demonstrated about the techniques of preservation of lower plants like bryophytes as well as higher plants parts such as flowers, fruits which can be preserved for many years and serve as reference materials for flora study.

#### 10. **Biogeography of Himalayan plants with reference to Nepal Flora Vol. 10**

Biogeography includes studies of all patterns of geographic variations in nature from genes to entire communities and ecosystems. On this topic, Dr. Ram Chandra Poudel (Nepal Academy of Science and Technology) presented his lecture. The main objective of this class was to introduce the participants with the modern analytical system (DNA analysis, barcoding, phylogeny) related with the taxonomy.

Biogeography is interdisciplinary subject, which attempts to document and understand spatial pattern of biological diversity. He focused his presentation on role of geographic variation in climate, topography, and interactions with other organisms in limiting distribution of a species. He also gave information on various biogeographical processes which cause in the speciation and extinction of species. Dr. Poudel also highlighted evolutionary history of monocot group i.e. Acorales group as basal group and Zingiberales and Commelinales are the recent advanced group. He further elaborated the biogeographical process by giving example on the evolutionary history and distribution of *Taxus* (Himalayan yew) species in Nepal.

#### 11. **Importance of Botanical Art illustration in Flora writing**

Botanical Art and illustrations are important in flora writing. Botanical Artist Neera Joshi Pradhan gave her valuable lecture on the art, illustration and its importance. Its aim is to explain the modern taxonomic botany through the art of visually appealing scientific illustration/paintings. Ms. Pradhan described that Botanical art is a method of visual communication for education and conservation of biodiversity and it speaks hundreds of words. She presented that botanical illustration should be of same size and scale. She also discussed that if there is botanical illustration along with the description in flora it will be easier to understand and identify the species. She further presented the basic ideas to be considered in drawing.

## 12. Field Visit

A short field visit was made to the National Botanical Garden (NBG). On the occasion of Plant Conservation Day, all the participants together with resource person visited the garden and participated in plantation of rare plants within the premises of the NBG. In the mean time, all the participants also took photographs of different flowering plants, which were to be evaluated in next session.

## 13. Digitization and Photography

The main objective of this topic in the training was to introduce the participants about the importance of digitization and photography in flora writing. Related to this topic Mr. Sanjeev Kumar Rai (DDG, DPR) gave his valuable lecture.

Digitization is process of converting any information in digital format. Herbarium digitization means making digital image of herbarium which can be easily studied and examined from anywhere when they are available online. Mr. Rai focused his presentation on the importance of digitized image of herbarium specimens in flora writing. He also described about the photography and its general ideas. During collection time, not only the plant materials collected for herbarium specimens are important but also the photographs taken at field are also valuable and useful for describing the taxa. He informed about the handling techniques as well as different function of cameras which should be carefully known before taking plant photographs. The good photograph of plant also serve as voucher specimens thus care should be taken before taking photographs. In this class, all the participants did practice with their cameras along with theoretical knowledge. In the mean time, after getting theoretical knowledge on photography, all the participants took one/one photographs of plant and their photos were also evaluated by the resource person.

## 14. Key preparation using Database from Excel to MS Access for Flora Writing

Dr. Jyoti Prasad Gajurel presented the lecture upon techniques and importance of key preparation using Databases. The main objective of this class was to introduce the participants about the best and easy method to prepare key and description of the taxa.

The modern electronic data-processing techniques like MS EXCEL, MS ACCESS can be used in the storage of morphological characters, specimens examined and for other purposes. Dr. Gajurel discussed on the various methods for preparing character matrix, literature matrix, specimens examined matrix which are much important before writing the taxonomic account. He also taught the participants about the technique of preparing keys and description from character matrix. Further he demonstrated practically the computer based easier programs to make illustration from the herbarium specimens as well as preparing distribution map the species. In the mean time participants were asked to prepare keys from the character matrix prepared by them and discussions were made on the queries and difficulties faced by the participants during key preparation.

On the same day, the participants were asked to fill up the evaluation form which could be helpful in upcoming trainings and all the technical session of the training was completed.

## Closing Session

The chief guest of the closing ceremony was Mr. Sanjeev Kumar Rai (DDG, DPR) and chair person was Mr. Ramesh Basnet (Chief, NHPL). Mr. Tirtha Raj Pandey (Asst. Research Officer, NHPL) presented a brief recap of the training. Then after Ms. Kalpana Sharma Dhakal and Rajesh Tamang (Contributors/Participants) gave their remarks regarding the training. They both appreciated about the lecture topics covered during the training and shared their experience that these types of training not only refresh the knowledge of the participants but also enhance the capacity and knowledge for carrying out the taxonomic works. Further they suggested that regular evaluation and monitoring on works of contributors should be done. After that Dr. Jyoti Prasad Gajurel (Taxonomist) gave his remarks on the successful completion of the training. He further focused that these type of training are much important for the contributors. Similarly, Mr. Deepak Lamichhane (Chief, NBG) also gave his remarks highlighting on the importance and relevancy of the program. The Chief Guest Mr. Sanjeev Kumar Rai (DDG, DPR) congratulate the organizers and the participants for the successful completion of the training. He gave his speech about the recent activities, plan and policies over the flora of Nepal. He also gave information about the progress and financial approach made by DPR on the upcoming budget for Flora of Nepal. Further he also shared his experience and knowledge regarding the flora writing. Lastly, Chairperson Ramesh Basnet, Chief, NHPL concluded the program by giving vote of thanks to all for making the program a grand success and his best wishes to all the participants for completing the flora in time and the closing ceremony session was closed.

## Phanerogams Section

Phanerogams section conducts research activities mainly on flowering plants viz. Angiosperms and Gymnosperms from different parts of the country. Herbarium specimens are collected from the field, and then pressed, dried, mounted, identified and arranged according to accepted system of nomenclature. Herbariums are national treasure and reference material for plant research. About 16,35,000 herbarium specimens and 87 type specimens are arranged according to Bentham & Hooker's system of classification for family, genus and species are arranged alphabetically. There are more than 20,000 unmounted plant specimens ready for mounting and housing and previously collected plant specimens are in the process of identification, mounting and housing.

### Objectives

- Exploration, survey and collect the flowering plants all over the Nepal.
- Preparation of herbarium (pressing, drying).
- Identification, labeling and mounting of collected specimens.
- Documenting the flowering plants of Nepal in the form of fascicles or in different regional flora books.
- Provide the identification services to students, researchers and different organizations.
- Provide practical information to the students regarding plant collection herbarium preparation techniques.



## Results

S.No.	Activities	No. of Specimens	
1	Herbarium preparation (Pressing and Drying)	1,314	
2	Mounting	Total = 5,233	
	Pteridophytes		496
	Gymnosperms		84
	Dicotyledons		4083
	Monocotyledons		570
3	Label preparation	707	
4	Plant identification services		
	Researchers/Students		12
	Legal cases		14
	Traders		1
5	Briefing to Student visit	768 students	
6	Mounting of images of eminent Botanist/Taxonomist (Luca Ghini, Carolus Linnaeus, George Bentham and Joseph Dalton Hooker) at the entrance of Dicot section.	4 wood laminated images, one each of the Botanists.	



**Table: Details of herbarium specimens deposited by different researchers to KATH**

S.No.	Name of Researcher	Organization	Collection area	No. of specimens	Remarks
1	Bhakta B. Raskoti	Chinese Academy of Sciences, Beijing, China	Different parts of Nepal	16	2- New to Science (Holotypes) : <i>Gastrochilus nepalensis</i> and <i>Odontochilus nandae</i> , 10 new to Nepal
2	Kusum Gurung	Central Department of Botany, TU	Dhading, Gorkha	28	<i>Dioscorea</i> spp.
3	Dr. Maan B. Rokaya	Academy of Sciences of Czech Republic, Prague	Manang	1	<i>Aconitum naviculare</i> - New to KATH
3	Prabin Bhandari	Central Department of Botany, TU	Panchase, Kaski	260	<i>Phreatia elegans</i> , new to Nepal
4	Pratiksha Shrestha	Central Department of Botany, TU	Palpa	140	
5	Shanta Budha Magar	Central Department of Botany, TU	Jaljala, Rolpa	275	
6	Dr. Sudha Joshi	Patan M. Campus, Patandhoka, Lalitpur	Different parts of Nepal	39	<i>Synotis managensis</i> – New to Science (Holotype), <i>Senecio echaetus</i> - New record for Nepal

## Type Specimens

### Introduction

Every known plant or scientific community is known after a scientific name. For example: *Oryza sativa* L. or *Rhododendron arboreum* Smith. This scientific name based on some definite characteristics of that plant. These characteristics are describing on the basis of examination of a definite specimen of that plant available to the author who named the plant. That plant specimen is known as type specimen. Since the characteristics, which are used to recognize a particular plant by a distinct name is based on the type specimen, hence it serves as the authentic or official reference for a scientific name. All other plants, which have similar characteristics belong to the same species on the basis of their similarity with type specimen, hence it exemplifies best the discovered species. The original descriptions are prepared on the basis of examination of type specimens; hence they form the basis of original description.

Since the characters which recognize a plant are best found or retained on the type specimen, hence this specimen serve as a scientific memory for the later research. Specimen may be a dried or flattened plant specimen-a herbarium specimen; or an illustration. If the author of a plant name provides or designates a figure in the original publication, the illustration or figure becomes the type. For example: in family Liliaceae which includes large water hyacinth which are difficult to flatten in a herbarium sheet because of their fleshy nature, in such case the author may provide a figure or illustration. Categories of Type specimens while doing floristic works the following different kinds type may be found depending upon the best available specimens for original description and authentic identification:

1. **Holotype:** The specimens which is examined and use to generate original description by the author of the plant name and designated in the first publish literature in the which the plant name was published first time.
2. **Isotype:** A duplicate specimen of the holotype collected at the same time and place as of the holotype.
3. **Syntype:** Any of the two or more specimens listed in the original description of a taxon when a holotype is not designated.
4. **Lectotype:** A specimen chosen by a later researcher to serve as the type when holotype is either lost or destroyed. It is chosen from among the specimens available to original author.
5. **Topotype:** A specimen collected from the same locality as of the holotype, not necessary at the same time.
6. **Paratype:** specimen cited in the protologue that is neither the holotype nor an isotype, nor one of the syntypes if two or more specimens were simultaneously designated as types.
7. **Neotype:** A specimen chosen by later researcher to serve as a type when the entire specimen available to original author have been lost or destroyed.
8. **Epitype:** A specimen or illustration selected to serve as an interpretative type when the holotype, lectotype, or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name of a taxon. When an epitype is designated, the holotype, lectotype, or neotype that the epitype supports must be explicitly cited.

## **Uses of Type specimens**

While doing floristic works the names to a particular plant is designated on the basis of their similarity to the type of that name, hence to determine the correct application of a name, the type specimens from the best reference. If there are any differences to apply the same of a plant, the type clarifies the controversy. In floristic works there are many examples when a single taxon is designated more than one name. In this case examination of type of those names clarifies the matter.

## **How to locate the type specimens**

The first or original publication of the name includes the citation of the type specimens and where it is lodged. The Monographs of the family or genus also have a citation for the type specimens. Similarly, the revision and floras also include citation of the types. Reference to type specimens in early plant systematic literature is absent or vague. Prior to January 1958, the publication of the new name of the taxon did not require designation of type.

## **Designation of the type**

When a plant is found to be new to science, it must be validly published according to the International Code of Botanical Nomenclature (ICBN) (now called ICN) with its own new name in a scientific publication with proper designation of specimen. For proper designation, a specimen must be selected which best represents the newly described taxon among the specimens examined. The selected specimen must be designated in the first or original publication. The designation must include:

- Collection locality and collector
- Collection number
- The public herbarium where it is deposited

## **How Types are preserved?**

The international code of botanical nomenclature strongly recommends that the material on which the name of a plant is based be deposited in a public herbarium with a policy of giving bona-fide botanists open access to deposited material. The type specimens were formerly intermingled with general collection. Now days, they are kept in separate special cases to avoid unnecessary handling. It needs adequate inspection for possible insect and fungal infestation.

- The type specimen sheet must be placed within a protective cover.
- The type specimen should be given benefit of the most protective housing available, preferably in a fireproof structure with metal cabinets.
- Type must not be sent on loan to other institutions/botanists.

## **Values of type specimens**

Type specimens are unique (original description for authentic identification) and there is only one type (holotype) for each species in the whole world. Type specimen is the only definitive reference material, which decides the species. Type specimens are permanent records of a species for future references. Type specimens are most essential material to be observed while making taxonomic studies, e.g. monographs, revisions and floras. Realizing the great importance of Herbarium, some of the herbaria of the world are mainly built to keep, preserve and make access to researchers for the study of Type Specimen to trace their phylogeny and establish relationship for further strengthening the system of classification or revise them based on strong foundation. Most famous type specimen rich herbaria of the world are Herbarium of Linnaeus of London (UK) and De Candolle Herbarium of Geneva, Switzerland (Acharya and Subedi, 2005).

## List of Type specimens preserved in the KATH

### ACANTHACEAE

1. **Justicia tukuchensis** V. A. W. Graham (isotype).
2. **Strobilanthes angustifrons** C. B. Clarke (isotype of *Goldfussia acuminata*).
3. **Strobilanthes bheriensis** (Shakya) J. R. I. Wood (isotype of *Dossifluga bheriensis*).
4. **Strobilanthes cuneata** (Shakya) J. R. I. Wood (isotype of *Dossifluga cuneata*).
5. **Thunbergia nepalensis** Bh. Adhikari & J. R. I. Wood (isotype).

### BEGONIACEAE

6. **Begonia flagellaris** H. Hara (isotype).
7. **Begonia minicarpa** H. Hara (isotype).

### BERBERIDACEAE

8. **Berberis karnaliensis** Bh. Adhikari (isotype).

### CARYOPHYLLACEAE

9. **Arenaria mukerjeeana** (Majumdar) H. Hara (isotype of *Stellaria mukerjeeana*).
10. **Silene davidlongii** Rajbh. & Mitsuo Suzuki in J. Jap. Bot. 82: 276, f. 3-4 (2007 (isotype)).

### COMPOSITAE

11. **Artemisia mustangensis** Yonek. (paratype).
12. **Synotis managensis** S. Joshi, K. Shrestha & D. Bajracharya (holotype)

### CRASSULACEAE

13. **Rosularia marnieri** (R.-Hamet ex H. Ohba) H. Ohba (isotype of *Sedum marnieri*).

### CRUCIFERAE

14. **Desideria haranensis** Al-Shehbaz (isotype of *Ermaniopsis pumila*).

### CYPERACEAE

15. **Carex hemineuros** T. Koyama (isotype).
16. **Kobresia esbirajbhandarii** Rajbh. & H. Ohba (isotype).
17. **Kobresia harae** Rajbh. & H. Ohba (isotype).
18. **Kobresia kanaii** Rajbh. & H. Ohba (isotype).
19. **Kobresia mallae** Rajbh. & H. Ohba (isotype).

### ELAEAGNACEAE

20. **Elaeagnus kanaii** Momiy (isotype).

### ERIOCAULACEAE

21. **Eriocaulon staintonii** Satake (isotype).

### EUPHORBIACEAE

22. **Baliospermum calycinum** Muell.-Arg. var. **nepalense** (Hurus. & Ya. Tanaka) Chakrab. & N. P. Balakr. (isotype).
23. **Euphorbia pseudosikkimensis** (Hurusawa & Ya. Tanaka) Radcliffe-Smith (paratype of *Tithymalus pseudosikkimensis*).
24. **Mallotus bicarpellatus** T. Kuros. (isotype).

#### GENTIANACEAE

25. *Gentianella lowndesii* H. Sm. (isotype).
26. *Lomatogonium micranthum* H. Sm. (isotype).

#### GRAMINEAE

27. *Himalayacalamus brevinodus* C. M. A. Stapleton (isotype).
28. *Himalayacalamus porcatus* C. M. A. Stapleton (isotype).
29. *Poa harae* Rajbh. (isotype).
30. *Poa hideaki-ohbae* Rajbh. (holotype).
31. *Poa kanaii* Rajbh. (isotype).
32. *Poa mustangensis* Rajbh. (isotype).
33. *Thamnocalamus spathiflorus* (Trin.) Munro subsp. **nepalensis** Stapleton (isotype).

#### IRIDACEAE

34. *Iris staintonii* H. Hara (isotype).

