

National Mission on Himalayan Studies

PROFORMA FOR THE HALF YEARLY PROGRESS REPORT
(Period from 01-04-2017 to 31-09-2017)

Project Title: Multidisciplinary Studies in Floristic Assessment, Ecological Analysis, Ecosystem Services, Conservation and Sustainable Management of Selected National Parks in W. Himalaya

Sanction No. and date -: Ref. No. NMHS/MG-2016/006/8504-7 Dt. 31-3-2016

Institution Name-: Botanical Survey of India, Kolkata & BSI, NRC, Dehradun

Personal Details -:

Name and Address of the PI-: Dr. Paramjit Singh, Director, Botanical Survey of India, CGO Complex, Salt Lake City, Kolkata-700064
Name and Address of the Co PI-: 1. Dr. B.K. Sinha, Scientist-F, BSI, Kolkata 2. Dr. Kumar Ambrish, Scientist-D, BSI, NRC, Dehradun

Partner Details-:

Sl. No.	Name/Address	Work assigned to partners	Fund allocated to partners during the period
1.	Dr. Paramjit Singh Director Botanical Survey of India, Kolkata	Floristic Assessment Preparation of Database, Documentation of comprehensive flora .	26,49,980
2.	Dr. Chandrasekar, Scientist-D G.B. Pant Institute of Himalayan & Development, Kosi Katarmal, Almora-263643, Uttarakhand	Ecological Studies, Analysis of ecosystem services, Impact of Climate Change on flora and vegetation.	7,81,323

Project Objectives -:

Objective(s) of the Project that will be achieved by the project

- Exploration and inventorisation of floristic diversity
- Estimation of endemism, categorization and reassessment of rare and threatened species of VoF and GHNP based on revised IUCN guidelines.

- Identification and documentation of economic/ socioeconomic uses of plants occurring within the park area along with future potentials of medicinal plants in the socioeconomy of local peoples.
- Ecological assessment (species richness, community structure, population structure, seasonal changes in plant community structure) of different groups of plants within the park and their role on the ecosystem along with functional dynamics and phenology.
- Impact of Anthropogenic and other factors on the plants.
- To identify the change in vegetation and species population due to climatic change and natural hazards including the assessment and impact of invasive species on indigenous flora.
- Detailed report on floristic and ecological studies along with conservation measures of RET species both *in-situ* and *ex-situ* in the proposed study area.
- To analyse the ecosystem services emanating from the National Park
- To establish the relationships between the structural and functional parameters of the flora in context with recent natural calamity in Uttarakhand and Himachal Pradesh states and to suggest measures for conservation of the plant diversity in the area.
- Create awareness programme for local community towards the biological conservation and sustainable use of biodiversity.

Completion in the last six months in % (According to each Deliverables):-

Sl. No.	Quantifiable Deliverables (as per sanction letter)	Output/ achievements	Performance in terms of Monitoring indicators	Remarks
1.	Preparation of plant database (Valley of Flowers National Park & Great Himalayan National Park)	70% complete Herbarium exsiccata of (Valley of Flowers and Great Himalayan National Park)	70% completed	Documented the plant diversity in Valley of Flowers National Park (Angiosperms: 800 taxa; Gymnosperms: 25; Pteridophytes: 30 taxa) based on herbarium and published literature. Further, a total of 05 taxa of bryoflora are also documented from Great Himalayan National Park, Himachal Pradesh
2.	Survey & Exploration of Floristic Diversity of	Tour to Valley of Flowers National Park undertaken w.e.f. 16 – 21 th April., 2017 and	40% achieved	Data of different seasons are required to analyze the entire plant diversity

