

National Mission on Himalayan Studies

HALF YEARLY PROGRESS REPORT

(Period from 1st April 2017 to 30th September 2017)

Project Title -: **Biodiversity Assessment through Long-term Monitoring Plots in Indian Himalayan Landscape (Project ID – NMHS/2015-16/LG-05)**

Sanction No. and date:- NMHS/LG-2016/011/8509-10, Dt. 31.03.2016

Institution Name:- **Botanical Survey of India (BSI)**

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Partner Details-:

Sl. No.	Name / Address	Work assigned to partners	Fund allocated to partners during the period (INR)
1	Botanical Survey of India (BSI)	Floral biodiversity assessment through long-term monitoring plots in Indian Himalayan Landscape	79,39,729
2	Zoological Survey of India (ZSI)	Faunal biodiversity assessment through long-term monitoring plots in Indian Himalayan Landscape	70,86,511

Project Objectives-:

1. To create a geospatial and genetic database on the flora of Himalaya and the climate change-induced impact on floral diversity of the region.
2. To establish long-term floral diversity monitoring plots across the Himalayan region.
3. To develop long-term monitoring protocols for selected indicator taxa in the region and to develop appropriate methodology for propagation of individual species for conservation.
4. To develop local level capacity building among students, teachers and NGO's in long-term monitoring through training programmes and publications for awareness.

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	Development of baseline data on the flora of Himalaya	Baseline floristic data of 6 sites were generated through literature review and by conducting 7 field tours to 6 IHR.	60%	An annotated checklist of 9090 belonging to 2050 genera and 228 families is prepared comprising information about the plant resources of 6 IHR states.
2	Development of baseline data on geospatial and genetic database of 6 sites on the representative taxa focusing on endemic / threatened / invasive-aliens	Baseline data of 13000 vouchers herbarium specimens from Himalayas is generated. Geo-spatial data of these specimens have been documented and analyzed with the help of ESRI Arc-Gis software.	40 %	A herbarium based database is generated having information of about more than 13000 herbarium sheets of himalayan plants available in different herbaria of Botanical Survey of India. All information related to geographic location, phenology, habit etc. were also taken into consideration.

3	Identification of the indicator taxa for prioritization of biodiversity conservation in selected sites.	Indicator taxa were identified in Great Himalayan National Park (H.P.), Valley of Flowers (Uttarakhand), Dzongri (Sikkim), Bum-la alpine zone and Zemithang forest (Tawang district, Arunachal Pradesh) and Neora Valley (West Bengal).	40 %	Phenological data of about 372 himalayan plants from different herbaria studied and data of last 100 years were analyzed. Based upon their shift on Phenology, a preliminary list of 20 species was selected as indicator taxa which will monitored further.
4	The establishment of long-term monitoring plots across ecosystems and habitat gradient in the 6 sites of Himalayas.	114 monitoring plots are established in the designed sites during this period and monitoring of 20 previously established plots were revisited and studied.	50 %	Plots were chosen on the basis of the availability of wide range of environmental gradients and with maximum diversity of the selected sites. All the plots were studied based upon the standard procedures.
5	Capacity building of local stake holders in 4 IHR states.	Plant identification manual and materials are being prepared for distribution among local stakeholders.	25 %	Local stake holders will be made aware of the plant resources of their locality along with their economic importance and conservation strategies will be prepared.

Summary of progress:-

A baseline data of plant diversity of all the assigned sites was prepared prior to field trips. The research staffs have conducted altogether 7 field trips to 5 IHR states for sampling, monitoring and establishment of long-term monitoring plots (Fig. 1-4, 9, 11, 13-14, 16, 22-24, 29, 34-36) as following

1. Namdapha Tiger Reserve (Arunachal Pradesh) from 26.03.2017 to 18.04.2017. [24 days]
2. Great Himalayan National Park (Himachal Pradesh) and Valley of Flowers (Uttarakhand) from 28.03.2017 to 24.04.2017. [28 days]
3. Neora Valley National Park (West Bengal) from 31.03.2017 to 16.04.2017. [17 days]
4. Dzongri, West Sikkim (Sikkim) from 06.08.2017 to 02.09.2017. [28 days]
5. Bum-la alpine zone and Zemithang forest of Tawang district (Arunachal Pradesh) from 08.08.2017 to 29.08.2017. [22 days]

6. Valley of Flowers (Uttarakhand) from 10.08.2017 to 01.09.2017. [23 days]

7. Great Himalayan National Park (Himachal Pradesh) from 02.09.2017 to 26.09.2017. [25 days]

Two herbarium consultation tours to Sikkim Himalayan Regional Centre (SHRC), BSI, Gangtok and Agharkar Research Institute, Pune were also conducted during this period. A total of 1715 plant specimens were collected from different sampling sites, which were preserved in Central National Herbarium, Howrah. Identification of the plants is partially done and is under process (Fig. 5-8, 10, 12, 15, 17, 25-28, 30-33, 37-41).

A total of 114 long-term monitoring plots are established and 20 previously established plots were monitored in each sampling area (Table 1). Quantitative account of different plant species (tree, shrub, herb and cryptogamic plants) was also recorded on the field for further ecological analysis. The indicator taxa in various landscapes were also chosen following themes like, indicators of environmental health, indicators of change in water quality, ecosystem dependency and bio-prospective species and threatened status of selected species.

List of publication under NMHS Project

Published : -

Articles in journals: 02

- V.Kumar, S.S. Dash, S. Panday, S. Lahiri, B. K. Sinha & P. Singh. Akaniaceae: A New Family Record for Flora of India and Lectotypification of the Name *Bretschneidera sinensis*. *Nelumbo*, 59(1): 01–09.
- D.S. Das, D.S. Rawat, N. Shrivastava, K. Ambrish, B.K. Sinha, P. Singh & S.S. Dash. 2017. A contribution to the flora of Great Himalayan National Park, Himachal Pradesh, India. *Nelumbo*, 59(1): 33–43.
- S.K. Das. 2017. A new species of heterocystous cyanoprokaryota from Sikkim, Eastern Himalayas (India). *Phykos* 47(2): 1–4.

Abstracts: 03

- Dinesh S. Rawat, S. Panday, V. Kumar, A. Banerjee, S.S. Dash, B.K. Sinha and M. Jha. 2017. Quantitative analysis of tree species in Neora Valley National Park, Eastern Himalaya, India. *In: Souvenir of National Seminar on “Understanding Himalayan Phytodiversity in Changing Climate”*. Botanical Survey of India, Sikkim Himalayan Regional Center, Gangtok, Sikkim. March 09–10, 2017. p. 31.
- Deep S. Das, Dinesh S. Rawat, N. Srivastava, S.S. Dash and B.K. Sinha. 2017. Floristic Diversity of Great Himalayan National Park, Western Himalaya, India: New Additions. *In: Souvenir of National Seminar on “Understanding Himalayan Phytodiversity in Changing Climate”*. Botanical Survey of India, Sikkim Himalayan Regional Center, Gangtok, Sikkim. March 09–10, 2017. p. 36.
- Subhajt Lahiri, S.S. Dash, B.K. Sinha and P. Singh. 2017. A preliminary appraisal of community structure of Gnathang Valley, East Sikkim. *In: Souvenir of National Seminar on “Understanding Himalayan Phytodiversity in Changing Climate”*.

Botanical Survey of India, Sikkim Himalayan Regional Center, Gangtok, Sikkim.
March 09–10, 2017. p. 52.

Popular articles: 03

- Vikas Kumar, Samiran Panday, B.K. Sinha and S.S. Das. 2017. Namdapha Rashtriya Udhyan ki vanaspati sampada: Ek parichay. *Vanaspativani* 26: 1–5.
- Dinesh S. Rawat, Deep S. Das and Nikesh Kumar. 2017. Nag Chhatri: Ek sankchhipt parichay. 2017. *Vanaspativani* 26: 100.
- Subhajit Lahiri and Madhav K. Jha. 2017. Dzungri yatra vritant. *Vanaspativani* 26: 106–107.

Communicated:

- Population structure and regeneration status of tree species in the Neora Valley National Park, Eastern Himalaya: A long term monitoring approach.

Under preparation:

- *Goodyera schlechtendaliana* var. *robusta* Av. Bhattacharjee & H.J. Chowdhery [Orchidaceae]: A new distributional record for West Bengal.
- *Brandisia rosea* var. *flava* C.E.C. Fisch. – a very rare and lesser known plant recollected from Arunachal Pradesh, India.
- A new species of *Encyonema* Kützing (Baccilariophyta), from Neora Valley National Park (Eastern Himalayas), India.

List of supporting data files/ maps/ tables/ figures attached:-

Table 1: Location and GPS data of the monitoring plots in the sampling sites.

Figures 1-41: Location map of study sites with panoramic view of the landscapes of the sites and the photographs of the plants collected.

Name of the PI:- Paramjit Singh

Signature -:

Date-

Table 1: Location and GPS data of the newly established and previously existing monitoring plots which are sampled and monitored during 01.04.2017 to 30.09.2017.