#### JUNCACEAE

35. *Juncus biglumoides* H. Hara (isotype).
36. *Juncus ganeshii* Miyam. & H. Ohba (isotype).
37. *Juncus nepalicus* Miyam. & H. Ohba (isotype).

#### LABIATAE

38. *Isodon dhankutanus* Murata (isotype).
39. *Salvia transhimalaica* Yonek. (paratype).

#### LEGUMINOSAE

40. *Astragalus langtangensis* Podlech (isotype).

#### ONAGRACEAE

41. *Epilobium wallichianum* Hausskn. (isostype of *Epilobium sykesii*).
42. *Epilobium williamsii* Raven (isotype of *Epilobium squamosum*).

#### ORCHIDACEAE

43. *Bhutanthera fimbriata* B. B. Raskoti (holotype).
44. *Bulbophyllum nepalense* Raskoti & Ale (holotype).
45. *Eria annapurnensis* L. R. Shakya & M. R. Shrestha (holotype).
46. *Eria baniaii* Bajracharya, Shakya and Chettri (isotype).
47. *Eria nepalensis* D. M. Bajracharya & K. K. Shrestha (holotype).
48. *Eria pokharensis* Bajracharya, Subedi and Shrestha (holotype).
49. *Gastrochilus calceolaris* (Buch.-Ham. ex Sm.) D. Don var. **biflora** L. R. Shakya & M. R. Shrestha (holotype).
50. *Gastrochilus nepalensis* Raskoti (holotype)
51. *Herminium hongdeyanii* Raskoti (holotype).
52. *Liparis langtangensis* B. B. Raskoti & Ale (holotype).
53. *Malaxis delpensis* M. R. Shrestha, L. R. Shakya and S. K. Ghimire (holotype).
54. *Neottia chandrae* B. B. Raskoti, J. J. Wood & Rita Ale (holotype).
55. *Oberonia nepalensis* Shakya & R. P. Chaudhary (holotype).
56. *Odontochilus nandae* Raskoti & H. Kurzweil (holotype)
57. *Sunipia nepalensis* B. B. Raskoti & R. Ale (holotype).

**OROBANCHACEAE**

- 58. *Pedicularis annapurnensis* T. Yamaz. (isotype).
- 59. *Pedicularis chamissonoides* T. Yamaz. (isotype).
- 60. *Pedicularis muguensis* T. Yamaz. (paratype).
- 61. *Pedicularis terrenoflora* T. Yamaz (isotype).

**PAPAVERACEAE**

- 62. *Corydalis spicata* Liden (isotype).
- 63. *Corydalis stipulata* Liden (isotype).
- 64. *Corydalis terracina* Liden (isotype).
- 65. *Meconopsis automnalis* P.Egan (Isotype)
- 66. *Meconopsis chankheliensis* Grey-Wilson (isotype).
- 67. *Meconopsis manasluensis* P. A. Egan (isotype).
- 68. *Meconopsis staintonii* Grey-Wilson (isotype).

**POLYGONACEAE**

- 69. *Bistorta jaljalensis* H. Ohba & S. Akiyama (isotype).
- 70. *Bistorta sherei* H. Ohba & S. Akiyama (isotype).
- 71. *Fallopia filipes* (H. Hara) Holub (isotype of *Bilderdykia filipes*).

**RANUNCULACEAE**

- 72. *Aconitum tabatae* Tamura (isotype).
- 73. *Adonis nepalensis* Sim. (isotype).
- 74. *Anemone obtusiloba* D. Don var. **leiocarpa** Tamura (isotype).
- 75. *Clematis orientalis* L. var. **uniflora** Tamura (isotype).
- 76. *Clematis phlebantha* L. H. J. Williams (isotype).

**RHAMNACEAE**

- 77. *Ziziphus budhensis* Bhattarai & M. L. Pathak (holotype and isotype).

**ROSACEAE**

- 78. *Geum elatum* Wall. ex G. Don forma **rubrum** Ludlow (isotype).
- 79. *Potentilla peduncularis* D.Don var. **ganeshii** H.Ikeda & H.Ohba (isotype).
- 80. *Prunus taplejungnica* H. Ohba & S. Akiyama (isotype).

**RUBIACEAE**

- 81. *Galium hirtiflorum* Requier ex DC Var. **hirsutum** T. Yamaz (isotype).

**UMBELLIFERAE**

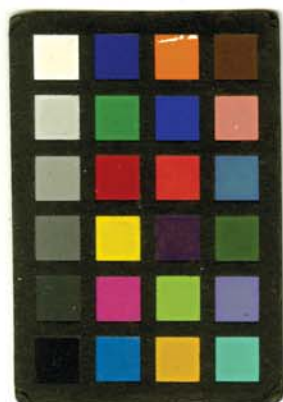
- 82. *Lalldhowjia pastinacifolia* Pimenov & Kljuykov (isotype).
- 83. *Orecome involucellata* Pimenov & Kljuykov (isotype).
- 84. *Sinocarum staintonianum* P. K. Mukh. ex Farille & Lachard (isotype).
- 85. *Vicatia nepalensis* Kljuykov (isotype).

**URTICACEAE**

- 86. *Boehmeria densiflora* Hook. & Arn. var. **intermedia** N. Acharya & Yonek. (isotype).

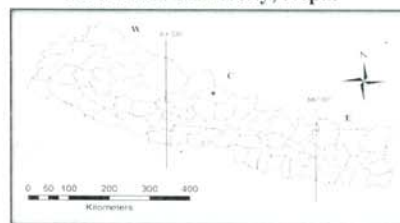
**VITACEAE**

- 87. *Amplecissus rugosa* (Wall.) Planch. (isotype of *Vitis rugosa*)



Type Specimen  
**Holotype**

Central Department of Botany  
Tribhuvan University, Nepal



Collection No.: SJ1010      Date: September 22, 2012  
 Botanical Name: *Synotis managensis* S.Joshi, K.Shrestha & D.Bajracharya  
 Family: Asteraceae      Local Name:  
 Locality: On the way to Khansar      District: Manang  
 Lat/Long: 28°38'15.6"N / 84°05'29.6"E      Altitude: 3432 m  
 Habit/Habitat: Undershrub on the crevices of rocks in north facing moist areas .  
 Remarks: Leaf sessile, abaxial surface of leaf white tomentose; capitula lax, yellow; ray florets 5 – 7, but usually 5; disc florets many; less frequent.  
 Collector: Sudha Joshi  
 Det.: Sudha Joshi ..... Date:





1. Habit sketch *Ampelocissus rugosa*  
 2. flower 4. Stamens with ovary 6. Fruit 1. cross section of fruit.  
 3. Bud 5. Petal

\**Ampelocissus rugosa* (Wall.) Planch. (Isotype of *Vitis rugosa* Wall.) was collected in between 1818-1820.

Illustration by – Neera Joshi Pradhan @ 2016



## Digitization of herbarium specimens preserved in the KATH

Digitization is the ongoing program of National Herbarium which includes the scanning of specimens with 'Herbscan' along with their database entry. Each of such digitized specimens bears unique barcode number for their quick reference. Under the program, 4,025 herbarium specimens were scanned, databased and stored in digital storage devices. The annual target of digitization for the fiscal year, was 4,000 specimens. Apart from this, 2,000 Barcode numbers were printed for the first time in Nepal in this year.

### Kailash Sacred Landscape Conservation and Development Initiative (KSLCDI) Program

Under the Program, NHPL was mandated to carry out 'Identification and digitization of herbarium specimens collected from KSL'. Following is the summary of activities carried out so far:

1. Procurement of a Full frame DSLR Camera (Canon 6D) for digitization of herbarium specimens.
2. Procurement of a hard disk drive to store the digitized images.
3. Herbarium collection from Baitadi and Darchula district.

After the completion of field work in Bajhang and Humla, the herbarium specimens will be digitized and a report including the images will be published within 2016. The annual budget was NRs. Five Lakhs only.



## Pteridophyte Studies

### An Account of Pteridophytes from Kaski District, Central Nepal

#### Introduction

Pteridophytes (ferns and fern allies) are non-flowering vascular plants. The distribution of ferns varies according to altitude, moisture, terrain etc. Certain species are found only in the Terai lowlands and many more flourish in the mid-Himalaya (Fleming, 1984). The diversity and density of pteridophytes generally decreases from east to west along the length of Nepal (Thapa, 2002). The total number of species and subspecies of pteridophytes known from Nepal is 580 (550 species plus an extra 30 subspecies) (Fraser-Jenkins *et al.*, 2015).

Documentation of the pteridophytic flora of particular districts is essential for a fuller understanding of the distribution of species and the composition of the flora. Phuyal *et al.* (2011) documented the pteridophytic flora of Makawanpur district and Pathak *et al.* (2012) listed 133 pteridophytes from Sankhuwasabha district. Documentation of the pteridophytic flora of other districts of Nepal is much needed. Previous studies in Nepal have focused only on pteridophytes of ethnological or medicinal value. The aim of the present work is to document the pteridophytic flora of Kaski district.

Fern specimens were collected from several forest areas of Kaski in November 2015 and herbarium specimens were prepared. These were accurately identified from their morphological characters. Additional literature we have consulted include Beddome (1892), Iwatsuki (1988), Thapa (2002), Gurung (1984, 1991), Khullar (1994, 2000), Fraser-Jenkins (2008, 2010a, 2013), Fraser-Jenkins *et al.* (2015) and Kramer & Green (1990). All herbarium specimens were deposited at the National Herbarium (KATH), Godawari, Nepal.

#### Results

Forty one species of pteridophytes were collected from Begnas Lake, Rani Ban, Panchase, Phewa, Mahendra Gupha and Chamere Gupha area of Kaski district (Table 1). Collection of *Bolbitis tibetica* is a major achievement of this field study. Likewise, *Huperzia phlegmaria* was collected from Kaski for KATH Herbarium; this is a very rare species of Nepal.

**Table 1 : Pteridophytes of Kaski**

Collection No.	Name	Family
201	<i>Lycopodiella cernua</i> (L.) Pic.Serm.	Lycopodiaceae
202	<i>Thelypteris lakhimpurensis</i> (Rosenst.) K. Iwats.	Thelypteridaceae
203	<i>Dicranopteris X nepalensis</i> Fraser-Jenk.	Gleicheniaceae
204	<i>Phymatosorus cuspidatus</i> (D.Don) Pic.Serm.	Polypodiaceae
205	<i>Thelypteris glanduligera</i> (Kunze) Ching	Thelypteridaceae
206	<i>Pteris alata</i> Lam.	Pteridaceae
207	<i>Pyrrosia lanceolata</i> (L.) Fraw.	Polypodiaceae
208	<i>Blechnum orientale</i> L.	Blechnaceae
209	<i>Microlepia rhomboidea</i> (Wall. ex Kunze) Prantl	Dennstaedtiaceae
210	<i>Bolbitis heterocliata</i> (C.Presl) Ching	Elaphoglossaceae
211	<i>Hypolepis polypodioides</i> (Blume) Hook.	Dennstaedtiaceae
212	<i>Huperzia squarrosa</i> (G.Forst.) Trevis	Lycopodiaceae
213	<i>Thelypteris clarkei</i> (Bedd.) C.F. Reed	Thelypteridaceae
301	<i>Lycopodium japonicum</i> Thunb.	Lycopodiaceae
303	<i>Dennstaedtia zeylanica</i> (Sw.) Zink. ex Fraser-Jenk. & Kandel	Dennstaedtiaceae

304	<i>Lepisorus sublinearis</i> (Baker ex Takeda) Ching	Polypodiaceae
306	<i>Oleandra wallichii</i> (Hook.) C.Presl	Oleandraceae
307	<i>Huperzia hamiltonii</i> (Spreng.) Trevis.	Lycopodiaceae
308	<i>Vittaria flexuosa</i> Fee	Vittariaceae
309	<i>Aleuritopteris subdimorpha</i> (C.B. Clarke & Baker) Fraser-Jenk.	Pteridaceae
310	<i>Oleandra pistillaris</i> (Sw.) C.Chr.	Oleandraceae
312	<i>Lycopodiella cernua</i> (L.) Pic. Serm.	Lycopodiaceae
313	<i>Asplenium yoshinagae</i> Makino subsp. <i>indicum</i>	Aspleniaceae
314	<i>Selaginella bisulcata</i> Spring	Selaginellaceae
315	<i>Peranema cyatheoides</i> D. Don	Dryopteridaceae
316	<i>Athyrium distans</i> (D.Don) T. Moore	Woodsiaceae
317	<i>Dicranopteris taiwanensis</i> Ching & P.S. Chiu	Gleicheniaceae
318	<i>Thelypteris microstegia</i> subsp. <i>laterepens</i>	Thelypteridaceae
319	<i>Thelypteris cana</i> (J.Sm.) Ching	Thelypteridaceae
320	<i>Onychium lucidum</i> (D.Don) Spreng	Pteridaceae
321	<i>Arthromeris wallichiana</i> (Spreng.) Ching	Polypodiaceae
322	<i>Huperzia pulcherrima</i> (Wall ex Hook. & Grev.) Pic. Serm. f. <i>subulifolia</i>	Lycopodiaceae
323	<i>Elaphoglossum marginatum</i> T. Moore	Elaphoglossaceae
325	<i>Selaginella involvens</i> (Sw.) Spring	Selaginellaceae
327	<i>Lepisorus loriformis</i> (Wall. ex Mett.) Ching	Polypodiaceae
328	<i>Asplenium ensiforme</i> Wall. ex Hook.	Aspleniaceae
329	<i>Trichomanes latealatum</i> (Bosch) Copel	Hymenophyllaceae
331	<i>Tomophyllum donianum</i> (Spreng.) Fraser-Jenk. & Parris	Grammitidaceae
401	<i>Oleandra undulate</i> (Willd.) Ching	Oleandraceae
402	<i>Thelypteris lakhimpurensis</i> (Rosenst.) K. Iwats	Thelypteridaceae
501	<i>Deparia petersenii</i> (Kunze) M.Kato subsp. <i>petersenii</i>	Woodsiaceae
502	<i>Bolbitis tibetica</i> Ching & S.K. Wu	Elaphoglossaceae
504	<i>Huperzia phlegmaria</i> (L.) Rothm.	Lycopodiaceae
505	<i>Pyrrhosia lanceolata</i> (L.) Farw.	Polypodiaceae

Note: (Collection No 201-213 from Begnas, 301-331 from Panchase, 401-402 from Raniban, 501 from Mahendra Gupha, 502 from Chamere Gupha, 504-505 from Phewa)

## Documentation of Pteridophytes from Surrounding of Rara Wetland, Mugu, West Nepal

### Introduction

Pteridophytes are spore bearing vascular cryptogams. People of Nepal use several ferns as a vegetable or medicinally (Manandhar 2002, Rajbhandari 2002, Baral & Kurmi 2006). A few ferns are also of commercial importance, for example fronds of *Nephrolepis cordifolia* (L.) C.Presl are sold as ornamental foliage in markets and florists in Nepal.

Several authors have documented pteridophytes from eastern and central Nepal (Thapa 2000, Phuyal *et al.* 2011, Pathak *et al.* 2012). For example, Thapa (2000) documented 79 pteridophyte species from Milke - Jaljale area, east Nepal. But few studies have been conducted to document pteridophytes of western Nepal. Kandel & Pathak (2013) listed 25 pteridophytes species from Pyuthan district, West Nepal.

This paper is aimed at listing pteridophytes of Rara wetland, West Nepal.