	Valley of Flowers and Great Himalayan National Park	Great Himalayan National Park undertaken w.e.f. 11 th -27 th September ,2017 from Valley Of Flowers National Park ,collected 70 specimens of angiosperms (c.25 families), 04 specimens of gymnosperms (01 families) ,10 specimens of lichens (c. 05 families) and 10 specimens of Macro Fungus and from Great Himalayan National Park collected 270 specimens of Angiosperms (c.35 families),05 specimens of gymnosperms (c.01 families) , 13 specimens of lichens (c.05 families) 25 specimens of Macro Fungi &10 soil samples for the study of macro fungus. The preservation and identification of specimens are in progress.		patterns. Identified 265 species of Angiosperms, 6 species of lichens, 5 species of pteridophytes.
3.	Identification of RET Species (Valley of Flowers National Park & Great Himalayan National Park)	Total 12 Nos. RET species identified during survey work from both the National Parks (Valley of Flowers National Park & Great Himalayan National Park)	12% achieved	

Summary of progress:

I. Botanical Survey of India : A field survey was conducted two different National Park viz. Valley Of Flowers National Park, Chamoli (U.K.) & Great Himalayan National Park, Kullu, (H.P.) during 16th – 21th April, 2017 at Valley of Flowers National Park, Chamoli (U.K.) and 11th - 27th September, 2017 at Great Himalayan National Park, Kullu (H.P.) for the fulfillment of the objectives of the project assigned to BSI viz. Floristic Assessment, Ecological Analysis, Ecosystem Services, status assessment of threatened, endemic and medicinal plants, analysis of floristic changes and analysis of possible loss of plants in relation to climate and anthropogenic aspects.

A total number of specimens of 340 angiosperms (c. 60 families), 10 specimens of pteridophytes 2 specimens of gymnosperms (2 families) and 18 specimens of lichens (c. 05 families), 35 specimens of Macro Fungus & 10 soil samples were collected from both the National Parks (i.e. Valley Of Flowers and Great Himalayan National Park.) during survey work. The preservation and identification of specimens are in progress.

Total 12 RET species namely *Podophylum hexandrum* Royle, *Taxus wallichiana* Zucc., *Berberis aristata* DC., *Bergenia ciliata* (Haw.) Sternb, and *Rheum emodi* Wall. ex Meissn and *Trillium govaniatum* Wall. ex D. Don, *Berberis aristata* DC., *Zanthoxylum armatum* DC *Dioscorea deltoidea* Wall. ex Griseb., *Arnebia benthamii* (Wall. ex D. Don) I.M. Jhonst., *Arnebia euchroma* (Royle) I.M. Jhonst., *Pyrossia lanceolata* (L.) Farw. were identified during survey work.

2.GB Pant Institute of Himalayan Environment & Development :

A field survey was conducted during June and Aug 2017 at Valley of Flowers National Park and July at Great Himalayan National Park for ecological assessment of floristic diversity. A total of 150 specimens collected from Valley of Flowers National Park. Out of these, 124 specimens were identified and belong to 36 families. Asteraceae was the dominant family with 19 species. Ranunculaceae was the co-dominant with 9 species. (Fig 1). A total of 200 specimens collected

from Great Himalayan National Park. Out of these, 41 specimens were identified and belong to 23 families. (Fig 2). Identification of remaining specimens are in process.

The phytosociological study was conducted in different seasons at VOFNP. *Potentilla atosanguinea* Lodd., G. Lodd. & W. Lodd. was the most dominant species with the density of 14.47 ± 12.64 ind/m², followed by *Polygonum polystachyum* with the density of 4.63 ± 3.83 ind/m². The diversity of *Polygonum polystachyum* (Wallich ex Meissn.) was found in higher density and may be a major invasive plant in the valley. *Thermopsis barbata* Benth. showing the lowest density with 0.77 ± 0.23 ind/m² (Table 1).

Six threatened species namely *Polygonatum verticillatum* (L.) Alloni (1.71 ± 0.41 ind/m²), *Dactylorhiza hatagirea* (D. Don) Soo. (1.76 ± 0.38 ind/m²), *Fritillaria roylei* Hook. (0.42 ± 0.8 ind/m²), *Podophylum hexandrum* Royle (0.78 ± 0.02 ind/m²), *Angelica glauca* Edgew. (3.33 ± 2.25 ind/m²) and *Malaxis muscifera* (Lindl.) Kuntze (1.00 ± 0.02 ind/m²) were analyzed for status assessment and data was compared with earlier records (Kala, 2005) to define the floristic changes (Fig. 3). There was found massive decrease in the density of *Dactylorhiza hatagirea*, *Fritillaria roylei*, *Polygonatum verticillatum*, *Podophylum hexandrum* while density of *Angelica glauca* and *Malaxis muscifera* were found higher than earlier studies (Fig. 3).