Plot No.	Latitude	Longitude	Altitude (m)	Slope	Aspect	Remarks
A. Neora Valley National Park, West Bengal						
Grid No. 1. PHE area						
1	27°06'12.7" N	88°43'21.5" E	2207	x	x	Monitored
2	27°06'05.2" N	88°43'23.0" E	2229	x	x	Monitored
3	27°05'57.6" N	88°43'24.3" E	2203	53°	x	Monitored
4	27°05'50.3" N	88°43'28.3" E	2156	x	x	Monitored
5	27°05'46.7" N	88°43'29.5" E	2187	52°	SE	Monitored
6	27°05'42.3" N	88°43'34.8" E	2212	60°	N	Monitored
7	27°05'50.4" N	88°43'33.3" E	2167	x	x	Monitored
8	27°05'52.8" N	88°43'29.8" E	2162	x	x	Monitored
9	27°05'54.9" N	88°43'28.1" E	2171	x	x	Monitored
10	27°05'57.1" N	88°43'25.1" E	2213	40°	x	Monitored
Grid No. 3. Chaudhapheri area						
1	27°05'35.8" N	88°42'12.5" E	2385	50°	NE	Monitored
2	27°05'32.8" N	88°42'20.1" E	2402	x	x	Monitored
3	27°05'30.4" N	88°42'26.2" E	2402	x	S	Monitored
4	27°05'37.2" N	88°42'10.2" E	2401	35°	SE	Monitored
5	27°05'40.0" N	88°42'13.6" E	2429	65°	N-NW	Monitored
6	27°05'41.2" N	88°42'19.0" E	2456	25°	S-SE	Monitored
7	27°05'42.2" N	88°42'21.2" E	2474	60°	SW-S	Monitored
8	27°05'25.8" N	88°42'03.3" E	2338	40°	NE	Monitored
9	27°05'14.8" N	88°41'59.2" E	2327	22°	SE	Monitored
10	27°05'08.1" N	88°41'55.1" E	2349	28°	S	Monitored
Grid No. 4. Doley area						
1	27°04'13.53" N	88°42'32.93" E	1945	14.5 °	W	New
2	27°04'10.35" N	88°42'31.31" E	2006	8.5 °	WS	New
3	27°04'09.63" N	88°42'35.49" E	2035	19.2°	S	New
4	27°04'14.46" N	88°42'36.10" E	1958	39.2°	EN	New
5	27°04'09.26" N	88°42'41.65" E	2023	19°	x	New
6	27°04'12.25" N	88°42'45.54" E	1975	27°	EN	New
7	27°04'16.91" N	88°42'36.54" E	2080	52°	ES	New
8	27°04'15.96" N	88°42'36.22" E	2074	7.5°	SW	New
9	27°04'44.42" N	88°42'26.32" E	2085	38°	x	New
10	27°04'47.33" N	88°42'19.86" E	2131	29°	x	New
Grid No. 5. Barkhe Dara area						
1	27°00'58.90" N	88°46'41.01" E	1070	7.5°	NE	New
2	27°01'00.00" N	88°46'42.64" E	900	20°	ES	New
3	27°01'05.03" N	88°46'41.36" E	988	16.5°	NW	New
4	27°01'01.02" N	88°46'41.87" E	927	24 °	SE	New
5	27°01'15.34" N	88°46'42.85" E	997	11.5°	x	New
6	27°01'04.07" N	88°46'42.59" E	969	3°	x	New
7	27°01'08.50" N	88°46'46.39" E	947	8.9°	SW	New

8	27°00'52.91" N	88°46'43.40" E	949	4.5°	SE	New
9	27°00'48.99" N	88°46'46.24" E	885	2.5°	S	New
10	27°00'46.05" N	88°46'49.49" E	926	4.5°	S	New
B. Dzungri, Sikkim						
Grid No. 1. Dzungri and Doring						
1	27°28' 36.37"	88° 09'38.93"	3993			New
2	27°28' 31.63"	88° 09'37.24"	3836			New
3	27°28' 34.25"	88° 09'45.10"	4031			New
4	27°28' 34.32"	88° 09'48.94"	4060			New
5	27°28' 42.81"	88° 09'30.68"	4008			New
6	27°28' 48.12"	88° 09'26.18"	3968			New
7	27°28' 56.18"	88° 09'15.38"	4043			New
8	27°28' 39.17"	88° 09'30.56"	4088			New
9	27°28' 22.29"	88° 09'41.18"	4110			New
10	27°28' 29.38"	88° 09'39.40"	4010			New
C. Namdapha National Park, Arunachal Pradesh						
Grid No. 1. Happy Valley area						
1	27°30'19.2" N	96°23'21.7" E	373	X	X	New
2	27°30'32.9" N	96°23'22.0" E	387	X	X	New
3	27°30'49.3" N	96°23'19.4" E	420	X	X	New
Grid No. 2. Haldibari area						
1	27°31'24.4" N	96°24'13.6" E	489	X	X	New
2	27°31'29.2" N	96°24'26.2" E	512	X	X	New
3	27°31'28.2" N	96°24'36.9" E	512	X	X	New
4	27°30'22.3" N	96°23'42.5" E	380	X	X	New
5	27°30'40.9" N	96°23'43.1" E	384	X	X	New
6	27°30'57.7" N	96°23'40.9" E	393	X	X	New
7	27°31'12.8" N	96°23'38.9" E	378	X	X	New
8	27°31'28.6" N	96°23'45.7" E	406	X	X	New
9	27°31'28.3" N	96°23'53.8" E	469	X	X	New
Grid No. 3. Camera Point area						
1	27°52'3.36" N	95°56'11.04" E	518	X	X	New
2	27°51'58.35" N	95°56'02.15" E	512	X	X	New
3	27°52'02.14" N	95°55'10" E	510	X	X	New
4	27°52'02.95" N	95°56'11" E	511	X	X	New
Grid No. 4. 25-miles area						
1	27°28'33.4" N	96°24'46.4" E	501	X	X	New
2	27°27'56.0" N	96°24'40.0" E	526	X	X	New
D. Valley of Flowers National Park, Uttarakhand						
1	30°43'19.28" N	79°35'20.54" E	3515	-	N	New
2	30°43'32.12" N	79°35'28.59" E	3534	-	N	New
3	30°43'37.01" N	79°35'40.48" E	3556	-	N	New
4	30°43'26.02" N	79°35'49.99" E	3506	-	N	New
5	30°43'32.02" N	79°35'53.35" E	3520	-	N	New
6	30°43'37.44" N	79°35'57.62" E	3548	-	N	New
7	30°43'24.66"N	79°35'14.46"E	3595	-	N	New

8	30°43'23.25"N	79°35'9.26"E	3630	-	N	New
9	30°43'10.93"N	79°34'53.97"E	3776	-	N	New
10	30°43'4.15"N	79°34'43.71"E	3820	-	N	New
11	30°42'56.49" N	79°34'27.71" E	3924	-	N	New
12	30°43'31.89"N	79°35'59.95"E	3505	-	N	New
13	30°43'31.85"N	79°36'4.92"E	3497	-	N	New
14	30°43'36.25"N	79°36'13.16"E	3503	-	N	New
15	30°43'35.72"N	79°36'26.72"E	3529	-	N	New

E. Great Himalayan Park National Park, Himachal Pradesh

Grid No. 1. Rolla area

1	31°41'05.83" N	77°30'39.41" E	2368	45	N	New
2	31°40'59.01" N	77°30'26.89" E	2323	-	-	New
3	31°40'55.19" N	77°30'19.10" E	2343	-	-	New
4	31°40'55.32" N	77°30'15.01" E	2391	-	-	New
5	31°40'50.90" N	77°30'06.02" E	2318	70	NW	New
6	31°40'47.81" N	77°29'56.93" E	2231	-	-	New
7	31°40'46.56" N	77°29'42.25" E	2209	-	-	New
8	31°40'37.30" N	77°29'25.90" E	2189	-	-	New
9	31°40'57.10" N	77°29'09.03" E	2667	60	NE	New
10	31°40'57.10" N	77°29'09.03" E	2630	-	-	New
11	31°40'57.10" N	77°29'09.03" E	2602	-	-	New
12	31°40'57.10" N	77°29'09.03" E	2442	-	-	New
13	31°40'57.10" N	77°29'09.03" E	2150	-	-	New
14	31°40'57.10" N	77°29'09.03" E	2137	-	-	New
15	31°40'57.10" N	77°29'09.03" E	2172	-	-	New
16	31°40'57.10" N	77°29'09.03" E	2248	-	-	New
17	31°40'57.10" N	77°29'09.03" E	2266	-	-	New