The field work was conducted in January 2016. Pteridophytes specimens were collected in the vicinity of Rara wetland, Mugu. The altitude of this wetland is about 3000 m. The specimens collected were identified with the help of literature. These specimens were deposited at KATH herbarium, Godawari, Lalitpur. The

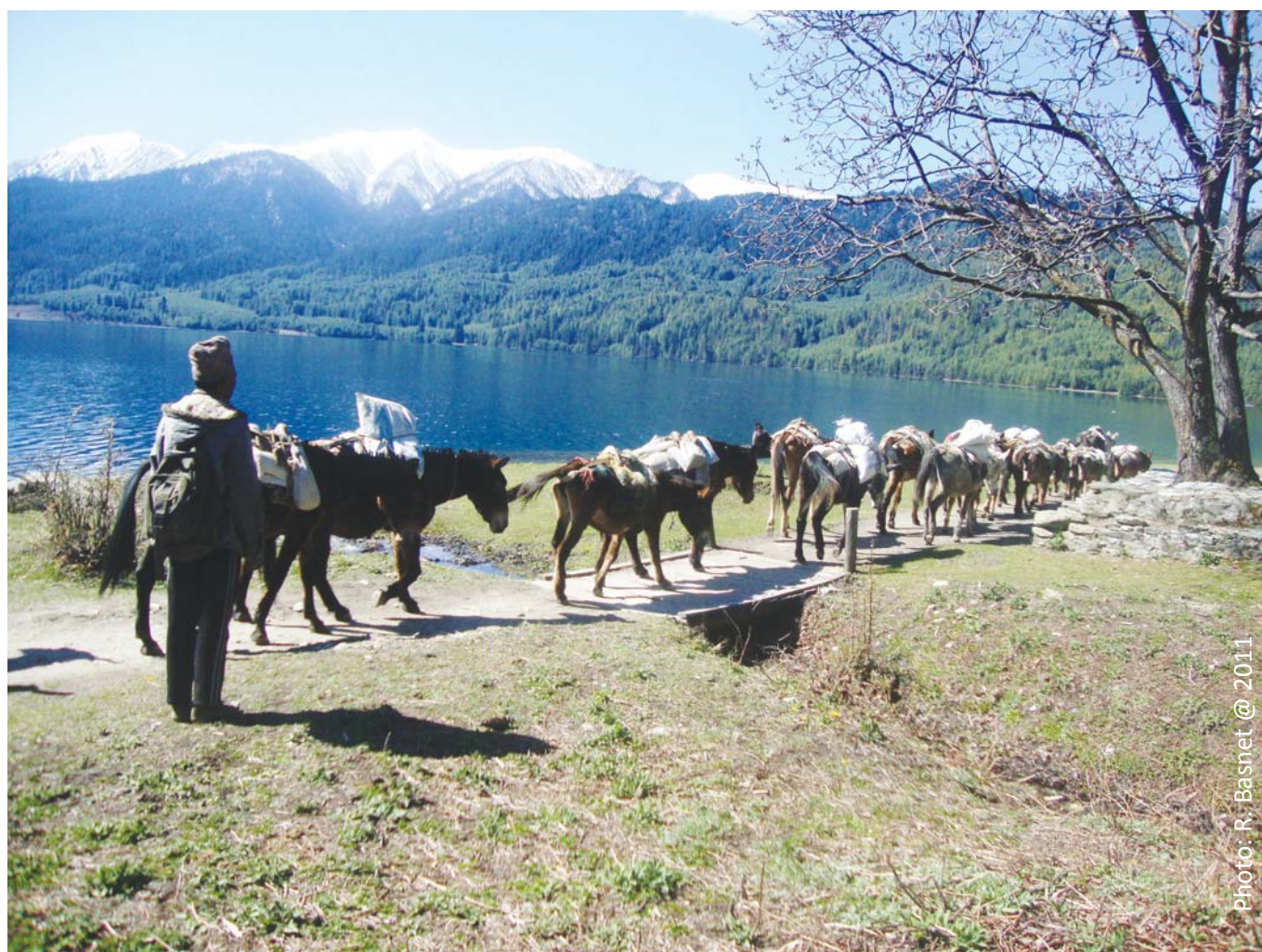
classification and nomenclature employed is according to Fraser-Jenkins *et al.* (2015). Herbarium specimens collected in Rara Wetland by other workers housed in KATH and other herbaria were also included in the species-list given below.

## Results

**Table 1 : List of Pteridophytes found near Rara Wetland, Hutu, Mugu, West Nepal**

[Collectors: D.R. Kandel & G.D. Bhatt]

Coll. No.	Scientific Name	Family	No of Specimens
201621	<i>Notholaena marantae</i> (L.) R. Br.	Pteridaceae	3
201622	<i>Drynaria mollis</i> Bedd.	Polypodiaceae	3
201623	<i>Lepisorus thunbergianus</i> (Kaulf.) Ching	Polypodiaceae	1
201624	<i>Dryopteris chrysocoma</i> (Christ.) C.Chr.	Dryopteridaceae	2
201625	<i>Pteridium revolutum</i> (Blume) Nakai	Dennstaedtiaceae	1
201626	<i>Cheilanthes subvillosa</i> Hook.	Pteridaceae	1
201627	<i>Dryopteris sublacera</i> Christ	Dryopteridaceae	1
201628	<i>Onychium crptogrammoides</i> Christ subsp. <i>cryptogrammoides</i>	Pteridaceae	1



Outstanding beauty of the Rara Lake

**Table 2 : Pteridophytes collected by different researchers from Rara Wetland, Mugu**

Coll. No.	Scientific Name	Family	Collectors	Collection Date
8101	<i>Equisetum arvens</i> L. subsp. <i>arvens</i>	Equisetaceae	N.P. Manandhar & D.P. Joshi	10.08.1981
3739	<i>Dryopteris redactopinnata</i> S.K. Basu & Panigrahi	Dryopteridaceae	K.R. Rajbhandari & B. Roy	22.7.1979
112R	<i>Dryopteris xanthomelas</i> (Christ.) C. Chr.	Dryopteridaceae	Basnet <i>et al.</i>	23.04.2011
031R	<i>Notholaena himalaica</i> Fraser-Jenk.	Pteridaceae	Basnet <i>et al.</i>	24.04.2011
7472	<i>Pteris cretica</i> L. subsp. <i>cretica</i>	Pteridaceae	P.P. Kurmi & N. Thapa	26.11.1995
7031/81	<i>Pichisermollodes ebenipes</i> (Hook.) Fraser-Jenk	Polypodiaceae	N.P. Manandhar & D.P. Joshi	10.08.1981
19664	<i>Polystichum sinense</i> (Christ) Christ	Dryopteridaceae	Tabata <i>et al.</i>	13.10.1984
21448	<i>Dryopteris fructuosa</i> (Christ) C. Chr.	Dryopteridaceae	Tabata <i>et al.</i>	10.11.1983
4104	<i>Osmunda claytoniana</i> L subsp. <i>vestita</i> (Wall. ex Milde) A Love & D. Love.	Osmundaceae	Polunin, Sykes & Williams	17.05.1952
20365	<i>Aleuritopteris grisea</i> (Blanf.) Panigrahi	Pteridaceae	Tabata <i>et al.</i>	01.09.1983
15412	<i>Aleuritopteris leptolepis</i> (Fraser-Jenk.) Fraser-Jenk	Pteridaceae	Tabata <i>et al.</i>	13.07.1983

Table 1 and Table 2 above show that nineteen species of pteridophytes are present near Rara wetland, Mugu. Out of nineteen species, six species belong to family Dryopteridaceae. Family Pteridaceae also includes six species. *Pteridium revolutum* is poisonous species. *Drynaria mollis* and *Pichisermollodes ebenipes* are epiphytic species. From Table 1 & 2 it is obvious that *Dryopteris* is dominant genus in the vicinity of Rara Wetland, Mugu.

## Ecology and Environment Section

This section investigates the underlying factors that control distribution and diversity patterns, adaptation strategy and quantitative analysis of vegetation and ecosystem. In this fiscal year, two studies were carried out, that is – (i) study on distribution pattern of Nepalese *Urtica* and, (ii) adaptive strategies of some alpine flowering plants along the altitudinal gradient. For this, three field visits were organized in different areas (Rara, Daman and Gosainkunda) of the country.

### Distribution notes on Nepalese *Urtica* L.

#### Introduction

*Urtica* L. (Urticaceae) is a genus of about 30 species distributed principally in North and South temperate regions, and also in montane areas of tropics (Qian *et al.*, 2003). *Urtica* species are called *Sisnu* in Nepali and are relished in Nepal by all as an edible and medicinal value. The stem fibers are used to make ropes and the leaves are used as fodder.

#### Findings

The herbarium study in the National Herbarium of Nepal (KATH) and field visit of different places has revealed that there are five species of *Urtica* in Nepal. The genus *Urtica* grows throughout Nepal. However

*Urtica dioica*, *Urtica hyperborea* and *Urtica mairei* have been found limited to central physiographic zone, whereas *Urtica ardens* and *Urtica parviflora* are distributed all over the country. In this context, present study tries to depict the horizontal and vertical distribution of *Urtica* in Nepal. The genus *Urtica* shows wide altitudinal distribution ranging from the tropical (120 m) to alpine (5151 m) regions of Nepal; details of horizontal and vertical distribution of different *Urtica* species are given below in Table 1. So, this study indicates that *Urtica ardens* and *Urtica parviflora* have broad altitudinal range and are very common species in Nepal; similarly *Urtica dioica* has medium altitudinal range, while *Urtica hyperborea* and *Urtica mairei* have narrow altitudinal range.

**Table 1 : Distribution of *Urtica* spp. in Nepal**

S.No.	Species	Horizontal distribution			Altitudinal Distribution (m)
		West	Central	East	
1	<i>Urtica ardens</i> Link.				160 – 3600
2	<i>Urtica dioica</i> L.				3100 – 4242
3	<i>Urtica hyperborea</i> Jacquem. ex Wedd.				4545 – 5151
4	<i>Urtica mairei</i> H. Lev.				2600 – 3118
5	<i>Urtica parviflora</i> Roxb.				120 – 3030

### Adaptive strategies of some alpine flowering plants of Langtang Region

Plants adapt to their environment in many ways. They can have structural or behavioral adaptations; structural adaptations are related to modifications of specific parts such as roots, leaves, stems, flowers and fruits while the behavioral modifications include phenology, colour patterns, response mechanisms to different stimuli, and secretion of certain chemicals among others. Altitudinal variations coupled with unique habitats in Nepal present ideal platform to study adaptation strategies of plant in nature.

In an attempt to study adaptive strategies of some alpine flowering plants, a field survey was carried out in Gosainkund area of Langtang region. During the field visit, initially 20 species of alpine flowering plants were observed and different life forms were noted down. Among the 20 species, the adaptive strategies of 7 species were studied in detail and are briefly explained below.

#### *Eriophyton wallichii* Benth.

*Eriophyton wallichii* is a perennial herb, 30 – 40 cm in height, growing on scree slope in alpine zone having wet summer monsoon coverage. Flowers are covered by tuft of bracts on their upper surface. These bracts provide shade to the flowers and fruits and keep off intermittent rain, cold and snow until the whole plant withers away. This plant shows structural adaptation in its bracts.

#### *Meconopsis napaulensis* DC.

*Meconopsis napaulensis* is a stout and spiny plant reaching up to 1 m and found mainly on the rock crevices of sub alpine slopes. It exhibits structural adaptation in its floral arrangement where it develops drooping flowers to protect reproductive organs from incessant cold rain and seems to change their orientation according to the degree of rainfall.

#### *Saussurea gossipiphora* D. Don

*Saussurea gossipiphora* is a small cottony herb found in sub-alpine and alpine slopes. Its inflorescence is densely covered with long wool-like hairs, which retains heat and moisture and facilitates pollination in the harsh cold climate.

***Primula primulina*** (Spreng) H. Hara

*Primula primulina* is a herb of about 30 cm growing luxuriantly on rocky slopes of sub-alpine region. It bears a tuft of dense hairs in the throat of the corolla in its flower, which prevents rain from entering the corolla tube.

***Pedicularis* spp.**

Many species of *Pedicularis* have perianth, which protects the reproductive organs from cold and dry winds as these species are mostly found on sub-alpine and alpine habitats. The perianth of flower covers the fruits until they mature and ensures healthy seed formation.

***Saxifraga pulvinaria*** H. Smith and ***Androsace tapete*** Maxim

*Saxifraga pulvinaria* and *Androsace tapete* are truly the cushion plants, which grow on scree and rocky slopes of the alpine zone. The branches can survive many years and bear numerous old leaves that do not decompose because of the low temperature. They avoid cold wind because of their rounded smooth surface. They retain warmth from sunshine and from terrestrial heat, absorb moisture from fog in summer, and attract pollinators with mass flowering.



*Androsace tapete*



*Primula primulina*



*Eriophyton wallichii*



*Meconopsis napaulensis*

## Study on *Prasiola formosana* Okada from Kavrepalanchok District

### Introduction

*Prasiola* is the genus of leafy green algae found in marine as well as fresh water sources. The plant is characterized by monostromatic blades generally expanding above and narrowing to a short stipitate region at the base. There are 36 species of the genus reported so far in the world and at least 14 of which are fresh water species (Kim *et al.*, 2015); one of this is *Prasiola formosana* Okada, reported from Kavre District of Central Nepal. To assess the present status and its use by the local communities, a field visit was designed to collect the plant and to study its habitat. The program included field collection of the species, study of its habitat and to uncover the potential of the plant in terms of its value as food supplement and ethnobotanical use. The plant was reported 12 years ago regarding its occurrence in Roshi Khola (Kushadevi Village Development Committee/VDC-5) of Kavrepalanchok (Adhikari & Basnet, 2013). It was therefore also necessary to assess its present status in terms of occurrence, distribution and threats. The objective of this work was to study the status and threats of an edible algae *Prasiola formosana* from Roshi Khola Stream.

### Results

*Prasiola formosana* Okada is fresh water edible algae found in running cold water not adulterated by other pollutants. The thallus of the alga is found attached to the large sized submerged stones and rocks in the stream. It forms the rich dark green leafy mat on its substratum. *Prasiola formosana* is locally called 'Simali' and in Newari, it is called 'Nyhaklu'. The alga prefers to grow in undisturbed water and during our field observation it was found that the alga was restricted to the area which were far from the settlements and unaffected by the development works. There is sharp correlation between the occurrence of the alga and fishes in the river as told by the local people. This may be due the role of the alga as food for the fishes.

During present field visit, *Prasiola formosana* was collected from the Roshikhola stream above a local temple. However, its population was not good; the reason may be the severe disturbance to the fragile habitat due to excessive ongoing stone mining activities that pollute the stream. The locals were also of the view that the occurrence of the plant in the stream has significantly decreased after the activities.



Roshi Khola Stream



Fresh *Prasiola formosana*



Dry Simali at local market, Panauti



## Field observation of Panchase: a biodiversity hotspot in Central Nepal

### Introduction

Panchase region is situated in the Mid Hills of Nepal, between the latitudes 28° 12' to 28° 18' N and longitudes 83° 45' to 83° 57' E. Altitude ranges from 855 m asl at the Harpan River to 2517 m asl at the peak of Panchase whereas the forest ranges from 1450 m asl to the peak. The Panchase Mountain is the origin of many rivers and tributaries supplying water to the villages and a primary source for Phewa Lake. Climate is subtropical at lower altitudes and moist temperate at elevation above 2100 m. The Panchase forest is spread over three districts; Kaski, Parbat and Syangja, and with five different Village Development Committees (VDCs). The ethnic composition of the area constitutes Brahmin, Chhetri, Gurung, Bishwokarma, Nepali, Pariyar, Magar and Thakali, where generally Gurung communities inhabit higher elevation and Brahmin and Chhetri dominate the valley bottom. Of these, Gurung and Magar are indigenous to the area and Bishwokarma, Nepali and Pariyar are the dalits. Approximately 40,000 people live in the adjoining villages and depend upon the forest for their livelihood (fodder, firewood, timber, edible and medicinal plants).

The Panchase area is known for its dense forests (sub-tropical and temperate mixed evergreen) and the immensely diverse biological resources found there. To date, more than 589 flowering plant species have been recorded in the area. This area is also commonly known as the 'Heaven of wild Orchids' as more than 115 species of orchids are reported from the area which is roughly about one fourth of the total orchids occurring in Nepal; furthermore, the area also boasts two endemic orchid species *Panisea panchasensis* and *Eria pokharensis* and 35 species with a high commercial value (MoFSC/DoF, 2014). Also, a small wetland known as the 'Panchase Taal' is situated at an altitude of 2278 m and attracts pilgrims and tourists alike. This area is also the source of several rivers including the Harpan, the main feeder stream of Phewa Lake. All the rivers originated from Panchase Lekh are a source of irrigation and drinking water for communities living downstream (Bhattarai *et al.*, 2011).

A short field visit was organized to witness the pre-spring floral diversity of Panchase area. During this, mainly the core habitat of orchids, *Taxus wallichiana* and *Daphniphyllum himalayense* was observed. In addition to the observation, herbarium specimens were also collected from the site, especially the orchids seen in flowering stage were collected.