Ecological data compilation of Great Himalayan National Park is in process.

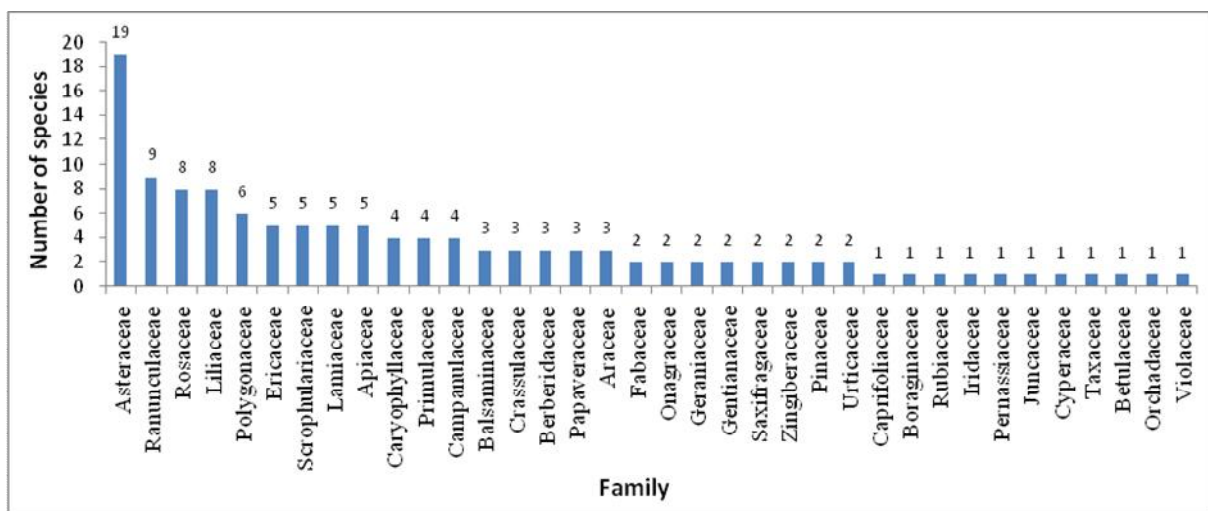


Fig 1. Distribution of species in each family in VOFNP.

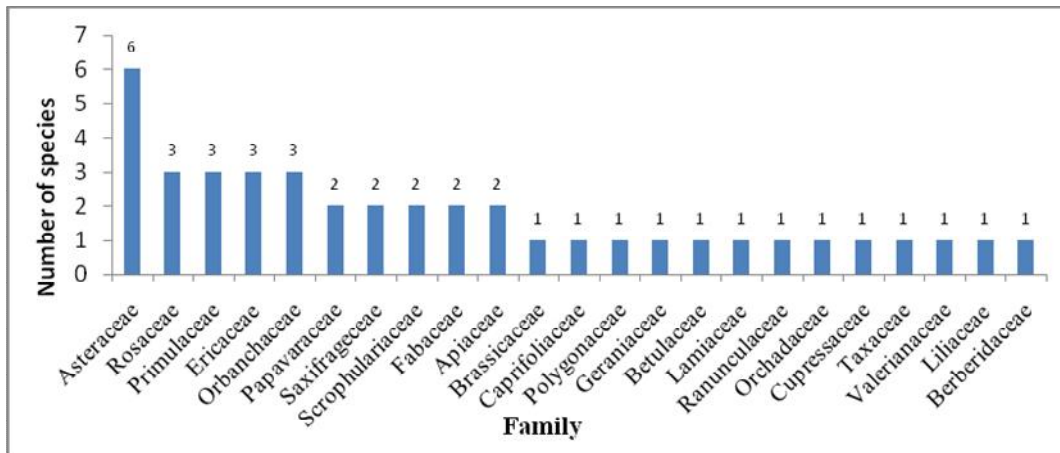


Fig 2. Distribution of species in each family in GHNP.