Grid No. 2. Shakti-Humkani-Maror area

1	31°47'14.0" N	77°32'07.00" E	2294	45	NE	New
2	31°47'13.5" N	77°31'57.5" E	2359	40	NE	New
3	31°47'08.85" N	77°32'00.54" E	2333	40	NE	New
4	31°47'02.60" N	77°32'05.67" E	2289	25	W	New
5	31°47'04.60" N	77°32'10.06" E	2922	40	S-SW	New
6	31°47'21.52" N	77°31'09.11" E	2920	40	SW	New
7	31°47'19.84" N	77°31'35.97" E	2787	35	S	New
8	31°47'16.20" N	77°31'41.96" E	2728	45	SW	New
9	31°47'18.03" N	77°29'37.74" E	2621	40	S	New
10	31°47'20.40" N	77°30'28.60" E	2551	50	S-SW	New
11	31°47'23.06" N	77°30'11.55" E	2470	80	SW	New
12	31°47'20.96" N	77°30'03.31" E	2346	35	SW	New
13	31°46'38.14" N	77°29'11.65" E	2547	45	NE-N	New
14	31°46'40.25" N	77°28'59.35" E	2590	50	N-NW	New
15	31°46'44.10" N	77°29'08.60" E	2700	40	N	New

16	31°46'54.46" N	77°29'13.09" E	2753	35	E	New
17	31°46'57.85" N	77°29'24.44" E	2649	50	E-SE	New
18	31°47'04.15" N	77°29'26.73" E	2412	60	SE	New
19	31°47'08.40" N	77°29'27.47" E	2505	65	N-NW	New
20	31°47'13.94" N	77°29'23.01" E	2550	75	S	New

Grid No. 3. Parkachi area

1	31°47'39.92" N	77°36'48.82" E	3126	45	SE-E	New
2	31°47'54.58" N	77°36'11.35" E	3052	45	S-SW	New
3	31°47'58.64" N	77°35'55.56" E	3036	10	SE	New
4	31°48'05.31" N	77°35'58.03" E	3107	30	NW	New
5	31	77	3107	-	-	New
6	31°48'10.40" N	77°37'36.74" E	3366	-	-	New
7	31°48'08.73" N	77°37'29.80" E	3338	-	-	New
8	31°48'04.59" N	77°37'22.66" E	3283	-	-	New
9	31°47'57.48" N	77°37'13.75" E	3233	-	-	New
10	31°47'49.32" N	77°37'05.50" E	3195	-	-	New
11	31°47'44.35" N	77°36'57.88" E	3162	-	-	New
12	31°47'06.39" N	77°36'58.62" E	3157	-	-	New
13	31°47'13.71" N	77°36'59.10" E	3144	-	-	New
14	NA	NA	NA	-	-	New
15	NA	NA	NA	-	-	New
16	NA	NA	NA	-	-	New
17	31°40'20.62" N	77°29'15.68" E	2266	-	-	New
18	31°48'04.63" N	77°36'06.63" E	3167	-	-	New
19	31°48'04.59" N	77°36'11.10" E	3208	80	-	New
20	31°48'00.12" N	77°36'16.09" E	3169	-	-	New
21	31°48'01.14" N	77°36'19.39" E	3210	-	-	New
22	31°48'03.29" N	77°36'26.66" E	3339	-	-	New
23	31°48'05.53" N	77°36'28.44" E	3439	-	-	New
24	31°47'54.22" N	77°36'19.46" E	3112	-	-	New

F. Tawang district, Arunachal Pradesh

Grid No. 1. Zemithang Area

1.	27°42'39.63"N	91°43'54.92"E	2182	-	-	SW
2.	27°42'26.79"N	91°43'45.75"E	2146	-	-	S
3.	27°42'14.25"N	91°43'49.10"E	2147	-	-	W
4.	27°42'03.28"N	91°43'46.55"E	2154	-	-	SW
5.	27°43'39.89"N	91°43'08.32"E	2137	-	-	N
6.	27°43'43.67"N	91°43'20.90"E	2135	-	-	S
7.	27°44'14.20"N	91°42'26.21"E	2182	-	-	N
8.	27°43'16.71"N	91°42'56.25"E	2614	-	-	NE
9.	27°43'25.79"N	91°42'55.19"E	2571	-	-	E
10.	27°43'31.24"N	91°43'00.47"E	2517	-	-	N
11.	27°37'40.62"N	91°51'30.40"E	2531	-	-	W

Grid No. 2. Bumla Area

12.	27°37'40.62"N	91°51'30.40"E	3863	-	-	E
13.	27°38'49.29"N	91°51'42.97"E	4044	-	-	N

14.	27°38'52.88"N	91°51'46.00"E	4087	-	-	W
15.	27°39'06.20"N	91°51'40.39"E	4100	-	-	N
16.	27°39'20.26"N	91°51'44.23"E	4131	-	-	W
17.	27°39'49.73"N	91°51'32.63"E	4173	-	-	SW
18.	27°40'20.88"N	91°51'19.14"E	4279	-	-	SW
19.	27°40'53.95"N	91°51'16.30"E	4240	-	-	--
20.	27°41'35.57"N	91°50'52.73"E	4257	-	-	NW
21.	27°42'47.12"N	91°49'59.68"E	3963	-	-	---
22.	27°43'00.28"N	91°49'45.57"E	3857	-	-	--
23.	27°43'05.52"N	91°49'36.93"E	3814	-	-	NW

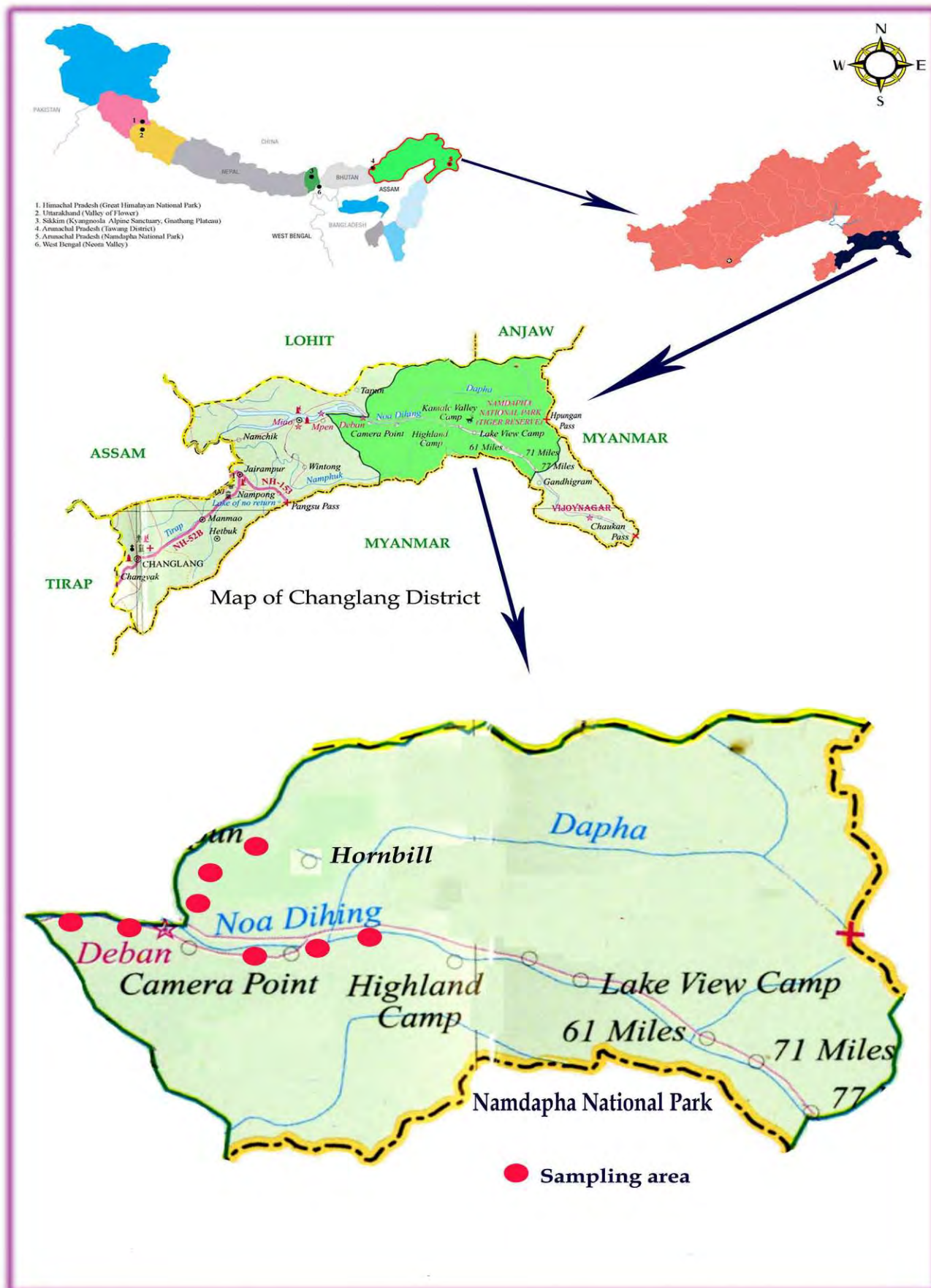


Fig. 01 - Location map of monitoring plots in Namdapha National Park, Arunachal Pradesh



Fig. 02 - Panoramic views of Namdapha N.P. - a. Happy valley; b. Camera point; c. Deban hills



Fig. 03 - Panoramic views of Namdapha; a. Riverine forest; b. Evergreen forest near Hombill; c. Grass land near Deban