### Results

Panchase forest consists of dense and moist mountainous vegetation comprising of *Daphniphyllum himalayense*, *Rhododendron arboreum*, *Quercus* sp. as the dominant species. These plants are also the ideal hosts for the epiphytic orchids. The trees covered with orchids were a common sight along the foot trail to the peak. Apart from the ecological features, the region is equally important in its cultural heritage. Remarkable religious sites of Panchase include Panchase Daha, Mahadev Temple and Buddha Stupa. The peak itself is an excellent vantage point for panoramic view in all directions.

In recognition of Panchase areas' significance as ecological and cultural site, a project is being implemented in the region in collaboration with government agencies and United Nations Development Program (UNDP) – the Ecosystem based Adaptation (EBA), aimed at conservation of the fragile ecosystem and its utilization. The delimiting of core habitat of important species such as Orchids, Rhododendrons and *Taxus* and tagging of plant names are noticeable work of the project. However, there seemed inadequacy regarding the correct identification and proper tagging of the plant in the field. Indeed, the establishment of a Botanical Garden at Aahaledanda inside Panchase is a welcome step for all plant lovers.

## Recommendations

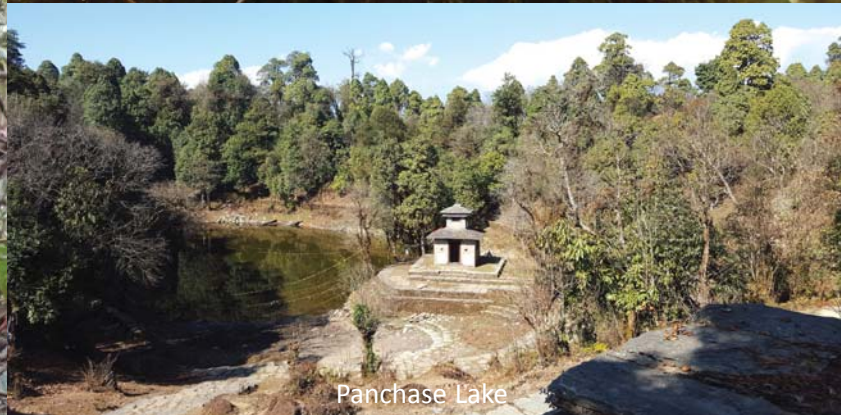
The rich diversity of Panchase region is gaining more and more importance locally and nationally. And to conserve its diversity, proper documentation of the species occurring in the area is equally important. Panchase is home to the two endemic orchid species of Nepal and there is possibility of finding more such valuable plants from the area. It supports the livelihood of downstream population in multiple ways. Being the centre of cultural and biological significance, it holds immense potential for ecotourism activities. Therefore, it is very important to study and document the floral and faunal diversity of the area and to control the degradation of the area to safeguard the sustainability of Panchase which is deteriorating due to anthropogenic activities such as deforestation, undocumented trade of valuable plants (Orchids), uncontrolled grazing of cattle and littering the pristine area.



*Oberonia falcata* hanging on *Trudelia sp*  
(Orchid on Orchid)



*Pleione humilis*



Panchase Lake

### पञ्चासे वानस्पतिक उद्यान

भदौरे तामागी गा.वि.स. आहलडाडा, कास्की

Panchase Botanical Garden, Badhaure Tamagi VDC, Aahaldanda, Kaski

Altitude: 2017 meter  
Area: 2.03 Hectore

Name List of Main Plant Species

क्र.सं.	स्थानीय नाम	Botanical Name
१.	सोठ बल्ला	Taxus baccata
२.	घुत्रे उन्नु	Cyathea spinulosa
३.	धुपी बल्ला	Cryptomeria japonica
४.	रुखर	Daphniphyllum himalaense
५.	सार्सिङ्गुरेस	Rhododendron anthopogon
६.	खडू	Quercus semicarpifolia
७.	सिन्धुली	Arundinaria species
८.	सेकचोप	Magnolia campbelli
९.	पिलाट	Quercus glauca
१०.	सोका	Daphne bhulua
११.	खम सिल्लु	Girardinia diversifolia
१२.	औसिल्लु	Rubus spp.
१३.	जुमारी गुलाब	Rosa acicularis
१४.	बाउने	सोकोला (Sesuvium)



Good initiation for Botanical Garden establishment

## Spirit collection from Annapurna Conservation Area and Panchase area, Central Nepal

### Introduction

Spirit collection is particularly important for fleshy flower and fruit that are not suitable for drying, pressing and mounting on a herbarium sheet. In this method, specimens are stored in Copenhagen solution (70% industrial methylated spirit, 28% distilled water and 2% glycerol). Two field visits were carried out to collect the samples for spirit collection. All specimen collected are to be identified and label with field note is attached to each bottle of specimen collected and stored with in economic botany museum and herbarium of same number specimen are deposited in herbarium house.

### List of plant samples from Annapurna Conservation Region

1. *Hedychium coronarium*
2. *Bulbophyllum muscicola*
3. *Dendrobium chrysanthum*
4. *Dendrobium eriiflorum*
5. *Dendrobium longicornu*
6. *Oberonia acaulis*
7. *Allium wallichii*

### List of plant samples from Panchase Region

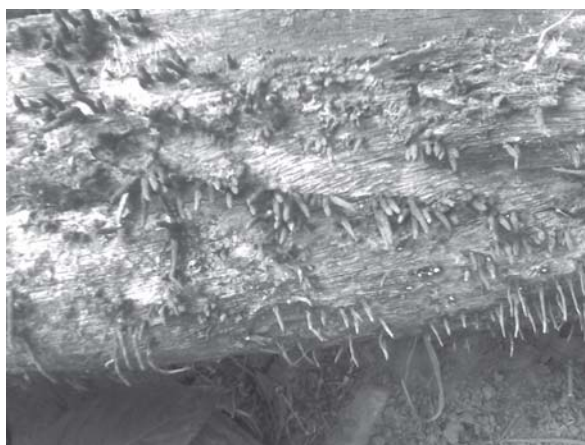
1. *Rhynchostylis retusa*
2. *Coelogyne corymbosa*
3. *Coelogyne nitida*
4. *Dendrobium amoenum*

## Mycology Section

The mushroom specimens were collected from selected some community forest from Baglung district and from some selected area viz. Whaki VDC, Ranipani VDC from Parbat district and along the Kali Gandaki riverside around Setibeni area of Parbat district. Since the mycological collection from these area of mid hill was not carried out, so study area was selected accordingly. The survey was conducted from September 23 to 29, 2015. Thirty one mushroom samples especially mostly Polypores were collected.



*Daediolopsis confragosa* (Bolt. Fr.) Schr. var. *cofragosa*



*Xylaria nigripes* (Kl.) Sacc.

## Results

Table 1: List of mushroom species collected from the study area

S.No.	Name of species Collection no./Alt. (m)	Host/Substratum	Locality
1	<i>Trametes hirsuta</i> 130P/880	Rotten branch of <i>Sapium insigne</i>	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
2	<i>Clavulinopsis</i> sp. 132P/1100	Grow on log of <i>Terminallia bellirica</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
3	<i>Trametes</i> sp. 118P/1100	Grow on branch of <i>Sapium insigne</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
4	<i>Russula</i> sp. 1122p/880	On moist soil	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
5	<i>Laeticorticium</i> sp. 134P/880	Unknown rotten branch of tree	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
6	<i>Peziza</i> sp. 131P/880	Unknown rotten branch of tree	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
7	<i>Chondrostereum purpureum</i> 115P/920	Log of <i>Shorea robusta</i>	Jhaterani community forest, Chhisti-3, Baglung
8	<i>Trichoglossum hirsutum</i> 112P/1100	On moist soil	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
9	<i>Stereum</i> sp. 109P/880	On stump of <i>Wendlandia puberulla</i>	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
10	<i>Heterobasidion annosum</i> 110P/880	On trunk of living tree of <i>Mucuna fragrantissima</i>	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
11	<i>Polyporus ovinus</i> 105P/1100	Fallen log of <i>Terminallia bellirica</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
12	<i>Thelophora</i> sp. 104B/930	Substrate unknown	Tusharopakha community forest, Chhisti-2, Baglung
13	<i>Polyporus ovinus</i> 105P/1100	Fallen log of <i>Terminallia bellirica</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
14	<i>Polyporus</i> sp. 106P/1100	On fallen log of <i>Terminalia belleica</i>	Tyang community forest, Chhisti-5, Baglung
15	<i>Pycnoporus cinnabarinus</i> 101B/920	On dead branch of <i>Sapium insigne</i>	Tyang community forest, Chhisti-5, Baglung
16	<i>Schizophyllum commune</i> 102B/900	On fallen branch of <i>Sapium insigne</i>	Tyang community forest, Chhisti-5, Baglung
17	<i>Innotus hispidus</i> 107P/1100	On fallen log of <i>Schima wallichii</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
18	<i>Chondrostereum purpureum</i> 107P/900	On log of <i>Mucuna fragrantissima</i>	Barrachaur, Koldanda, Parbat
19	<i>Steccherinum albo-fibrilloso</i> 127P/880	On trunk of live tree of locally called Amaro	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
20	<i>Polyporus</i> sp. 137P/880	On rotten branch of <i>Sapium insigne</i>	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
21	<i>Hexagonia</i> sp. 120P/800	On fallen log of <i>Acacia catechu</i>	Setibeni, Parbat
22	<i>Thelophora</i> sp. 129P/700	Substrate unknown	Setibeni, Parbat
23	<i>Pseudotrametes gibbosa</i> 124P/700	Substrate unknown	Setibeni, Parbat
24	<i>Hexagonia</i> sp. 128P/700	On fallen log of <i>Acacia catechu</i>	Setibeni, Parbat
25	<i>Schizophyllum commune</i> 123P/700	Unknown substrate of dead log	Setibeni, Parbat

26	<i>Exobasidium ovalifoliae</i> 114P/1100	On living tree of <i>Schima wallichii</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
27	<i>Daedalia quercina</i> 133P/880	On fallen branch of Ipil-Ipil	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
28	<i>Hexagonia</i> sp. 129P/880	Substrate unknown	Whaki VDC-3, Limsia Puchhar, Arjelthar, Parbat
29	<i>Stereum</i> sp. 117P/800	On log of <i>Acacia catechu</i>	Setibeni, Parbat
30	<i>Trametes gibbosa</i> 116P/1100	On log of <i>Terminalia bellerica</i>	Ranipani VDC-4, Kudandi, Paharichaur, Parbat
31	<i>Trametes versicolor</i> 103B/900	On log of <i>Shorea robusta</i>	Jhaterani community forest, Chhisti-3, Baglung

## Anatomy Section

The sample of wood collection was carried out from Nuwakot Community Forest, Palpa District. Since reference sample of wood collected from sub tropical and temperate region is large in number in xylarium, so priority was given to collect wood sample from tropical region. To meet such objective survey was conducted from February 28<sup>th</sup> to 5<sup>th</sup> March in 2016 and 12 wood samples were collected. In the survey, 12 species of tree was recorded and sample of wood was collected by cutting branches of trees with the help of saw. Collected wood samples were well air dried in shade. The identification was done with the help of relevant literature and unknown species were identified by cross checking the wood specimens deposited at Xylarium in the NHPL. Local name of the wood samples was noted by showing the sample of wood collected to local people.

### Results

In the survey, 12 species of tree was recorded and collected.

**Table 1: Sample of wood species**

S.No.	Scientific Name	Local Name	Collection No.	Family
1	<i>Haldina cordifolia</i> (Willd. ex Roxb.) Benth & Hook	Karma	20149	Rubiaceae
2	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Bedd	Banjhi	20141	Combretaceae
3	<i>Bauhinia purpurea</i> L.	Tanki	20142	Leguminosae
4	<i>Buchanania latifolia</i> Roxb.	Piyari	20144	Anacardiaceae
5	<i>Cassia fistula</i> L.	Rajbrikchha	201432	Leguminosae
6	<i>Hydrangea</i> sp.	Joikath	201417	Hydrangeaceae
7	<i>Lagerstroemia paviflora</i> Roxb.	Botdhayaro	201418	Lythraceae
8	<i>Semecarpus anacardium</i> L.	Bhalayo	201421	Anacardiaceae
9	<i>Shorea robusta</i> Gaertn.	Sal	201413	Dipterocarpaceae
10	<i>Syzygium cumini</i> L. Skeels.	Jamun	201422	Myrtaceae
11	<i>Terminalia alata</i> Heyne ex Roth.	Saj	201419	Combretaceae
12	<i>Wendlandia puberula</i> DC.	Setotilko	201416	Rubiaceae

Likewise, altogether 22 samples were collected from 11 different trees (of different age group) of *Juniperus indica* Bertol. The sampling was done in the way of Rechi (Chhepka area) of She-Phoksundo National Park, Dolpa at altitude of 2,700 m.

## Plant Genetic Resources (PGR) Section

### Introduction

The Plant Genetic Resources section undertakes the *ex situ* conservation of important plant species that fall in various categories viz. endemic, rare, protected, CITES listed and with high medicinal values. To achieve these targets, following activities were carried out:

1. Germplasm conservation of two endemic species- *Hypericum cordifolium* (seedlings source-Dhading) and *Delphinium himalayai* (seeds source Patmara, Jumla).
2. Germplasm conservation of commercially important orchids – *Dendrobium eriiflorum* (seedling).
3. Germplasm conservation of commercially important plant *Paris polyphylla* (16 seedlings)
4. Labelling of 100 specimens.
5. Colouring of the fencing (250 m)
6. Cleaning and colouring of earthen pots with plant-400

### Vegetation survey of Gaja Lake, Baglung

#### Introduction

Wetlands are defined as “natural or artificially created areas, such as swamp, marsh, riverine floodplain, lake, water storage area and agricultural land containing water from underground water resources or atmospheric precipitation that may be permanent or temporary, static or flowing and fresh water or saline”. Wetlands are considered as the most productive and dynamic ecosystem of the earth.

#### Study area

There are two famous peaks in Baglung district. One of them is Gaja and another one is Ghumte. There is a lake named after the peak Gaja. The lake occupies an area of approximately 1.5 hectore. The area covers over 2500 hectares of land and is located at an altitude of 1800 - 3000 m. The present study covers the core Lake area and 500 m around the water bodies of the Lake.

#### Methods

The present study based on herbarium and information collection during the field visits that was organized representing pre-monsoon in current fiscal year. During field visit, field note, photography and enumeration of the species were done.

#### Results

During field visit more than 80 specimens (more than 40 species) were collected. This year specially we observed *Paris polyphylla*, an endangered medicinal plant, *Aconitum bisma*, *A. spicatum*, *Lyonia villosa* are poisonous plants, *Gaultheria fragrantissima*, *Taxus wallichiana*, *Abies spectabilis*, *Symplocos theifolia*, *Rubia cordifolia*, *Polygonatum verticillatum*, *Dichroa febrifuga* etc. as commercially important medicinal plants and 3 species of orchids. The trees species recorded were *Symplocos theifolia*, *S. ramosissima*, *Eunymous tingens*, *E. echinatus*, *Lindera pulcherima*, *Taxus wallichiana* and *Ligustrum indicum*. The shrub species were *Pieris formosa*, *Berberis asiatica*, *Senecio diversifolius*, *Indigofera heterantha*, *Cardamine sp.* *Gaultheria fragrantissima*, *G. nummularioides*, *Sarcococca wallichii*, *Wikstroemia canescens* and *Leptodermis*

*sp.* The common herbs were *Prunella vulgaris*, *Anemone rupestris*, *Polygonatum verticillatum*, *Viola biflora* and *Ajuga lobata*. The climbers were *Jasminum officinale*, *Schisandra grandiflora*, *Tetrastigma sp.* and *Rubia manjith*.

## Vegetation survey of Shey Phoksundo and surrounding area, Dolpa

### Introduction

Shey Phoksundo Lake is situated on the North of Dolpa Headquarter (2 days walking distance from headquarter), boarder point between the Rigmo VDC and Saldang VDC. It is a famous lake of Nepal because of its depth. The Lake is located by the side of the forest but no leaves are found floating on the Lake. The Lake is approximately 9880 ropanis. The Lake is situated inside the Shey Phoksundo National Park. Most of the area of Dolpa district belongs to Trans Himalayan region and the vegetation of such area is interesting and different from rest of the area.