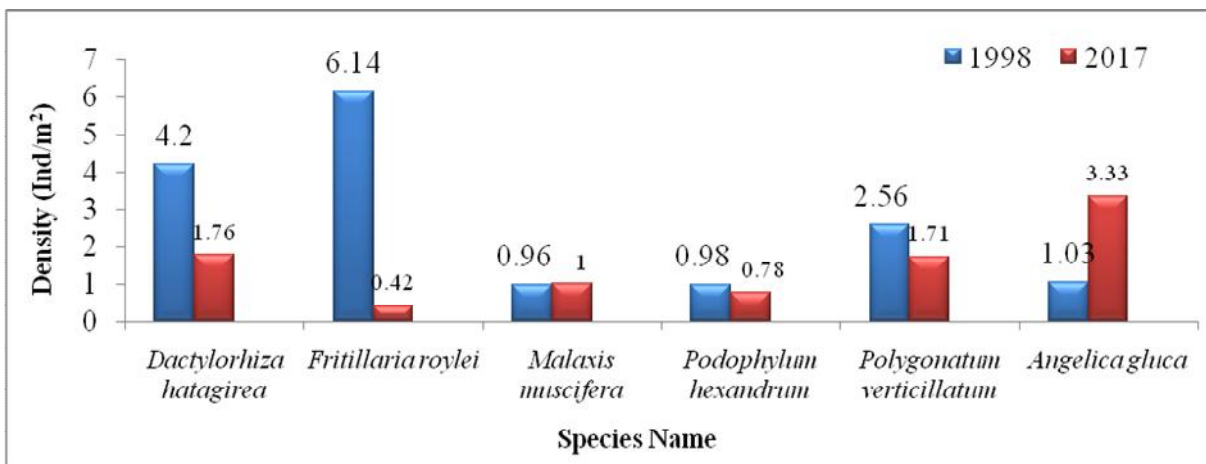


Fig 3. Comparative analysis of densities (Ind/m², SD) of threatened plants in VOFNP in 1998 and 2017

Table 1. Density of Dominant species in VOFNP

Sr.No	Name of the species	Family	Density (Ind/m ²) ± SD
1.	<i>Allium humile</i> Kunth	Amaryllidaceae	1.68 ± 1.66
2.	<i>Anemone tetrsepala</i> Royle	Ranunculaceae	3.12 ± 1.68
3.	<i>Angelica glauca</i> Edgew.	Apiaceae	3.33 ± 2.25

4.	<i>Dactylorhiza hatagirea</i> (D. Don) Soo	Orchidaceae	1.76 ± 0.38
5.	<i>Fritillaria roylei</i> Hook.	Liliaceae	0.42 ± 0.8
6.	<i>Hackelia uncinata</i> (Benth.) C.E.C. Fisch.	Boraginaceae	3.38 ± 5.17
7.	<i>Iris kumaonensis</i> Wall.	Iridaceae	2.13 ± 1.63
8.	<i>Lilium oxypetalum</i> (Royle) Baker	Liliaceae	1.30 ± 0.93
9.	<i>Malaxis muscifera</i> (Lindl.) Kuntze	Orchidaceae	1.00 ± 0.02
10.	<i>Podophyllum hexandrum</i> Royle	Podophyllaceae	0.78 ± 0.02
11.	<i>Polygonatum verticillatum</i> (L.) All.	Asparagaceae	1.1 ± 0.41
12.	<i>Polygonum polystachyum</i> Wall. ex Meisn.	Polygonaceae	4.63 ± 3.83
13.	<i>Potentilla atrosanguinea</i> Lodd., G. Lodd. & W. Lodd.	Rosaceae	14.47 ± 12.64
14.	<i>Selinum wallichianum</i> L.	Apiaceae	2.45 ± 1.68
15.	<i>Thermopsis barbata</i> Benth.	Fabaceae	0.77 ± 0.23



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