Fig. 04 -a - d. Ecological study; e. Collection of plant specimen and field data; f. Plant processing and incorporation of field data



Fig. 05- a. *Aeschynanthus gracilis*; b. *Pseudocaryopteris foetida*; c. *Henckelia pumila*; d. *Davallia griffithiana*; e. *Dicliptera chinensis*; f. *Dipteris wallichii*; g. *Disporum calcaratum*; h. *Eria lasiopetala*

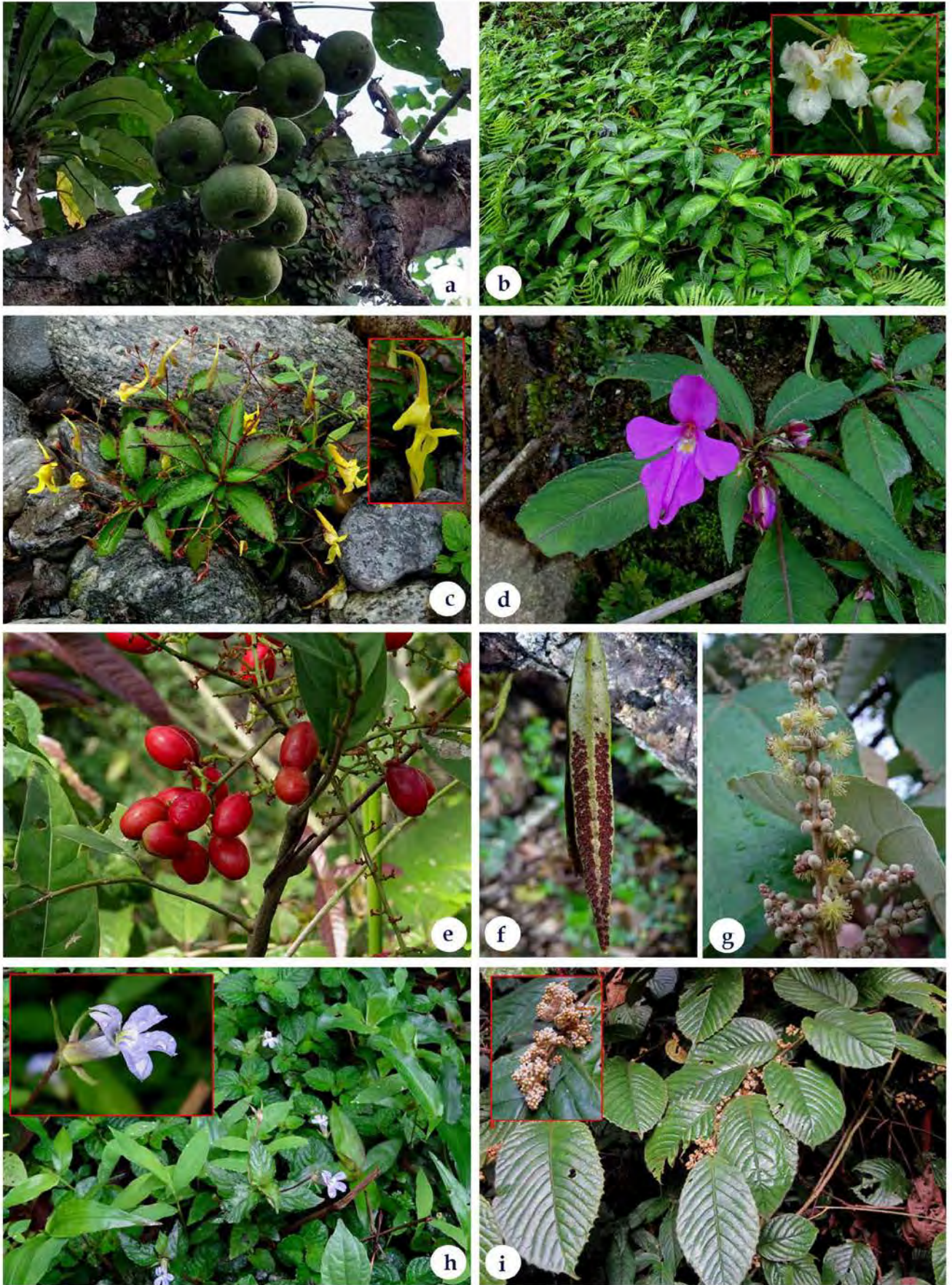


Fig. 06- a. *Ficus auriculata*; b. *Impatiens arguta*; c. *I. drepanophora*; d. *I. latiflora*; e. *Lepisanthes rubiginosa*; f. *Pyrrhosia lanceolata*; g. *Mallotus roxburghianus*; h. *Lobelia zeylanica*; i. *Maesa truncata*

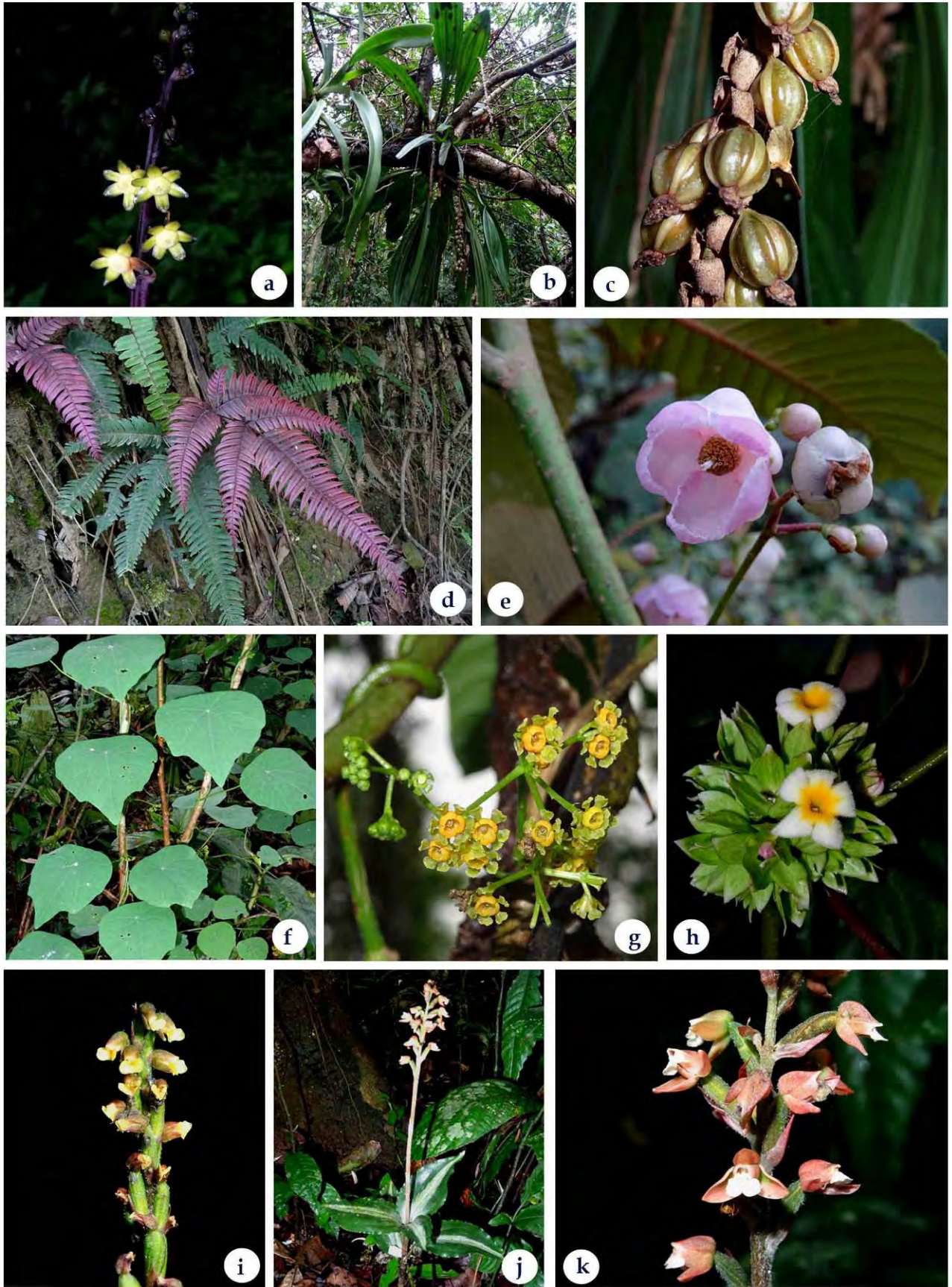


Fig. 07- a. *Peliosanthes teta*; b - c. *Pholidota imbricata*; d. *Pteris arisansis*; e. *Saurauia nepaulensis*; f - g. *Stephania rotunda*; h. *Silvianthus bracteatus*; i. *Zeuxine flava*; j - k. *Z. nervosa*