### Results

During field visit 105 species were enumerated and 30 species were collected for herbarium study. Among them, 7 herbs, 18 shrubs and 5 trees were noted. *Pteridium revolutum*, *Drynaria mollis* and *Selaginella pulvinata* are the collected pteridophytes. Among them, *Selaginella pulvinata* is an uncommon species. *Ulmus sp* and *Cephalanthera longifolia* were also observed.



Difficult to reach



Measuring the tree



Beautiful Lake Shey Phoksundo

## Medicinal and Aromatic Plants (MAPs) Section

### Seed Collection of *Gaultheria fragrantissima* L. from Dolakha District

#### Introduction

*Gaultheria fragrantissima* L. is a high value medicinal plants belonging to family Ericaceae. It is commonly called “Dhasingre”. It is the main source of Methyl Salicylate extracted from leaves and twigs. The compound is used as raw materials in different ayurvedic drugs (i.e Iodex, Himalayan Massage Oil, etc.). This species is distributed from east to west and 1500 - 2500 m in vertical distribution. It is one of the prioritized Medicinal and Aromatic Plants (MAPs) by Nepal Government for research and economic development. The objective of this study was to collect seeds of *Gaultheria fragrantissima* L. from different localities to test its germination.

#### Methods

The seeds were collected (kept in zipper plastic bags with tissue paper) from Makaibari and Deurali around 2100 m altitude on 2072.6.9. After 3 days of collection, seeds were treated in cold water for 18 hours. Then the viable seeds were sown in the mixture of compost, sand and soil (1:1:1) for the germination test at the NHPL field (1515 m).

#### Results

No germination was recorded up to 4 months.

### Seed collection of economically important plants from Makwanpur District

Makwanpur district is known for its geographical diversity and associated plant species. To enrich the species collection of National Herbarium, seeds of following species of plants were collected from the district.

S.No.	Local Name	Scientific Name	Family
1	Bhujetro	<i>Butea minor</i> Buch.Ham. ex Baker	Leguminosae
2	Rajbrikshya	<i>Cassia fistula</i> L.	Leguminosae
3	Babool	<i>Acacia nilotica</i> (L.) Willd. Ex Del	Leguminosae
4	Bhyakur	<i>Dioscorea</i> sp.	Dioscoreaceae
5	Saaj	<i>Terminalia alata</i> Roth	Combretaceae
6	Teak	<i>Tectona grandis</i> L.	Verbenaceae
7	Siris	<i>Albizia procera</i> (Roxb.) Benth.	Leguminosae
8	Shami	<i>Ficus benjamina</i> L.	Moraceae
9	Fishtail Palm	<i>Caryota urens</i> L.	Palmae
10	Sindure	<i>Mallotus phillippensis</i> (Lam.) Muell. Arg.	Euphorbiaceae



## List of the Conserved MAPs



*Zanthoxylum armatum*



*Rosmarinus officinalis*



*Dioscorea* Garden



Seedlings (*Cinnamomum tamala*)

1. Rosemary-*Rosmarinus officinalis*
2. Sugandhawal-*Valeriana jatamansii*
3. Pakhanbed- *Bergenia ciliata*
4. Timur-*Zanthoxylum armatum*
5. Kurilo-*Asparagus racemosus*
6. Lauthsalla-*Taxus wallichiana*
7. Tejpat-*Cinnamomum tamala*
8. Kaulo-*Machilus odoratissima*
9. Jaitun-*Olea europea*
10. Bhyakur-*Dioscorea bulbifera*

## Tissue Culture Section

### Artificial seed preparation and *in vitro* culture of a *Dendrobium* species

#### Introduction

Artificial seed or synthetic seed can be defined as the artificial encapsulation of somatic embryo, shoot buds or aggregates of cell or any tissues which has the ability to form a plant in *in vitro* or *ex vivo* condition. Artificial seeds can be stored for a long time in appropriate condition. Toshio Murashige in 1970 first coined the term synthetic seed. Artificial seed production requires large scale production of viable plant material in laboratory condition using *in vitro* culture system.

#### Importance of Artificial Seeds

1. Genetic uniformity is maintained by using artificial seed technology.
2. Genetically modified plant or crops, hybrid plants, endangered species and elite genotype can be preserved and propagated using artificial seed technology.
3. Artificial seed production is cost effective when compared to traditional method as artificial seeds can be directly used in fields.
4. Artificial seeds can be transported from one country to another without obligations from quarantine department.
5. Artificial seed transportation is easy as these do not contain any disease causing agents. As artificial seeds are produced using sterile plant materials produced using plant tissue culture techniques.
6. Artificial seed encapsulation provides aseptic condition to the plant material or explant, which is present inside the capsule. Furthermore, herbicides added during encapsulation will provide extra protection to the explants against pests and diseases ([www.biotecharticles.com](http://www.biotecharticles.com)).

#### Methodology

Protocorms derived from *in vitro* culture of seeds of *Dendrobium* species were used as explants in present study. An immature capsule of *Dendrobium* species, collected from Dolakha district of central Nepal, was harvested. The capsule was sterilized by washing under running tap water besides 2-3 drops of tween 20 solution for 50 minutes until the water became totally clear and transparent. The capsule was then rinsed in 70% ethyl alcohol for 2 minutes and 1% solution of sodium hypochlorite for 10 minutes. Finally, it was rinsed with sterile water for five times. The sterilized capsule was dried on Whatman filter paper and dissected longitudinally with the help of sterilized surgical blade to expose its powdery seeds. Seeds were scooped out and spread thinly over the surface of Murashige and Skoog (MS) basal medium under aseptic condition. Protocorms started to develop after 15 weeks of culture and the four weeks old protocorms were selected as primary explants for present study.

Protocorms were used as primary explants to produce artificial seeds. For encapsulation of protocorms, sodium alginate (4%) solution and 0.2 mol/L of calcium chloride dihydrate solution were prepared separately by dissolving in sterile water. Individual protocorms were separated and mixed in 4% sodium alginate solution. Alginate matrix containing single protocorm were taken up with the help of sterile micropipette and then gently dropped into 0.2 mol/L calcium chloride dihydrate solution. Each drop containing single protocorm were left in calcium chloride dihydrate solution for about 30 min to harden as alginate beads. After that, the

alginate beads were washed with sterile water for three times and dried using blotting paper. The alginate beads, now called as artificial seeds or synthetic seeds, were inoculated on different strength of MS liquid medium i.e. 0.25 MS, 0.5 MS, 1.0 MS, 1.0 MS liquid medium supplemented with 0.5 mg/L BAP and 0.5 mg/L NAA and 1.0 MS liquid medium supplemented with 1 mg/L BAP and 1 mg/L NAA for their growth and germination. The cultures were incubated at  $25 \pm 2^\circ\text{C}$  under photoperiod of 16/8 hours light/dark cycle.

## Results

Medium	Growth hormones (mg/L)	Observation taken in weeks	
		Initiation of germination	1 <sup>st</sup> leaf formation
0.25 MS	-	3	8
0.5 MS	-	3	7
1.0 MS	-	2	5
1.0 MS	0.5 BAP + 0.5 NAA	2	5
1.0 MS	1 BAP + 1 NAA	2	5



Artificial seeds



Leaves formed

## Documentation of Traditional Knowledge of Jirel Community, Dolakha

Plant and plant products are used as food, medicine, resin, fibre, gum etc. from the beginning of human civilization. Each and every plant have medicinal value and all medicinal plant contain some chemical constituents such as alkaloids, glucosides, resins, tanins, steroids, gums etc. (Pandey, 1995). The age old tribal knowledge of plants is an important aspect of ethnobotanical research. These tribal tracts are the store house of knowledge about multiple uses of plants. The indigenous knowledge has been transmitted from generation to generation in the form of inherited culture and such practices has been handled down verbally/ orally and only few information are documented in the books and other religious scripts.

The objective of this field visit was to study the different plants and their parts used by Jirel community of Jiri municipality for different purposes.

### Results

Among different individuals (Jirel) living on different wards of Jiri municipality, 46 different adult individuals were selected randomly and made survey about different economic plants that are used in their daily life and method of their use for different puposes. Altogether 41 species of plants were found to be used for their different uses like medicines, fibres, mat, etc.

## Traditional knowledge documentation of Barpak, Gorkha

Indigenous knowledge systems are not only for the cultures from which they evolve, but also for scientists and planners striving to improve conditions in rural societies. The rural people have developed unique indigenous knowledge related to the uses of plant resources due to constant association with the forests. This existing valuable information is needed to be documented before lost or disappeared. The objective of the study was to document the traditional knowledge of local healers (Baidhya).



Interaction with the local people



Ancient plant knowledge in Ghale language

### Results

Altogether 22 species of medicinal plants and their uses by the local healers were recorded.

### Additional Findings



*Podocarpus neriifolius* in nature



*Asplenium finlaysonianum*

Besides, on the way (Golabhanjyang to Taribensi) of Dhading, it was found the natural habitat of *Podocarpus neriifolius* D. Don which is listed on CITES/Convention on International Treaty of Endangered Species of Wild Fauna and Flora -Appendix III plant; from Taribensi (27°58'N, 84°50'E, 920 m asl). The germplasm (3-seedlings) of this species was collected and conserved in the PGR field and the 2 seedlings are surviving well. At the same place, a fern, *Asplenium finlaysonianum* Wall. ex Hook. was also collected.

## Amchi's Knowledge documentation in Mustang

Amchi medical practice is identified by the name sowa rigpa, which means “science of healing” in classical Tibetan as well as in regional Himalayan and Central Asian languages and dialects. The word amchi means “doctor”. This system of medicine is a spiritual practice, a science, and an art that dates back thousands of years. The objective of this visit was to document the practice of Amchi of Mustang district for the treatment of different diseases. Dr. Tsampa Ngawang, an amchi, who has been in this profession for years, was selected and his knowledge on the uses of 32 plants species for the treatment of 17 different diseases was recorded.

## List of recipients of 'Ferns and Fern-allies of Nepal - 2015'

S.No.	Name	Address	Country	No. of Copies
1	Mohammad Gias Uddin	Toronto	Canada	1
2	Germinal Rouhan	Museum National d'Historie Naturelle, Herbar National, Paris	France	1
3	Professor S.P. Khullar	Chandigarh	India	1
4	Professor S.C. Varma	Chandigarh	India	1
5	Nirad C. Rout	Curator, Herbarium (RRLB), CSIR, Institute of Minerals & Materials, Technology, Bhubaneswar, Orissa	India	1
6	Dr. B.S. Kholia	Botanical Survey of India, Dehradun, Uttarkhand	India	1
7	Dr. Anil Kumar Biswal	Department of Botany, North Orissa University, Taktapur, Baripada	India	1
8	Dr. Atsushi Ebihara	National Museum of Nature and Science, Tsukuba, Ibaraki	Japan	1
9	Harry Roskam	Hortus Botanicus Leiden	Netherlands	1
10	Dr. Barara S. Parris	Fern Research Foundation, Bay of Island	New Zealand	1
11	Miss Alison Paul	The Natural History Museum, Cromwell Road, London	UK	2
12	Professor Mary Gibby	Royal Botanical Garden Edinburgh	UK	1
13	Dr. P.J. Edwards	The Herbarium, Royal Botanic Garden, Kew	UK	1
14	Jock Mullard	Radely College, Abingdon	UK	1
15	Dr. Heleen Plaisier	Curator, St Andrews Herbarium	UK	1
16	Dr. George Yatskievych	University of Texas, Austin	USA	1
17	Mike G. Price	Michigan	USA	1
18	Anja Buijsen	Botanical Library, Naturalis Biodiversity Centre	Netherlands	1
19	Stephanie Keirl	Peter H Raven Library, Missouri Botanical Garden	USA	1
20	Dr. Anna Gorner	CIPSEM, Dresden	Germany	1
21	SARRC Forestry Centre	Thimpu	Bhutan	1
22	Professor H. Ikeda	Tokyo University, Tokyo	Japan	1
23	Professor M. Amano	Koisikawa Herbarium, Tokyo	Japan	1
24	Professor K. Iwatsuki	Koisikawa Herbarium, Tokyo	Japan	1
25	Dr. A. Ebihara		Japan	1
26	Dr. Kajumi Fujikawa	The Kochi Prefectural Makino Botanical Garden	Japan	2
27	Dr. Michael G. Price	University of Michigan Herbarium	USA	1
28	New York Botanical Garden	New York	USA	1
29	National Botanical Garden	Lalitpur	Nepal	2
30	Central Department of Botany	Tribhuvan University	Nepal	26
31	Department National Park and Wildlife Conservation	Kathmandu	Nepal	2
32	St. Xavier College	Kathmandu	Nepal	1
33	Kailali Multiple Campus	Kailali	Nepal	1
34	Dhaulagiri Mutiple Campus	Baglung	Nepal	1
35	Sidhanath Science Campus	Kailali	Nepal	1

National Herbarium and Plant Laboratories  
Godawari, Lalitpur, Nepal

## List of visitors at NHPL (based on Visitor's Log Book)

S.N.	Name	Researcher / Visitor	Address	Remarks
1	Dr. Ram Chandra Poudel	Senior Scientist	NAST, Lalitpur	Herbarium Study & Identification
2	Mohan Sangraula	PhD. Scholar	CDB, TU	Herbarium Study & Identification
3	Binod Basnet	PhD. Scholar	CDB, TU	Herbarium Study & Identification
4	Pramaod Lamsal	Researcher	Kathmandu	Herbarium Study (Rhododendron)
5	Selana Nakarmi	M. Sc. Student	CDES, TU	Herbarium Study (Orchid)
6	Astha Twayana	B.E. Arch Student	IOE, Pulchok	Herbarium Building Study
7	Kamal Mohan Ghimire	PhD. Scholar	RECAST, TU	Herbarium Study & Identification
8	Hira Shova Shrestha	M. Sc. Student	CDB, TU	Herbarium Study & Identification (Pteridophytes)
9	Giridhar Amatya	Researcher	Surkhet	Herbarium Study (Zanthoxylum)
10	Shristi Poudel	B. Sc. Student	ASCOL, Kathmandu	Herbarium Study (Solanum)
11	Krishna Prashad Sharma	M. Sc. Student	CDB, TU	Herbarium Study & Observation
12	Marco Kruezer	Researcher	Edinburgh, KU	Herbarium Study & Observation
13	Marco Valussi	Researcher	Verona, Italy	Herbarium Observation
14	Daniela Riva	Researcher	Milan, Italy	Herbarium Observation
15	Dr. Jyoti Prashad Gajurel	Researcher	Kathmandu	Herbarium Study
16	Dr. Sandesh Bhattarai	Senior Scientist	NAST, Lalitpur	Herbarium Study
17	Baba Maya Pradhan	Researcher	TU	Herbarium Study
18	Mark F. Watson	Researcher	Royal Botanical Garden Edinburgh	Herbarium Observation
19	Bijaya Raj Subedi	Researcher	RECAST, TU	Herbarium Study
20	Pratyus Regmi	Student	Kathmandu	Herbarium Observation
21	Manju Neupane	M. Sc. Student	CDB, TU	Herbarium Study (Thalictrum)
22	Sunita Shrestha	M. Sc. Student	CDB, TU	Herbarium Study (Leguminosae)
23	Ramesh Chandra Trivedi	Researcher	Agriculture & Forest University	Herbarium Study
24	Dr. Keshab Shrestha	Professor	Natural History Museum, Kathmandu	Herbarium Study & Identification
25	Ngawang Thapke Sherpa	Student	SCHEMS College	Herbarium Observation
26	Aryan Balayar	Student	SCHEMS College	Herbarium Observation
27	Dr. Bhakta B. Raskoti	Researcher	Kathmandu	Herbarium Observation
28	Neera Joshi	Botanical Illustrator	Lalitpur	Herbarium Study ( <i>Leucosceptrum canum</i> )
29	DeBoech Walte	Researcher	France	Herbarium Observation
30	Bizouard Thiellus	Researcher	France	Herbarium Observation
31	Dr. Abdul Rahiem Mikrani	Researcher	Sarlahi	Herbarium Observation
32	Ming Hung Weng	Researcher	Taiwan	Herbarium Observation
33	Lamis Jamil	Researcher	Lebanon	Herbarium Observation
34	Manomaya Magar	Researcher	NARC, Lalitpur	Herbarium Observation
35	Bina Dangol	Researcher	NARC, Lalitpur	Herbarium Observation
36	Dr. Shambhu Dhital	Researcher	NARC, Lalitpur	Herbarium Observation
37	Namita Bhattarai	Researcher	NARC, Lalitpur	Herbarium Observation
38	Dr. Abhya Prashad Das	Professor	North Bengal University, India	Herbarium Observation
39	Flor Balavarca Villanueva	Researcher	Peru	Herbarium Observation
40	Dr. Bhaskar Adhikari	Researcher	Royal Botanical Garden, Edinburgh	Herbarium Observation