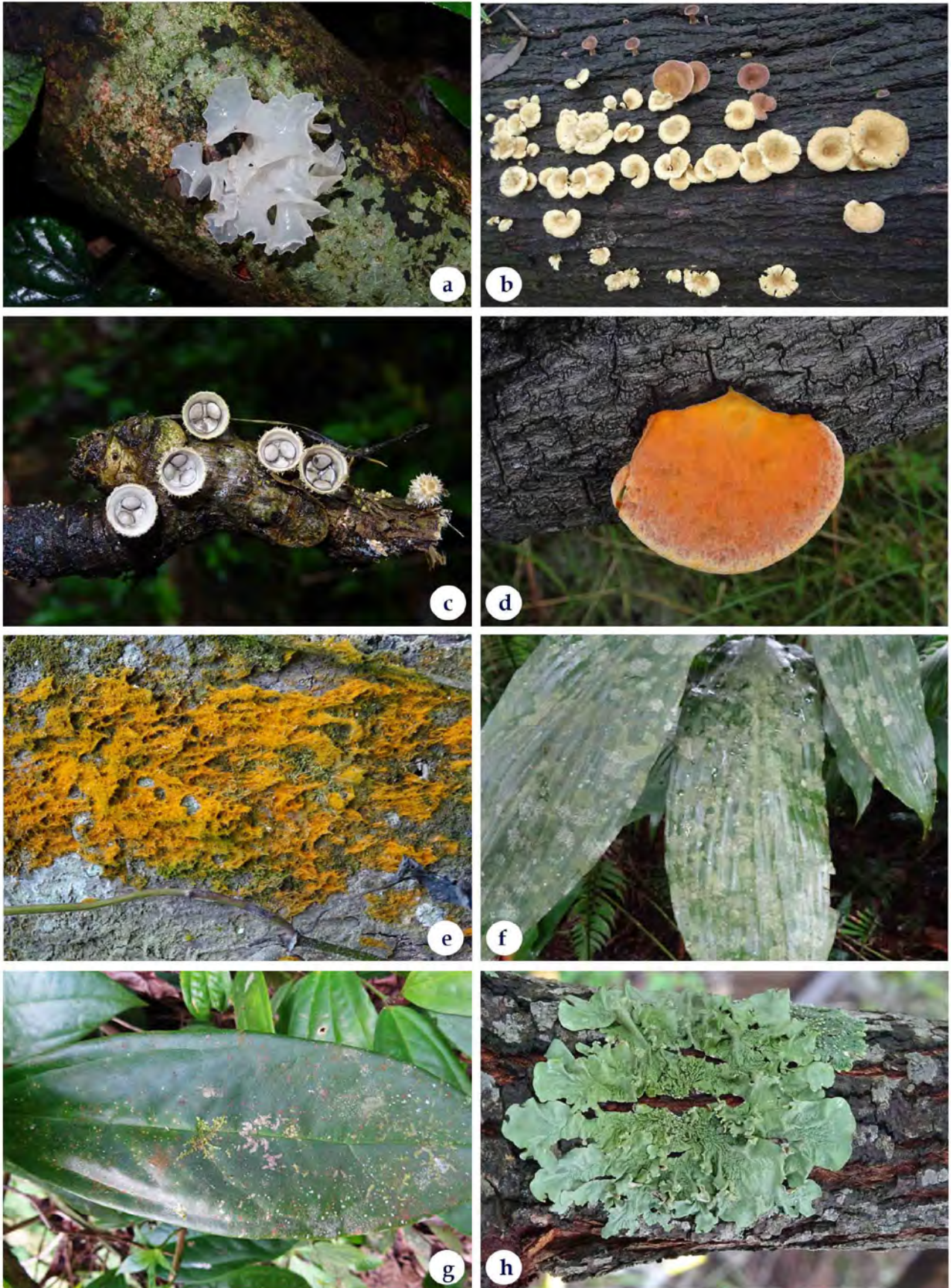


Fig. 08 - a. *Tremella fuciformis*; b. *Microporus* sp.; c. *Cyathus stercoreus*; d. *Polyporus* sp; e. *Trentepohlia* sp.; f. *Epiphyllus* lichens; g. *Epiphyllus* liverworts; h. *Flavoparmelia* sp.

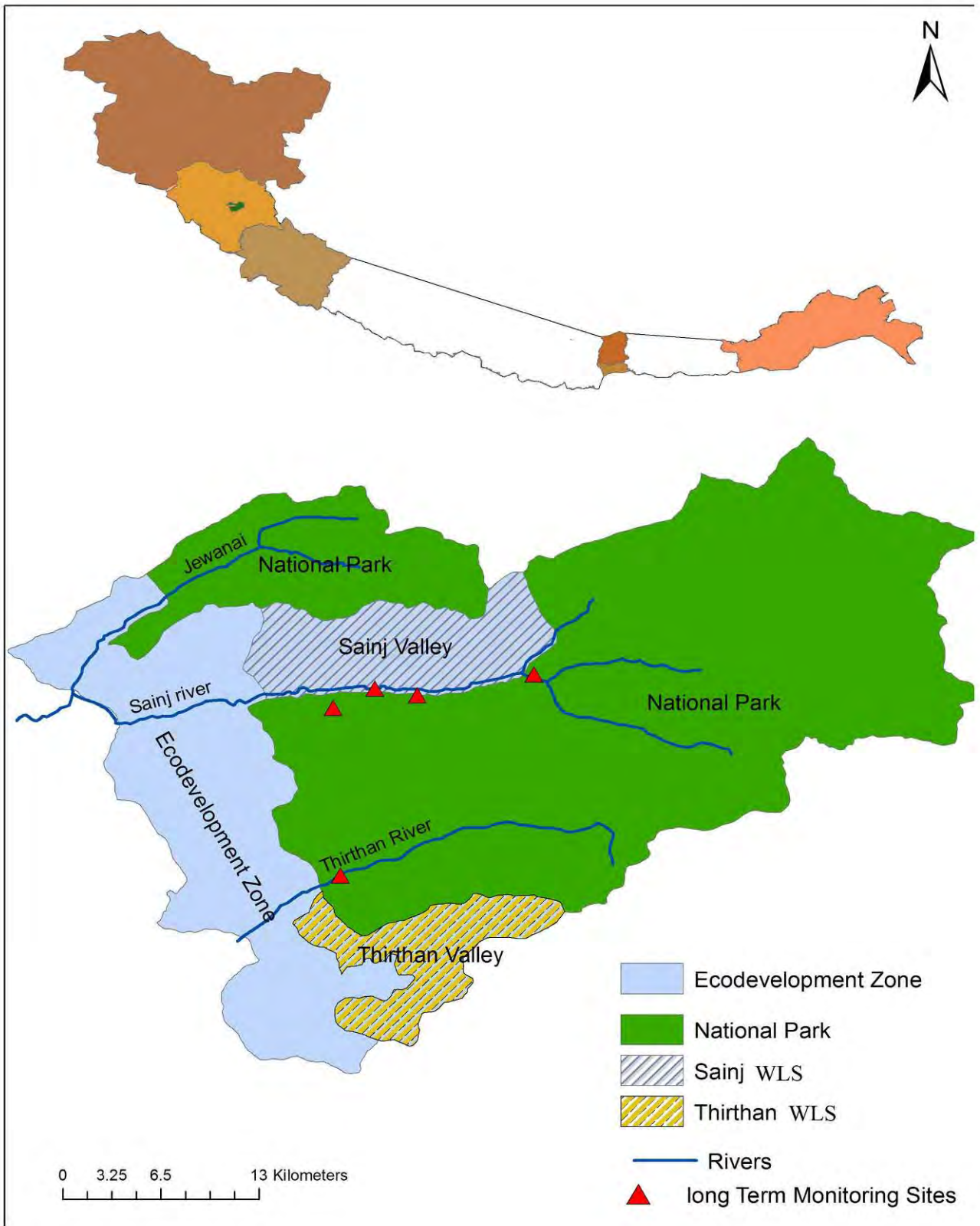


Fig. 09 - Map showing the sites of monitoring plots of Great Himalayan National Park, Himachal Pradesh



Fig. 10 – a. *Salvia* sp., b. *Hypericum* sp., c. *Oxalis acetosella*, d. *Silene* sp., e. *Rubus* sp., f. *Clematis* sp., g. *Viburnum* sp., h. *Valeriana* sp.



Fig. 11 - Landscapes of Great Himalayan National Park, Himachal Pradesh



Fig. 12 - a. *Cautleya spicata*, b. *Swertia* sp., c. *Potetilla* sp., d. *Aconitum heterophyllum*, e. *Spiranthes sinensis*, f. *Inula grandiflora*, g. *Silene* sp., h. Earth Star, i. *Prunella vulgaris*.

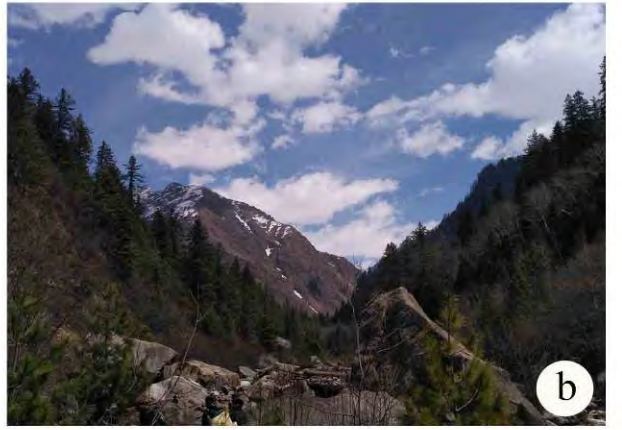


Fig. 13-Panoromic view of different areas of GHNP; (a) Maror, (b) Brahamchari, (c) Shighur, (d) (g) Parkachi, (h) Shakti



Fig. 14 - Field activities at Great Himalayan National Park, Himachal Pradesh

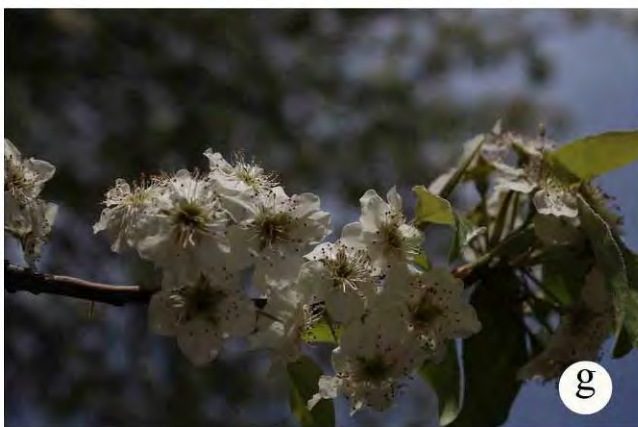


Fig. 15 -(a) *Gentiana* sp., (b) *Stellaria* sp., (c) *Primula* sp., (d) *Trillium* sp., (e) *Fragaria* sp., (f) *Betula utilis*, (g) *Pyrus* sp., (h) *Taraxacum* sp.



Fig. 16 - Landscape view of Valley of Flowers, Uttarakhand



Fig 17-a. *Meconopsis aculeata*, b. *Sassurea obvallata*, c. *Halenia elliptica*, d. *Campanula latifolia*, e. *Epilobium latifolium*, f. *Balanophora involucrata*, g. *Trillium govianum*, h. *Codonopsis* sp., i. Fungi, j. *Aconitum* sp., k. *Cassiope fastigiata*

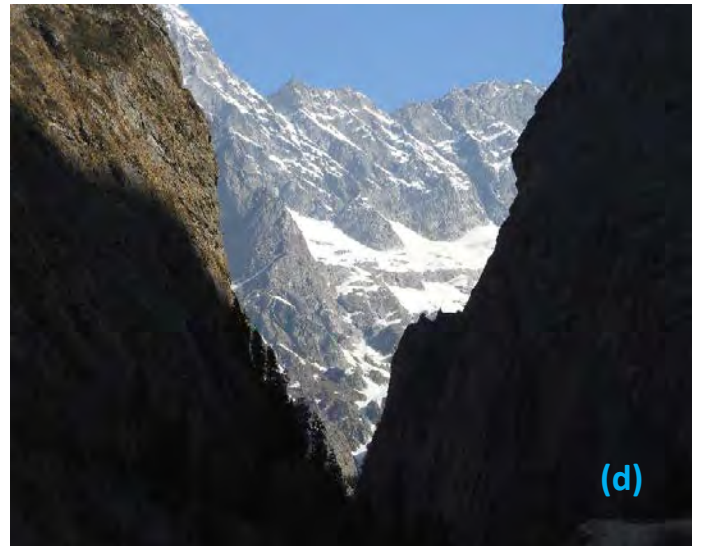


Fig. 18: a–d. Views of the Valley of Flowers area; e. A group of himalyan tahr near Ghangaria; f. A flood affected village on they trekking route of valley of flowers.

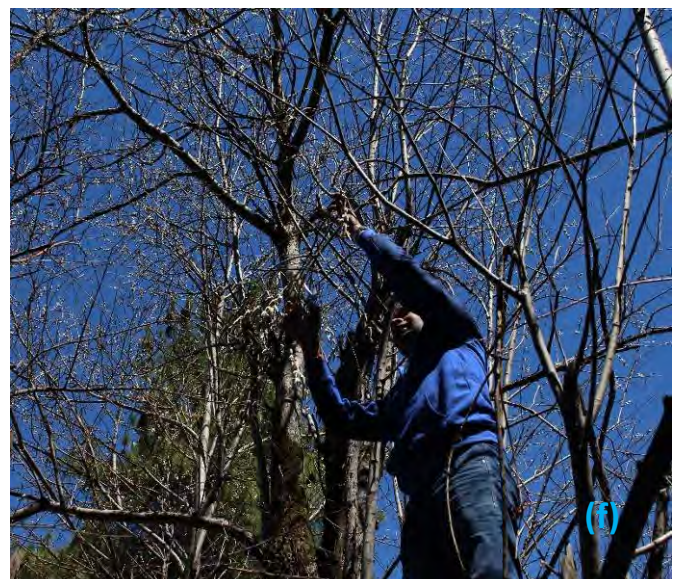


Fig. 19: a–f. Field activities during tour in the Valley of Flowers area.



Fig. 20: a. *Prunus cornuta*, b. *Taxus wallichiana*, c. *Primula denticulata*, d. *Corydalis* sp., e. *Gentiana* sp. and f. *Caltha palustris*.



Fig. 21: **a.** *Ainsliaea latifolia*, **b.** Unidentified (*Brassicaceae* member), **c.** *Bergenia ciliata*, **d.** *Trifolium repens*, **e.** *Thamnocalamus* sp. and **f.** *Sinopodophyllum hexandrum*.

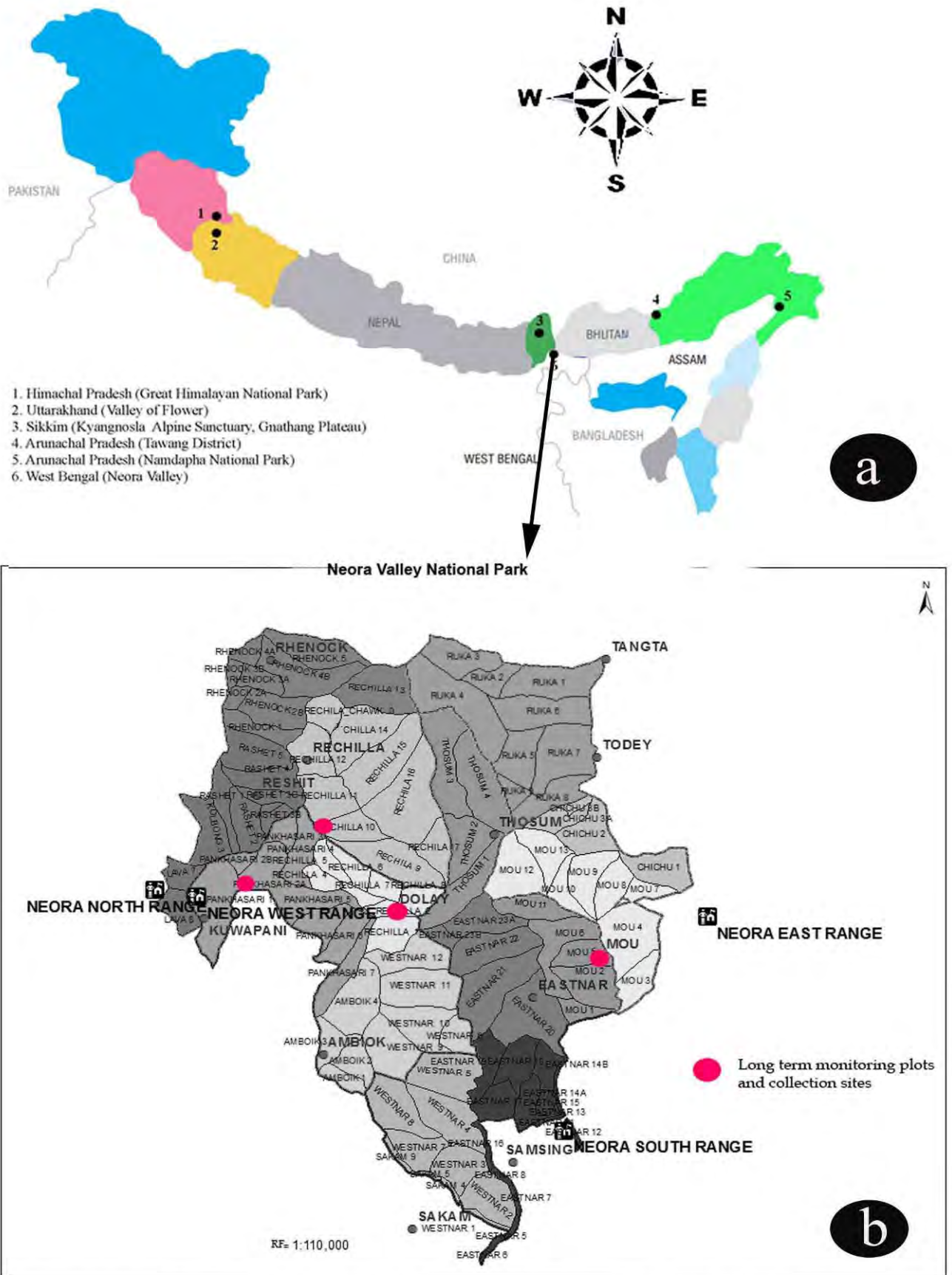


Fig. 22-(a) Map of selected sites under NMHS, (B) Studies sites in Neora Valley N.P. (West Bengal).