## List of Publications by NHPL staffs (Fiscal Year 2072/073)

(Without publications, science is dead. - Gerard Piel)

- **Acharya, R. and Parmar, G.** (2016). Preliminary Documentation of Basidiomycetous Fungi (Polypores and Mushrooms) found in Bardia National Park and its Buffer Zone Area, Western Nepal. *Bul. Dept. Pl. Res.* No. 38 (22 - 29). Department of Plant Resources, Kathmandu, Nepal.
- Ikeda, H., Noshiro, S., Yonekura, K., Yano, O., Yamamoto, N., Pendry, C. A., Elliot, A., **Pathak, M., and Bhatt G. D.** (2015). Botanical Inventory in Darchula District, far western Nepal in 2012. *Newsletter of Himalayan Botany*, 49 (5 -10), the Society of Himalayan Botany, Japan.
- **Parmar, G.** (2016). *Zephyranthus citrina* Baker (Amaryllidaceae) a new record for flora of Nepal. *Bul. Dept. Pl. Res.* No. 38 (14-15). Department of Plant Resources, Kathmandu, Nepal.
- **Parmar, G.** and Pant, B. (2016). Acclimatization of two epiphytic Orchids: *Coelogyne stricta* (D. Don) Schltr. And *Coelogyne flaccid* Lindl. propagated under *in vitro* conditions. *Bul. Dept. Pl. Res.* No. 38 (91 - 96). Department of Plant Resources, Kathmandu, Nepal.
- **Parmar, G.** and Pant, B. (2015). *In vitro* seed germination and seedling development of *Coelogyne flaccida* Lindl. (Orchidaceae), *Advances in Forestry Science*, 2(4): 85-88.
- **Parmar, G.** and Pant, B. (2016). *In vitro* seed germination and seedling development of the orchid *Coelogyne stricta* (D.Don) Schltr, *African Journal of Biotechnology*, 15(5):105-109.
- **Parmar, G.** and Acharya, R. (2016). *In vitro* seed germination of endangered Nepalese orchid species: *Dendrobium fimbriatum* Hook, *Advanced Journal of Seed Science and Technology*, 3(1):71-74.
- **Paudel, H. R. and Pandey, T. R.** (2016). Documentation of Flora of Ramaroshan Wetland Complex, Achham, West Nepal. *Bul. Dept. Pl. Res.* No. 38 (16 - 21). Department of Plant Resources, Kathmandu, Nepal.
- Rajbhandari, K. R., **Bhatt, G. D. and Chhetri, R.** (2015). A new record of *Puccinella, P. himalaica* (Poaceae) from Nepal. *The Journal of Japanese Botany* Vol. 90, No.4, Japan.
- Rajbhandari, K. R. **Bhatt, G. D., Chhetri, R.,** and Gajurel, J. P. (2016). *Eragrostis cilianensis* (Poaceae), a new record for Nepal. *Bul. Dept. Pl. Res.* No. 38 (12-13). Department of Plant Resources, Kathmandu, Nepal.
- Rajbhandari, K. R., **Bhatt, G. D., and Chhetri, R.** (2015). Notes on *Silene holosteifolia* Bocquet & Charter (Caryophyllaceae). *Newsletter of Himalayan Botany*. The Society of Himalayan Botany. 49 (21-24), Japan.
- Rajbhandari, K. R., Rai, S. K., and **Bhatt, G. D.** (2016). Endemic Flowering Plants of Nepal. *Bul. Dept. Pl. Res.* No. 38 (106-144). Department of Plant Resources, Kathmandu, Nepal.
- Tanaka, H., **Kandel, D. R.** and Ikeda, H. (2015). Increase in Nitrogen content with elevation in fine Rhododendron species due to nitrogen absorption by ericoid roots- implementation from  $\delta^{15}N$  data. *Newsletter of Himalayan Botany*, 49 (11-17), the Society of Himalayan Botany, Japan.
- Yano, O., Ikeda, H. and **Bhatt, G. D.** (2015). Dauciform roots in two species of Cyperaceae from the Nepal Himalaya. *Newsletter of Himalayan Botany*, 49 (18-20), the Society of Himalayan Botany, Japan.
- गंगा दत्त भट्ट (२०७२). फूल फुल्ने इन्डेमिक वनस्पति प्रजातिको तथ्याङ्क अध्यावधिक । वनस्पति स्रोत समाचार पत्र, वर्ष १९ अंक ३ (पेज १२ - १३), वनस्पति विभाग, काठमाडौं, नेपाल ।

## Book Review

- Verma, S. C. and Khullar, S. P. (2015). Ferns and Fern-allies of Nepal, Vol. 1. *Indian Fern Journal*, 32:262 -266, ISSN 0970-2741, India.



## Library (Books Purchased)

S.No.	Name of book	Library No.
1	Flora of Nepal Vol. 3 (Five copies)	3033, 3034, 3035, 3036, 3037
2	A Hand Book of Medicinal Plants of Nepal	3038
3	Bio-diversity in Nepal (Two copies)	3039, 3040
4	Medicinal Plants Utilization and Conservation	3041
5	The Complete Encyclopedia of Orchids	3042
6	Complect Guide to Orchids	3043
7	Biodiversity and Protected Areas of Nepal	3044
8	Integrated Pest Management in Nepal	3045
9	The Book of Indian Trees	3046
10	Application of Botany in Horticulture	3047
11	Laboratory Manual for Bio-technology	3048
12	World Economic Plants	3049
13	Flora the Gardener's Bible, Vol. 1	3050
14	Flora the Gardener's Bible, Vol. 2	3051
15	Portraits of Himalayan Flower	3052
16	Religions in Nepal (Two copies)	3053, 3054
17	Advances in Plant Tissue-Culture in India	3055
18	Nepal Forest and Environment	3056
19	Forest Management	3057
20	Communities Forest and Governance	3058
21	Political Economy of Less Priority crops in Food and Nutrition Security of Nepal (Two copies)	3059, 3060
22	Food Security in Post Conflict Nepal	3061, 3062
23	Agro forestry principle and Practices	3063
24	Biodiversity of Nepal	3064
25	Religious and Useful Plants of Nepal & India	3065
26	Forests and Forestry	3066
27	Medicinal Plants Forest and Their Conservation	3067
28	A HandBook of Trees of Nepal	3068
29	Fundamentals of Ecology (Two copies)	3069, 3070
30	Natural History and Economic Botany of Nepal	3071
31	Systematic Botany (Two copies)	3072, 3073
32	Taxonomy of Angiosperms (Two copies)	3074, 3075
33	Himalayan Flower Trees and Animals (Two copies)	3076, 3077
34	Hand Book of Ayurvedic Medicinal Plants (Two copies)	3078, 3079
35	The Orchids of the Sikkim Himalaya	3080
36	Introduction to the Principles of Plant Taxonomy (Two copies)	3081, 3082
37	Introduction on Taxonomy of Angiosperms	3083, 3084
38	Taxonomy of Angiosperms (Two copies)	3085, 3086
39	Ethnobotany and Biodiversity Conservation a sustainable livelihood among the Tamangs	3087
40	Ethnobotany & Conservation of Plant Diversity in Nepal	3088
41	Sikkim Himalayan Rhododendrons (Two copies)	3089, 3090
42	KEW A World of Plant	3091
43	DK RHS Plant Finder 1999-2000	3092
44	Plant Resources Utilization & Conservation	3093
45	Flowering Plant of India, Nepal and Bhutan	3094
46	DK Encyclopedia of Plants and Flowers	3095
47	Business of Bureaucracy (Two copies)	3096, 3097
48	राज्य संचालनका आधारहरु (२ थान)	3098, 3099
49	नेपालको संविधान २०७२ (३ थान)	3102, 3103, 3104
50	सारथी (सार्वजनिक व्यवस्थापज श्रोत सामाग्री)	3105

## Revenue Collection

S. No.	Bill No.	Date	Name	Address	Observation	Identification	Book sales	Amount (NRs.)
1	215	2072.4.7	Maharajgunj Medical Campus (Anita Dahal)	Maharajgunj, Kathmandu		√		20
2	254	2072.4.7	Ganga Prashad Kharel	Kathmandu 9			√	400
3	216	2072.4.10	Ganga Prashad Kharel	Kathmandu 9		√		25
4	217	2072.4.11	Maharajgunj Medical Campus (Pharmacy Department)	Maharajgunj, Kathmandu		√		140
5	218	2072.4.17	National Health, Science, Academy	Old Baneshor	√			1500
6	219	2072.4.18	Alternative Herbal Product	Kirtipur, Kathmandu		√		25
7	220	2072.4.19	Upendra Chalise	Maharajgunj, Kathmandu		√		20
8	221	2072.4.24	Sanothimi Campus	Sanothimi, Bhaktapur	√			800
9	255	2072.4.15	Keshab Raj Rajbhandari	Kathmandu			√	1600
10	256	2072.4.25	Ficus Biotech				√	90
11	257	2072.5.3	Ratna Pustak Bhandar	Kathmandu			√	1788
12	258	2072.5.4	Vidya Manandhar	Kathmandu			√	600
13	222	2072.5.8	Janamaitri foundation (L.A.College)	Hattiban, Lalitpur	√			2000
14	259	2072.5.18	CIST College	Kathmandu	√			2000
15	260	2072.5.28	Prof.Dr. Mohan Siwakoti	Kathmandu			√	600
16	223	2072.6.7	Minu Shrestha	Kalanki, Kathmandu		√		60
17	224	2072.6.15	Ankit Pandey	Kathmandu		√		120
18	225	2072.7.15	Anup Ojha	Doti		√		30
19	226	2072.7.16	Smriti Jadibuti Centre	Naikap, Kathmandu		√		130
20	227	2072.7.18	Ramakanta Lamichhane	Kathmandu		√		30
21	228	2072.7.18	Bipendra Pandey	Tanahu		√		60
22	229	2072.8.3	Sujit Shrestha	Kotteshor, Kathmandu		√		30
23	230	2072.8.7	Manoj Pokharel, Little Buddha College	Minbhawan, Kathmandu		√		30
24	231	2072.8.11	CIST College	New Baneshor	√			1500
25	232	2072.8.18	Binu Acharya	Kathmandu		√		30
26	233	2072.9.5	Karnali College of Health Sciences	Gausala, Kathmandu	√			1500
27	234	2072.9.7	Valley College of Technical Sciences	Sitapaila, Kathmandu	√			1500
28	261	2072.9.8	Pramod Lamsal	Kathmandu			√	1188
29	262	2072.9.20	Rojana Shrestha	Kathmandu		√		30
30	235	2072.9.13	Gorkha Campus	Gorkha	√			800
31	236	2072.10.3	Chandra Mohini Sharma	Kathmandu			√	600
32	237	2072.10.6	Thuma Rawat	Chakupat, Lalitpur		√		30
33	238	2072.10.6	Furpa Sherpa	Sindhupalchok		√		60
34	263	2072.10.14	Ban Bigyan Sankaya	Hetauda	√			2000
35	264	2072.10.15	Astha Toyana	Kathmandu			√	150
36	239	2072.10.19	Ban Bigyan Sankaya	Hetauda	√			1500
37	240	2072.10.21	Golden Gate International College	Battispatali, Kathmandu	√			1000
38	241	2072.10.22	District Forest Office	Kathmandu		√		100

## Let's Explore Our Plant Diversity for Present and Future

39	242	2072.10.22	Jamuna Bhatta, CIST College	Kathmandu		√		30
40	265	2072.10.24	Keshav Shrestha	Kathmandu			√	600
41	267	2072.10.28	CIST College	New Baneshor	√			30
42	243	2072.11.3	Kathmandu Forestry College	Koteshor, Kathmandu	√			2000
43	268	2072.11.10	Gajur Mukhi Herbal Pvt. Ltd.	Lalitpur		√		120
44	244	2072.11.11	Asthmangal Kasta Udyog	Kathmadnu	√			1000
45	269	2072.11.14	Ripu Kunwar	Kathmandu		√		1620
46	245	2072.11.20	Ring Model Higher Secondary School			√		100
47	246	2072.11.21	Saroj Gawali, Janamaitri Foundatin P.L.	Hattiban, Lalitpur		√		30
48	247	2072.11.21	Sujita Hona, Janamaitri Foundatin P.L.	Hattiban, Lalitpur		√		30
49	248	2072.11.21	Oman Malla, Janamaitri Foundatin P.L.	Hattiban, Lalitpur		√		30
50	249	2072.11.23	LITG College	Rupandehi	√			1500
51	250	2072.11.23	DK Agencies	New Delhi			√	3576
52	301	2072.11.23	Nepal Police Higher Secondary School	Sanga, Kavre	√			4,000
53	302	2072.11.27	Everest Herb Processing P. Ltd.			√		65
54	303	2072.12.1	Kalinchok National Higher Sccondery School	Kathmandu	√			1500
55	304	2072.12.1	Puspa Bikash Kendra	Godawari	√			100
56	305	2072.12.2	Chitwan National Park	Chitwan			√	415
57	306	2072.12.10	Tribhuvan University	Kathmandu	√			500
58	307	2072.12.14	Vinayak College	Gausala, Kathmandu	√			100
59	308	2072.12.21	Bheda Bakhra Anusandhan Kendra	Jumla		√		270
60	309	2072.12.21	Gyan Deep College	Dang	√			500
61	310	2072.12.26	School of Health Science	Chitwan	√			2000
62	270	2072.12.28	Koshi Herbal Institute	Biratnagar	√			1500
63	271	2073.1.2	Asmita Thapa	Lalitpur		√		90
64	311	2073.1.16	College of Applied Science	Anamnagar		√		30
65	312	2073.1.21	Nepal Institute of Medical Science & Technology	Lalitpur	√			2000
66	313	2073.1.22	Sagarmatha Technical College	Chitwan	√			2000
67	314	2073.1.24	John Bahadur Maharjan	Lalitpur				300
68	315	2073.1.24	John Maharjan	Lalitpur				300
69	316	2073.1.24	Suma Maharjan	Lalitpur				300
70	317	2073.1.24	Nobel College of Medical Science	Kathmandu	√			2000
71	318	2073.1.30	Pooja Shrestha	Pokhara		√		30
72	319	2073.1.31	Kantipur College of Medical Science		√			2000
73	272	2073.2.3	Ratna Pustak Distributors (Pvt. Ltd.)	Kathmandu			√	14304
74	273	2073.2.3	Ratna Pustak Distributors (Pvt. Ltd.)	Kathmandu			√	3658
75	320	2073.2.7	Universal College of Medical Science	Bhairahawa	√			1500
76	321	2073.2.13	St. Xavier's College	Kathmandu	√			1600
77	274	2073.3.5	Hira Shova Shrestha	TU			√	260
78	322	2073.3.5	Hira Shova Shrestha	TU		√		150
79	323	2073.3.14	New Isha Interprises	Kathmandu		√		175
80	324	2073.3.20	Ram Prasad Ghimire	Chitwan		√		420
			<b>Total</b>					<b>75,919</b>

## List of field visits by NHPL staffs

S.No.	Name	Date	Address	Objective	Remarks
1	Ramesh Basnet & Tirtha Raj Pandey	2072.9.25-28	Roshikhola, Kavrepalanchok	Study of Algae ( <i>Prasiola formosana</i> )	New addition to the museum
2	Ramesh Basnet, Tirtha Raj Pandey, Dashrath Silwal & Jit Bhadr Tamang	2072.10.30-11.5	Panchase, Kaski	Study of Orchid diversity	
3	Ganga Datt Bhatt, Rita Chhetri & Tirtha Raj Pandey	2072.6.13-19	Manang	Study of Endemic Plant ( <i>Oxytropis williamsii</i> )	
4	Dhan Raj Kandel, Krishna Dahal & Yogeshwor Acharya	2072.7.19-25	Panchase, Kaski	Fern collection	
5	Dhan Raj Kandel	2072.4.28-30	Makwanpur	Collaboration with DPR for Fern Collection	
6	Hem Raj Paudel & Lilaram Tharu	2072.6.7-13	Dolakha	Gaultheria Seed Collection	
7	Hem Raj Paudel	2072.6.17-23	Mustang	Plant collection, Collaboration with the Natural Product Research Laboratory	
8	Tirtha Raj Pandey & Hem Raj Paudel	2072.7.8-14	Achham	Plant Study of Ramarosan Wetland Complex	
9	Hem Raj Paudel, Gaurav Parmar & Amrit K.C.	2072.10.22-28	Barpak, Gorkha	Traditional knowledge documentation	
10	Lilaram Tharu & Jit Govinda Maharjan	2072.10.7-12	Makwanpur	Germ Plasm collection	
11	Gaurav Parmar, Amrit K.C. & Diwakar Dawadi	2072.6.9-15	Annapurna Area, Kaski	Spirit Collection of Orchids and <i>Zingiberaceae</i>	
12	Gaurav Parmar	2072.6.23-28	Kaski	Collaboration with DPR Plant Collection	
13	Gaurav Parmar & Amrit K.C.	2072.8.13-19	Dolakha	Traditional knowledge documentation of Jirel	
14	Dhan Raj Kandel & Ganga Datt Bhatt	2072.10.6-12	Rara National Park, Mugu	Wood sample and Fern Collection	
15	Rajendra Acharya & Bashudev Silwal	2072.6.13-19	Baglung and Parbat	Mushroom Collection	32 Polypores Mushroom
16	Rajendra Acharya	2072.7.18-24	Bardia	Mushroom Collection	
17	Rajendra Acharya & Beli Maya Tamang	2072.11.16-21	Palpa	Wood Collection	12 samples collected
18	Ganga Datt Bhatt	2072.12.01-06	Sidhababa, Ramapithecus Garden, Rupandehi	Collaboration with DPR Plant Collection	
19	Ganga Datt Bhatt	2072.12.12-16	Salhesh Garden, Siraha	Collaboration with DPR Plant Collection	
20	Ganga Datt Bhatt & Tirtha Raj Pandey	2073.2.15-19	Makwanpur & Bara	Plant Collection	
21	Tirtha Raj Pandey & Ganga Datt Bhatt	2073.2.23-28	Baitadi	Kailash area plant study	
22	Ganga Datt Bhatt	2073.2.31-3.5	Salhesh, Siraha	Salhesh Garden study Collaboration with DPR	
23	Ganga Datt Bhatt & Krishna Dahal	2073.3.10-16	Rasuwa	Plant adaptation study	
24	Gaurav Parmar, Krishna Dahal, Kanchi Tamang & Nani Maharjan	2073.2.30-3.2	Dolakha	Traditional knowledge documentation	
25	Gaurav Parmar, Yaksha Kumar Basnet & Diwakar Dawadi	2073.1.2-8	Mustang	Traditional knowledge documentation	
26	Hem Raj Paudel	2073.1.12-18	East West Highway (West to the Narayani River)	Collaboration with DPR Plant Collection	
27	Hem Raj Paudel & Rajendra Acharya	2073.2.16-21	Shey Phoksundo, Dolpa	Plant Collection, Wood ring collection	
28	Hem Raj Paudel	2073.2.29-3.4	Khaptad, Doti	Collaboration with DPR Plant Collection	
29	Hem Raj Paudel & Lilaram Tharu	2073.3.9-15	Baglung	Plant Collection on Gaja Lake	
30	Gaurav Parmar	2073.1.22-28	Kathmandu-Kakarvitta	Collaboration with DPR	
31	Gaurav Parmar, Amrit K.C., Diwakar Dawadi & Ganga Rijal	2073.1.12-18	Panchase, Kaski	Spirit Collection	
32	Gaurav Parmar & Bashudev Silwal	2073.3.10-16	Chitwan & Palpa	Plant Collection	<i>Musa balbisiana</i> collection from Palpa
33	Tirtha Raj Pandey	2073.1.26-31	Kailali	Fern Collection, Collaboration with DPRO, Kailali	
34	Dhan Raj Kandel	2073.2.28-32	Kailali	Herbarium Collection, Collaboration with DPRO, Kailali	
35	Tirtha Raj Pandey & Diwakar Dawadi	2073.3.3-9	Darchula	Kailash area plant study	
36	Gaurav Parmar	2073.3.17-4.4	MidHill of Nepal	Collaboration and plant collection with Royal Botanical Garden, Edinburgh	

### Officers Level (Gazetted III) Inservice Training (30 Working Days)

S.No.	Participants Name	Training Title	Period	Organizer
1	Rita Chhetri	Management for Conservation and Development	2072.11.23 -2073.1.5	Ministry of Forests and Soil Conservation, Kathmandu, Nepal
2	Tirtha Raj Pandey			
3	Dhan Raj Kandel	Management for Conservation and Development	2072.11.12-2072.12.22	
4	Gaurav Parmar			
5	Rajendra Acharya	Management for Conservation and Development	2073.2.24-2073.3.27	
6	Amrit K.C.			

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Annex-1 Program Progress Details

वनस्पति अध्ययन, अनुसन्धान तथा बजारीकरण कार्यक्रम

बजेट उपशीर्षक नं. ३२९८०९

क्र.सं.	कार्यक्रम र क्रियाकलाप	खर्च शीर्षक नं	इकाई	वार्षिक लक्ष्य			कैफियत
				परिमाण	भार	बजेट रु. (लाखमा)	
१	२	३	४	५	६	७	
अ.	<b>पूँजीगत खर्च अन्तरगतका कार्यक्रमहरू</b>						
१	वनस्पति अध्ययन तथा अनुसन्धान					५.४	
८.३.१.२२	हर्वेरियम क्याबिनेट (कार्यालयको लागि फर्निचर फिक्चर्स)	२५३११	संख्या	५	१.८८	१	
८.५.१.६	डेस्कटप कम्प्युटर, (कार्यालयको संचालन संग सम्बन्धी यन्त्र उपकरण तथा मेशीन औजार)	२५५११	संख्या	१	०.७५	०.४	
८.५.१.८	ल्यापटप खरिद (कार्यालयको संचालन संग सम्बन्धी यन्त्र उपकरण तथा मेशीन औजार)	२५५११	वटा	१	१.५	०.८	
८.५.१.१५	डिजिटल क्यामरा खरिद(कार्यालयको संचालन संग सम्बन्धी यन्त्र उपकरण तथा मेशीन औजार)	२५५११	वटा	१	०.३८	०.२	
८.६.४२.४४८	धारा, विजुली, ल्याव, राष्ट्रिय हर्वेरियम तथा वनस्पति प्रयोगशालाको भवन जिर्णोद्धार मर्मत तथा रंगरोगन, शौचालय आदि मर्मत, Debris Clearing (अन्य)	२५६११	संख्या	४	२.८१	१.५	
८.६.४२.५००	Wood Xylarium and Reference Library पूर्वाधार निर्माण (अन्य)	२५६११	जना	१	२.८१	१.५	
क)	<b>पूँजीगत खर्च कार्यक्रमको जम्मा</b>				१०.१३	५.४	
आ)	<b>चालु खर्च अन्तरगतका कार्यक्रमहरू</b>						
	वनस्पति अध्ययन तथा अनुसन्धान						
२.२.२.१	टेलीफोन महसुल (टेलिफोन महसुल)	२२११२	महिना	१	०.२४	०.१३	
२.४.१.१	मोटरसाईकल, कार जिप, भ्यान, लनमोर आदि (कार्यालयको ईन्धन)	२२२११	संख्या	७२५.६	१.५	०.८	
२.५.१.१	मोटरसाईकल, कार जिप, भ्यान, लनमोर आदि (सवारी साधन मर्मत)	२२२१२	संख्या	३	०.७१	०.३८	
२.७.१.२	कार्यालय सामान (कार्यालय मसलन्द सामान खर्च)	२२३११	संख्या	१०	०.८३	०.४४	
२.१५.३.६१	प्रतिवेदन तथा ब्रोशर प्रकाशन (प्रचार प्रसार तथा सामाग्री उत्पादन तथा प्रकाशन र वितरण)	२२५२२	संख्या	६००	०.५८	०.३	
२.१५.५.२८	जैविक स्रोत तथा वनस्पति परम्परागत ज्ञानको उपयोगको अभिलेखीकरण (सात जिल्ला र हर्वेरियम) (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	जिल्ला	१	१.५	०.८	
२.१५.५.३२	एनाटोमी, टिस्सूकल्चर, ईकोनोमी बोटानी, इकोलोजीकल, जैविक विविधता, जडीबुटी, माईकोलोजीकल, साईटोलोजीकल, टेरीडोफाइड, फेनरोगेम्स प्रयोगशालामा गरिने अध्ययन अनुसन्धान (हर्वेरियम)(अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	वटा	१०	३३.२१	१७.७	
२.१५.५.३५	Wood structure र Wood rings सहायतावाट Climate Change को असर अध्ययन (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	प्रजाति /स्थान	२	१.८८	१	
२.१५.५.३७	फूल फुले वनस्पति प्रजातिको Spirit Collection का लागि आवश्यक वनस्पतिका भागहरू संकलन (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	प्रजाति /स्थान	१०	३.७५	२	
२.१५.५.५४	नेपालको रैथाने वनस्पतिको (Endemic Plants) प्राकृतिक अवस्थामा Population Status को अनुसन्धान (रा.ह.) (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	प्रजाति /स्थान	४	३.७५	२	
२.१५.५.५७	हर्वेरियम नमुनाको पहिचान, संरक्षण Housing तथा व्यवस्थापन (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	संख्या	१	४.६५	२.५	
२.१५.५.५८	राष्ट्रिय हर्वेरियममा संरक्षित वनस्पति नमुनाहरूको Digitization कार्य (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	संख्या	४०००	७.५१	४	
२.१५.५.६०	पूर्व संकलित पहिचान नभएका Back logging वनस्पति नमुनाको Sorting, Mounting, Identification, Housing कार्य (रा.ह.) (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	संख्या	३०००	७.४५	३.५५	
२.१५.५.६१	नेपालबाट Report भएका रा.ह. मा संरक्षण नभएका वनस्पतिहरूको संकलन कार्य (अध्ययन/सर्वेक्षण/अनुसन्धान)	२२५२२	संख्या	४	३.७५	२	
२.१५.४०.१३	विभिन्न छिमेकी देशका Flora सम्बन्धी पुस्तकहरू खरिद (अन्य)	२२५२२	संख्या	२०	१.८८	१	
२.१५.४०.१४	Flora of Nepal Vol. 10 प्रकाशनको लागि आवश्यक जनशक्ति र अन्य पूर्वाधार विकास गर्ने (रा.ह.) (अन्य)	२२५२२	संख्या	१	१३.१४	७	
२.१५.१.३	कार्यक्रम संचालन भ्रमण/अनुगमन भ्रमण खर्च (अनुगमन मूल्यांकन तथा कार्यक्रम कार्यान्वयन भ्रमण खर्च)	२२६११	पटक	५	२.६३	१.४	
२.२०.१.१	जलपान (विविध खर्च सुरक्षा सम्बन्धी)	२२७११	पटक	१५	०.८४	०.४५	
	चालु खर्च कार्यक्रमहरूको जम्मा				८५.८८	४७.८५	
घ	<b>कुल जम्मा खर्च</b>					५३.२५	

आर्थिक प्रगति= ९६.०४%

भौतिक प्रगति=१००%

## नेपाल व्यापार एकीकृत रणनीति (वन कार्यक्रम)

बजेट उपशीर्षक नं. ३२९१५५

क.सं.	कार्यक्रम र क्रियाकलाप	खर्च शीर्षक	इकाई	०७२०७३ आ.व.को		
				वार्षिक लक्ष्य		
				परिमाण	भार	बजेट रु. लाखमा
१	२		३	४	५	६
अ.	पूँजीगत खर्च अन्तरगतका कार्यक्रमहरु					
१	वनस्पति विभाग					
८.५.१.१७	Stereomicroscopes (कार्यालय संचालन सम्बन्धी यन्त्र उपकरण तथा मेशीनरी औजार)	२५५११	संख्या	४	३०	३
८.५.१.२९	Digital Attendance System (कार्यालय संचालन सम्बन्धी यन्त्र उपकरण तथा मेशीनरी औजार)	२५५११	संख्या	१	१०	१
८.५.१.३०	LED Screen 46"CC Camera (कार्यालय संचालन सम्बन्धी यन्त्र उपकरण तथा मेशीनरी औजार)	२५५११	संख्या	२	१०	१
८.७.२९.५	प्रयोगशाला सुदृढिकरण (अन्य पूँजीगत सुधार)	२५६२१	संख्या	१	५०	५
	पूँजीगत खर्च कार्यक्रमको जम्मा					१०
क.	कूल जम्मा					१०

आर्थिक प्रगति= ९९.३९%

भौतिक प्रगति=१००%

### वालु खर्च (३२५०१५३)

वार्षिक बजेट - रु. १,३९,००,०००/-



CC Camera



LED TV



Digital Attendance Machine

वार्षिक खर्च - रु. १,०७,३४,३६०/-

क) २०७३/१२ गते यस राष्ट्रिय हर्वेरियम तथा वनस्पति प्रयोगशाला, गोदावरीमा रहेका पुराना सरसामानहरू लिलाम बापत प्राप्त भएको राजश्व :-  
रु. ४६,८५०/-



Fencing



Stereomicroscopes

ख) कूल वार्षिक राजश्व :-

रु. १,३०,०१२/-

ग) कूल धरौटी :- रु. १,३७,०११/५०

घ) राष्ट्रिय हर्वेरियम तथा वनस्पति प्रयोगशालाको बेरुजु रु. ८,३८,६५१/६५ मध्ये रु. १,६४,४२२/२८ नियमित र रु. १९,५३३/१५ असुल गरी फर्छ्यौट भैसकेको र उक्त बेरुजु मध्ये आ.व. ०७०/७१ को व.उ.शी.नं ३२९१५५४ को बेरुजु दफा ८ को सोलार प्यानल जडानको रु. ४,२७,१००/- को श्रीमान् सचिवज्यूबाट नियमित भई आएको तर महालेखा परीक्षण कार्यालयबाट लगत कट्टा हुन बाँकी ।

ड) वनस्पति विभागको मिति २०७३/३/१२, च.नं.१४८९ को पत्रानुसार यस राष्ट्रिय हर्वेरियम तथा वनस्पति प्रयोगशालालाई ल्यापटप एक थान र स्क्यानर एक थान प्राप्त भएको ।