Fig. 23-Paranomic view of Neora Valley National Park, West Bengal
(a) Forest View From Chaudaferi camp, (b) On the way to Jaributi Camp from PHE camp, (c) Jaributi camp ,(d) Barkhe Dara camp .



Fig. 25 - (a) *Rhododendron grande* Wight, (b) *Rhododendron arboreum* Sm., (c) *Arisaema nepenthoides* (Wall.) Mart. ex Schott & Endl., (d) *Machilus duthiei* King, (e) *Berberis insignis* Hook.f. & Thomson, (f) *Daphne bholua* Buch.-Ham. ex D. Don, (g) *Lobelia montana* Reinw. ex

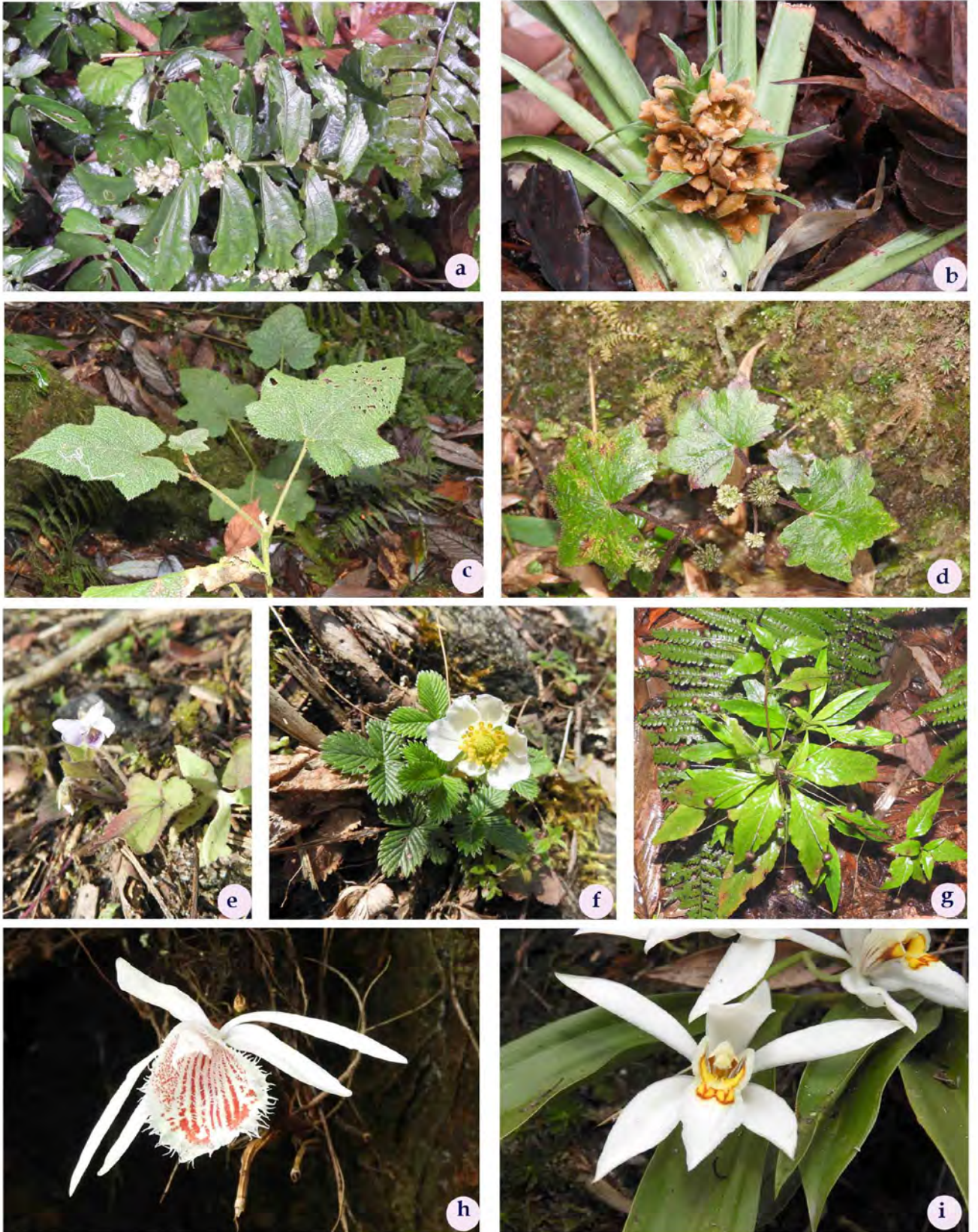


Fig. 26-(a) *Elatostema lineolatum* Wight , (b) *Tupistra grandistigma* F.T.Wang & S.Yun Liang , (c) *Rubus moluccanus* auct. , (d) *Hydrocotyle* sp. , (e) *Viola* sp. , (f) *Fragaria* sp. , (g) *Lysimachia laxa* Baudo , (h) *Pleione praecox* D. Don. , (i) *Coelogyne corymbosa* Lindl. .

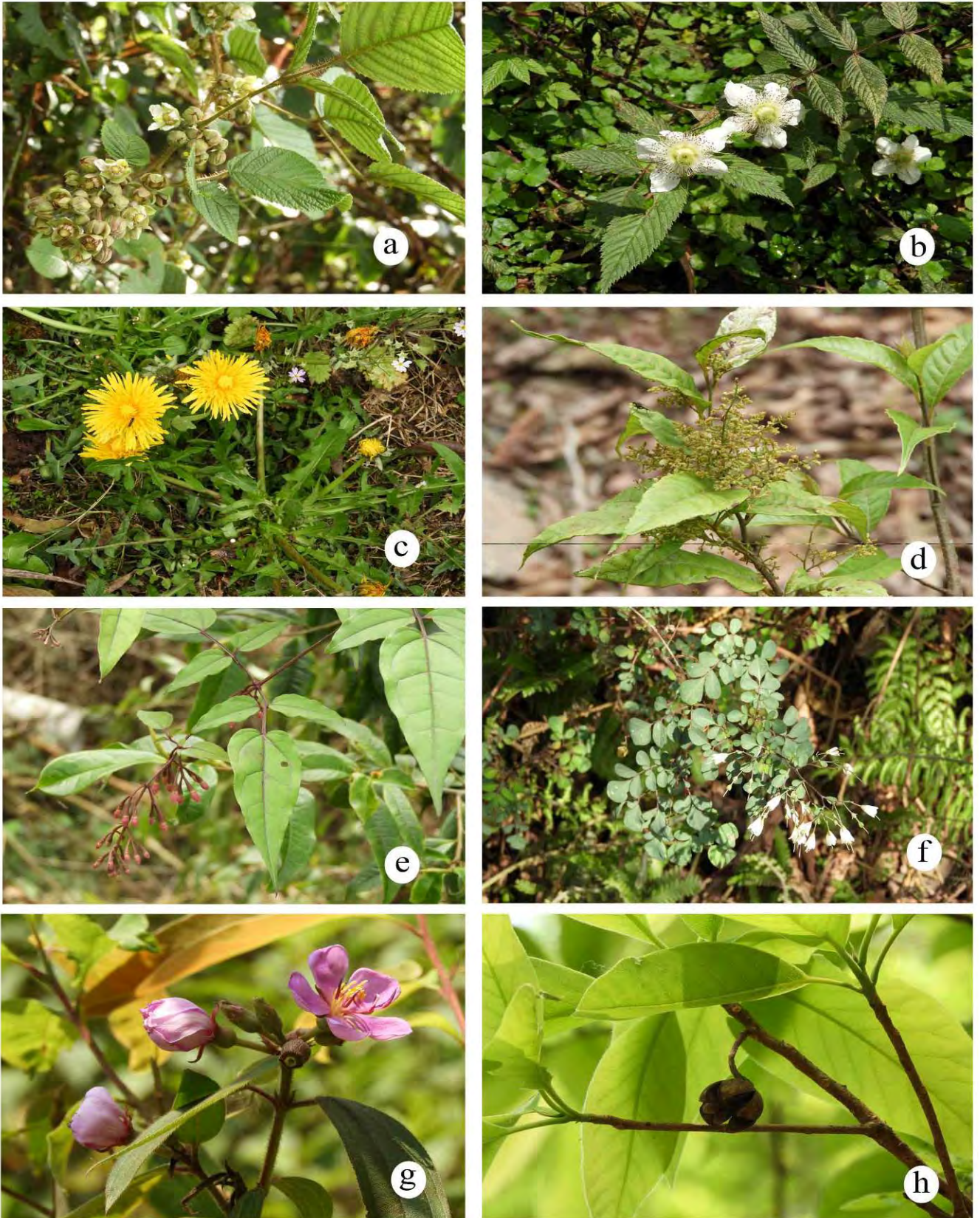


Fig. 27-(a) *Rubus ellipticus* Sm., (b) *Rubus rosifolius* Sm., (c) *Taraxacum officinale* (L.) Weber ex F.H.Wigg., (d) *Maesa indica* (Roxb.) A. DC., (e) *Jasminum dispernum* Wall., (f) *Boenninghausenia* sp., (g) *Melastoma malabathricum* L., (h) *Schima wallichii* Choisy.