## Annex-2

# Citizen Charter of the NHPL

## Regulations for Visitors

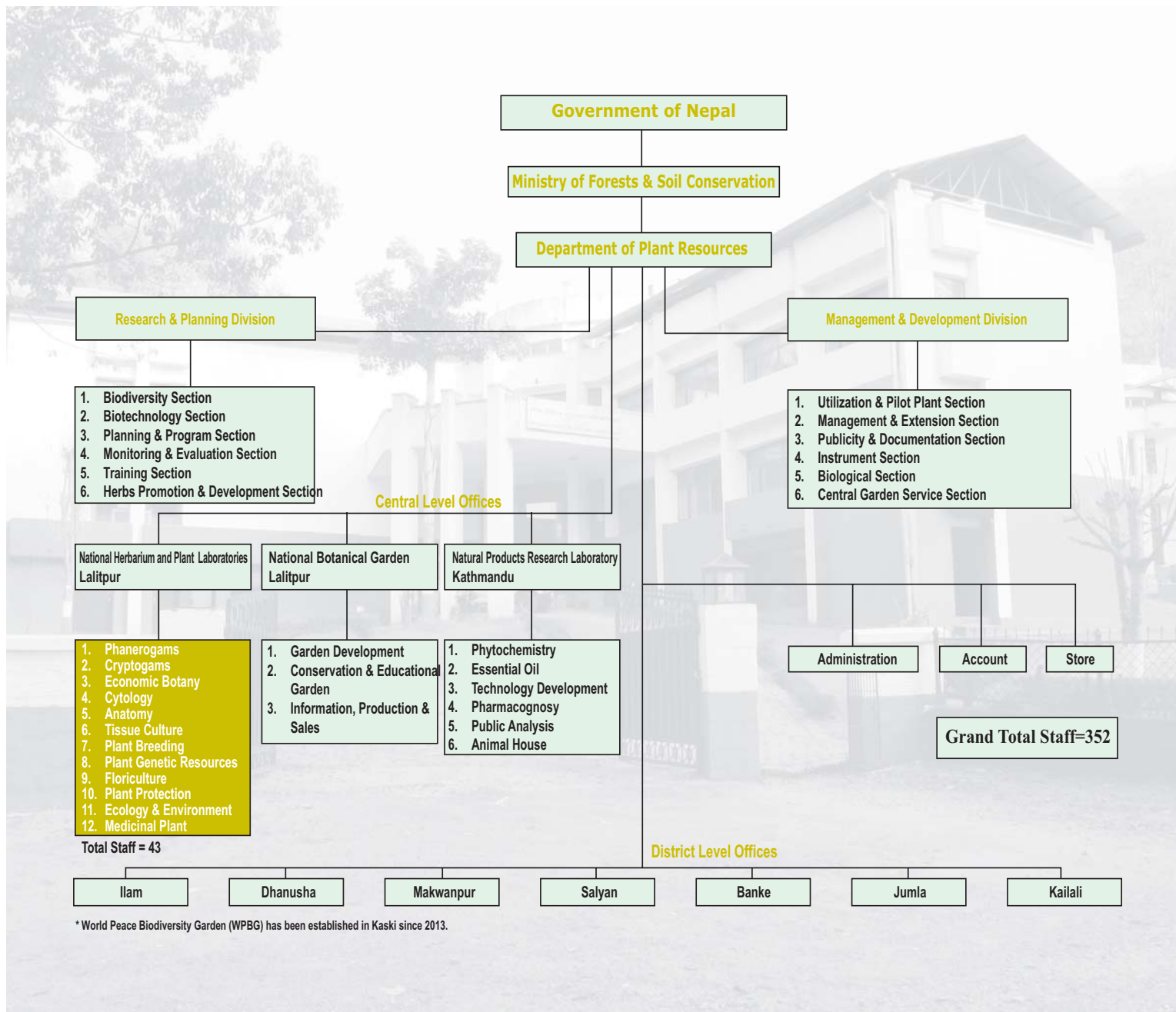
1. The National Herbarium and Plant Laboratories is available for consultation (services) from Sunday to Friday between 10:00 AM and 5:00 PM (Falgun through Kartik i.e. February to October) and between 10:00 AM and 4:00 PM (Marga to Magh i.e. November to January). This Institute will remain closed during the government holidays.
2. Permission to use the Herbarium is granted on application subject to these regulations to research workers only, provided the request letter from their respective institutions is submitted.
3. Visitors must sign their names in the visitor's book everyday on the first entry.
4. Smoking and use the flames of any kind (e.g. Matches, Cigarette, Lighters and Spirit lamps) for any offer whatsoever, is any part of Herbarium are strictly prohibited.
5. Visitors wishing to take photographs of specimens or to use their own electrical equipment in the Herbarium must obtain special permission.
6. Visitors who wish to take relatives or others inside the Herbarium should obtain permission.
7. On entering the building, visitors must submit their dried specimens of other articles for fumigation which may harbor insects, whether such material has been previously poisoned or not.
8. Detachment or dissection of any portion of specimen in herbarium is strictly prohibited.
9. Exiting labels or other determinations must not in any circumstances be removed, covered or any way defaced.
10. Permission must be obtained before rearrangement specimens, or the extraction of specimens for dispatch on loan is under taken. Loan of specimens, on approved projects are usually arranged on an inter-intuition basis only if the specimens are in duplicate numbers.
11. Specimens must not be removed from the hall or building.
12. The greatest care must be taken in handling specimens. Herbarium Sheets must not be bent or folded in anyway and heavy objects such as books must not be placed on them. Cupboard doors must be closed after use.
13. Personal bags and belongings are strictly banned/prohibited to be taken inside the Herbarium hall.
14. Litter anywhere is not allowed.
15. Get yourself checked before living the Herbarium building.
16. For any future details, contact the attending authority.

S.No.	Non Tax Revenue	Unit	Rate (NRs.)
1	<b>Herbarium Identification</b>		
	<b>a) For Students</b>		
	• Species	piece	15/-
	• Genus	piece	10/-
	• Family	piece	5/-
	• Herbarium Treatment	piece	5/-
	<b>b) For Nepalese Researchers</b>		
	• Species	piece	25/-
• Genus	piece	20/-	
• Family	piece	5/-	
• Herbarium Treatment	piece	5/-	
<b>c) For SAARC Researchers</b>			
• Species	piece	40/-	
• Genus	piece	30/-	
• Family	piece	15/-	
• Herbarium Treatment	piece	5/-	
<b>d) For Foreign Researchers</b>			
• Species	piece	75/-	
• Genus	piece	50/-	
• Family	piece	25/-	
• Herbarium Treatment	piece	5/-	
<b>e) For Government Organization</b>			
• Species	piece	60/-	
• Genus	piece	40/-	
• Family	piece	20/-	
• Herbarium Treatment	piece	5/-	
<b>f) For Non Government Organization</b>			
• Species	piece	65/-	
• Genus	piece	45/-	
• Family	piece	25/-	
• Herbarium Treatment	piece	5/-	
<b>g) For International Non Government Organization</b>			
• Species	piece	80/-	
• Genus	piece	50/-	
• Family	piece	30/-	
• Herbarium Treatment	piece	10/-	
	<b>h) Person, Private Organization and Traders</b>	@ Sample	500/-
2	<b>Auditorium Hall</b>		
	• Auditorium	@ Day	750/-
• Room	@ Day	300/-	
3	<b>Lab Facility and Technical Services</b>		
	• Mycology	@ Day/Person	500/-
	• Cytology	Per sample	500/-
• Anatomy		2,000/-	
4	<b>Herbarium, Tissue culture, Anatomy, Mycology, Economic Botany (Briefing/Event)</b>		
	• Up to Class 10	@ 10 persons	300/-
	• Bachelors		500/-
	• Masters		800/-
5	<b>Direct Observation of Museum</b>		100/-

Source: Chapter 64 Number 11, Nepal Gazette (Nepal Rajpatra) Section 5, Date 2071.3.30

Annex-3

# Organogram of the NHPL



## Annex-4

## Name List of the NHPL Permanent Staff

S. No.	Name	I.D. No.	Designation	Class	Remarks
1	Ramesh Basnet	181508	Chief, Senior Research Officer	Gazetted II	
2	Ganga Datt Bhatt	137909	Assistant Research Officer	Gazetted III	
3	Krishna Dahal	118592	Section officer	Gazetted III	
4	Yaksha Kumar Basnet	075157	Account Officer	Gazetted III	
5	Saroja Adhikari	137908	Assistant Research Officer	Gazetted III	Deputation in the DPR
6	Hem Raj Paudel	182561	Assistant Research Officer	Gazetted III	
7	Lila Ram Tharu	137911	Assistant Research Officer	Gazetted III	
8	Mitra Lal Pathak	195104	Assistant Research Officer	Gazetted III	Study leave (PhD) in China
9	Rita Chhetri	198200	Assistant Research Officer	Gazetted III	
10	Gaurav Parmar	198199	Assistant Research Officer	Gazetted III	
11	Dhan Raj Kandel	198198	Assistant Research Officer	Gazetted III	
12	Tirtha Raj Pandey	201346	Assistant Research Officer	Gazetted III	
13	Rajendra Acharya	203273	Assistant Research Officer	Gazetted III	
14	Amrit K.C.	203523	Assistant Research Officer	Gazetted III	
15	Diwakar Dawadi	169000	Supervisor	Non Gazetted I	
16	Basudev Silwal	128974	Head Field Assistant	Non Gazetted II	
17	Ganga Rijal	203590	Head Field Assistant	Non Gazetted II	
18	Jit Govinda Maharjan	88713	Office Assistant	-	
19	Jit Bahadur Tamang	168554	Office Assistant	-	
20	Nani Maharjan	105152	Office Assistant	-	
21	Kanchi Tamang	171209	Office Assistant	-	

**Note:** Total seat=43,

Fulfilled seat=21 and

Remaining seat=22 (Technical Officers -7 out of 18, Assistant Botanist-1 out of 2, Head Field Assistant-2 out of 4, Plumber- 1, Office Assistant -10 out of 14 and Driver-1)

## Annex-5

# Global Strategy for Plant Conservation (GSPC)

## Introduction

Plants are universally recognized as a vital component of the world's biological diversity and an essential resource for the planet. In addition to the cultivated plant species used for food, timber and fibers, many wild plants have great economic and cultural importance and potential, as future crops and commodities more so as humanity grapples with the emerging challenges of environmental and climate change. Plants play a key role in maintaining the planet's basic environmental balance and ecosystem stability and provide an irreplaceable component of the habitats for the world's animal life. At present, a complete inventory of the plants of the world has not been assembled, but it is estimated that the total number of vascular plant species may be of the order of 4,00,000.

Of urgent concern is the fact that many plant species, communities, and their ecological interactions, including the many relationships between plant species and human communities and cultures, are in danger of extinction, threatened by such human-induced factors as, inter alia, climate change, habitat loss and transformation, over-exploitation, alien invasive species, pollution, clearing for agriculture and other development. If this loss is not stemmed, countless opportunities to develop new solutions to pressing economic, social, health and industrial problems will also be lost. Furthermore, plant diversity is of special concern to indigenous and local communities, and these communities have a vital role to play in addressing the loss of plant diversity.

If efforts are made at all levels to fully implement this updated Strategy:

- Societies around the world will be able to continue to rely upon plants for ecosystem goods and services, including food, medicines, clean water, climate amelioration, rich, productive landscapes, energy sources, and a healthy atmosphere;
- Humanity will secure the ability to fully utilize the potential of plants to mitigate and adapt to climate change recognizing the role of plant diversity in maintaining the resilience of ecosystems;
- The risk of plant extinctions because of human activities will be greatly diminished, and the genetic diversity of plants safeguarded;
- The rich evolutionary legacy of plant diversity will be used sustainably and benefits arising are shared equitably to solve pressing problems, support livelihoods and improve human well-being;
- The knowledge, innovations and practices of indigenous and local human communities that depend on plant diversity will be recognized, respected, preserved and maintained; and
- People everywhere will be aware of the urgency of plant conservation and will understand that plants support their lives and that everyone has a role to play in plant conservation.

## The targets 2011-2020

### *Objective I: Plant diversity is well understood, documented and recognized*

- Target 1:** An online flora of all known plants.
- Target 2:** An assessment of the conservation status of all known plant species, as far as possible, to guide conservation action.
- Target 3:** Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared.

### *Objective II: Plant diversity is urgently and effectively conserved*

- Target 4:** At least 15 per cent of each ecological region or vegetation type secured through effective management and/or restoration.
- Target 5:** At least 75 per cent of the most important areas for plant diversity of each ecological region protected with effective management in place for conserving plants and their genetic diversity.
- Target 6:** At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity.
- Target 7:** At least 75 per cent of known threatened plant species conserved in situ.
- Target 8:** At least 75 per cent of threatened plant species in ex situ collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes.
- Target 9:** 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge.
- Target 10:** Effective management plans in place to prevent new biological invasions and to manage important areas for plant diversity that are invaded.

### *Objective III: Plant diversity is used in a sustainable and equitable manner*

- Target 11:** No species of wild flora endangered by international trade.
- Target 12:** All wild harvested plant-based products sourced sustainably.
- Target 13:** Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care.

### *Objective IV: Education and awareness about plant diversity, its role in sustainable livelihoods and importance to all life on earth is promoted*

- Target 14:** The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.

### *Objective V: The capacities and public engagement necessary to implement the Strategy have been developed*

- Target 15:** The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy.
- Target 16:** Institutions, networks and partnerships for plant conservation established or strengthened at national, regional and international levels to achieve the targets of this Strategy.

(Source: [www.cbd.int/gspc/targets.shtml](http://www.cbd.int/gspc/targets.shtml) dated on 2016.7.15)

## Annex-6

# Global Taxonomic Initiative (GTI), Nepal

## Introduction

The word 'taxonomy' refers to the science of description, naming and classification of the organisms ranging from micro to higher forms including micro-organisms, plants and animals. The ability to identify the organism is a basic prerequisite of a state for the implementation on international Convention on Biological Diversity (CBD).

It is estimated that more than 1.7 million species in the world have already been discovered, described and named. It is also assumed that 30 million species are yet waiting for their nomenclature.

The conferences (CBD) of parties (COPEs) have recognized that the implementation of decision of the conservation is suffering due to the inadequacy or lack of taxonomic skill and resources in developing world. In 2002, the sixth meeting of the COP approved the Global Taxonomic Initiative (GTI: VI/6) programme of the work to be implemented. The Eight meeting of the COP (VIII/3) in Brazil, in 2006, emphasized the need to build and retain capacity to address the taxonomic impediment and explore to ensure sustainability of the necessary financial support for the Global Taxonomy Initiative.

The COP urged parties and Governments to establish National focal points for the Global Taxonomy Initiative, so that they can contribute to the implementation of national taxonomic need assessments, related to fauna and flora.

The COP (VII/18) advised and requested the Global Environment Facility (GEF) to support the implementation of planned activated on taxonomic need assessments and provide financial resources to developing countries which helps to establish national focal points support capacity building activities.

## GTI Focal Point

As per the decision (VII/8) of the COP to the CBD, Government of Nepal in **6 June 2006** designated Director General, Department of Plant Resources as the National Focal point for GTI: A steering committee of 11 members has been formed represented by number of participating National institutes of various sectors. It plans, to assess the status and capacities of taxonomic activities, strengthen national institutes for their capacity building and development.

## Objectives

The objectives of GTI focal point in Nepal are provide an opportunity in building capacity in the field of taxonomy, embracing fauna, flora, microorganism, networking with national institutes, develop incentive for the local shareholders and mechanism to attract younger people in the taxonomic field. Besides these, it has following specific objectives.

1. Networking with National institute (NI) for implementing programme on GTI.
2. Promote collaboration and synergy in research and information sharing in the field of Taxonomy.
3. Acquisition of reference material and dissemination to concerned institution.
4. Provide flora for dialogue and sharing experience within member countries of the south Asian sub region.
5. Facilitate human resource development through training, education including public awareness programme.
6. Promote research, collection curation, maintenance and strengthening the collection of the materials in Herbaria related to fauna and flora of the country.

## Activities

1. Establish and strengthen secretariat of GTI focal point.
2. Networking with identified National institutes.
3. Carry out taxonomic need assessments and capacities at the national level.
4. Enhance and support the existing national journals dealing with taxonomy related to fauna and flora.
5. Develop incentives and mechanism to attract younger people in the taxonomic field.
6. Conduct exchange programme, among countries of the south Asian sub region.
7. Develop educational activities, training and awareness programme to promote taxonomy as important component of Biodiversity studies (fauna and flora).
8. Train Para taxonomist involving inter alia farmers, extension workers, teachers, elderly and knowledgeable tribble people.
9. Develop information system of National, Regional and Global perspective.
10. Repatriate data associated with specimens including digitized image.
11. Provide taxonomic information including invasive alien species to concerned authorities.
12. Prepare and disseminate field guides and keys for identification of biodiversities.
13. Strengthen national institute with basic infrastructure facilities to carry on taxonomic of the region works.

## GTI Steering Committee

S.No.	Designation	Address
1	Chairman, (DG, DPR)	Department of Plant Resources (DPR) Thapathali, Kathmandu
2	Member	Central Department of Zoology, Tribhuvan University (TU), Kathmandu
3	Member	Central Department of Botany, Tribhuvan University (TU), Kathmandu
4	Member	Natural History Museum, Tribhuvan University (TU), Kathmandu
5	Member	Central Department of Microbiology, Tribhuvan University (TU), Kathmandu
6	Member	Nepal Academy of Science and Technology (NAST), Lalitpur
7	Member	National Herbarium and Plant Laboratories (NHPL) Godavari, Lalitpur
8	Member	Department of Forest (DoF), Babarmahal, Kathmandu
9	Member	Department of National Park and Wildlife Conservation (DNPWC) Babarmahal, Kathmandu
10	Member	National Agriculture Research Council (NARC), Lalitpur
11	Member Secretary (Section Head, Biodiversity)	Department of Plant Resources (DPR) Thapathali, Kathmandu

(Source: DPR 2008, GTI Brochure)