Fig. 28-Cryptogams collected from Neora Valley National Park , (a) to (c) Fungi, (d) to (f) Bryophytes .



Fig. 29 - a. View Singalila range from Dzongri top; b. Trekking route of Dzongri; c. During Ecological Assessment at Dzongri; d. View of Dzongri Landscape; e. View of Bakhim; f. During Marking of 20m x 20m permanent plot; g. Our team at Dzongri; h. View of Mt. Padmin from Phedang; i. Grazing at Doring; j. Lake at Doring; k. One of landslide prone area between Sachen & Bakhim

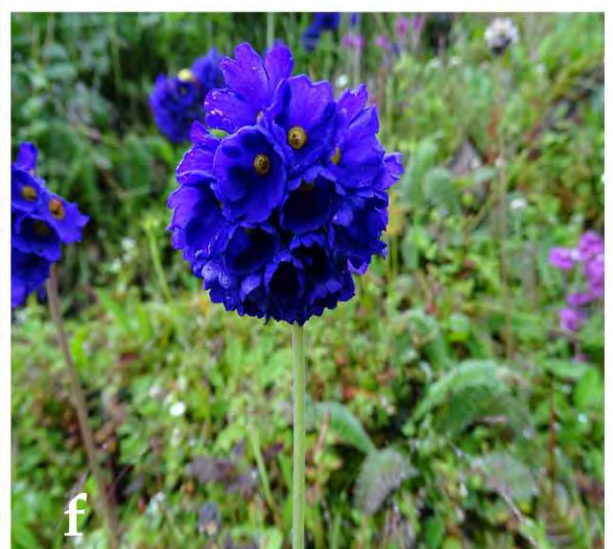


Fig. 30-a. *Caltha palustris* L.; b. *Cyananthus pedunculatus* C.B. Clarke; c. *Pedicularis siphonantha* D. Don; d. *Spiraea canescens* D. Don ; e. *Rhododendron setosum* D. Don.; f. *Primula capitata* Hook.

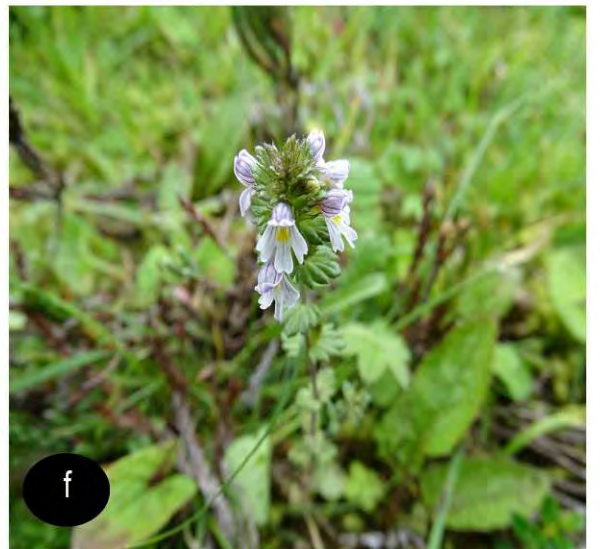


Fig. 31- a. *Rhodiola fastigiata* (Hook. f. & Thomson) S.H. Fu; b. *Parnassia nubicola* Wall. ex Royle; c. *Silene nigrescens* (Edgew.) Majumdar; d. *Primula obliqua* W.W. Sm.; e. *Potentilla coriandrifolia* D. Don; f. *Euphrasia bhutanica* Pugsley



Fig. 32- a. *Cyananthus lobatus* Wall. ex Benth.; b. *Geranium nepalense* Sweet; c. *Rheum acuminatum* Hook. f. & Thomson; d. *Neohymenopogon parasiticus* (Wall.) Bennet; e. *Ophiorrhiza succirubra* King ex Hook.f.; f. *Didymocarpus aurantiacus* C.B.Clarke



Fig. 33-a. *Impatiens uncipetala* C.B.Clarke ex Hook.f.; b. *Impatiens falcifer* Hook.f.; c. *Impatiens cymbifera* Hook.f.; d. *Impatiens puberula* DC.; e. *Impatiens radiata* Hook.f.; f. *Impatiens cathcartii* Hook.f.

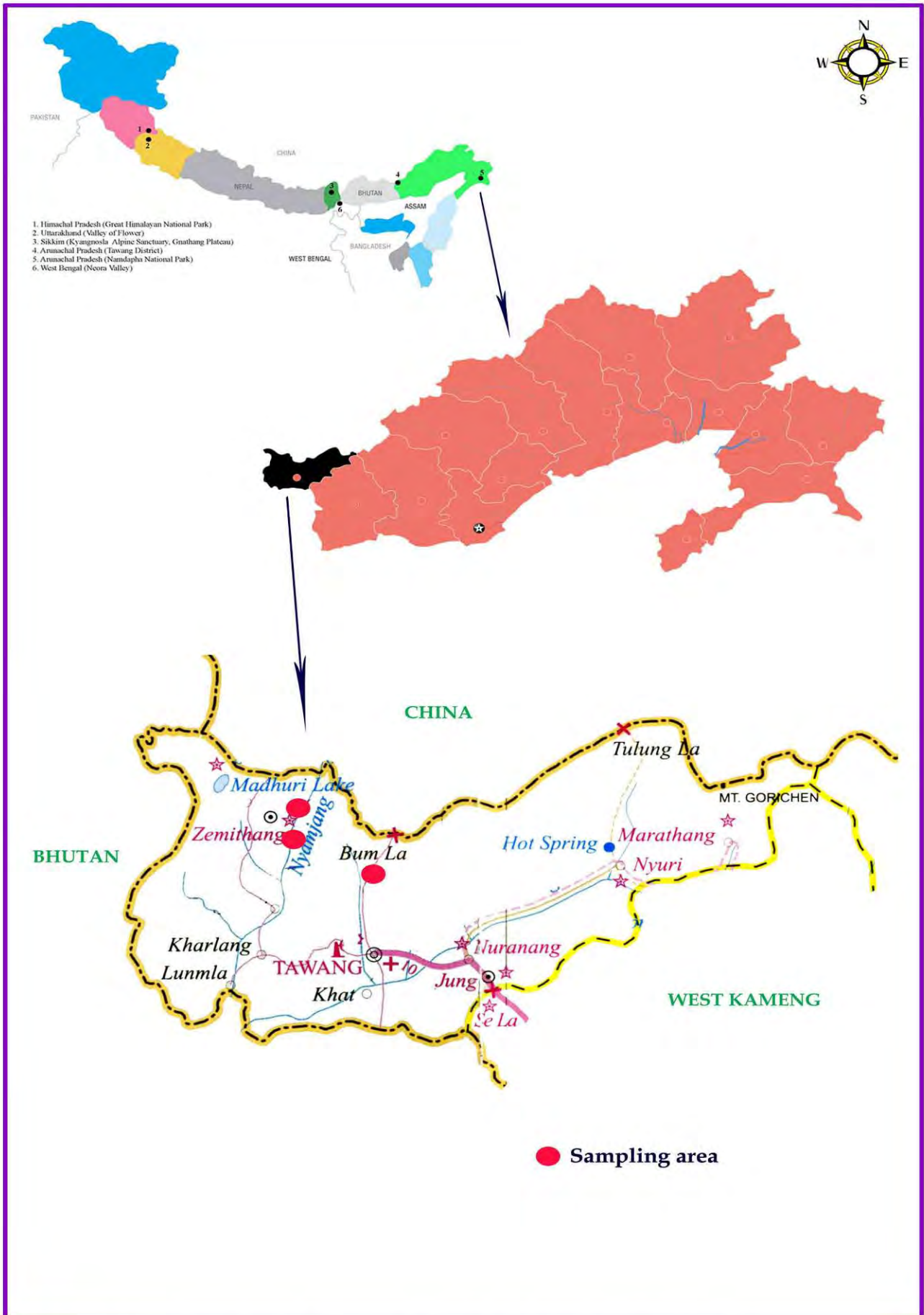


Fig. 34 - Location map of Tawang district in Arunachal Pradesh.



Fig. 35- a. Establishing the permanent plot; b. Taking GPS data of permanent plot; c. Counting the plants from permanent plot; d. Taking photographs; e. Measuring the dbh of pine tree; f. Collection of plant specimens from permanent plot; g. Interaction with local people for collecting data about economic & ethnobotanical important plants; h. Pressing of collected plant specimens.



Fig. 36- a, b & c. Views of different permanent plot of Zemithang area; d, e & f. Views of different permanent plot of Bumla area; g & h. Views of different permanent plot of Sungetsar area.



Fig. 37- a. *Aconitum hookeri* Stapf [Ranunculaceae]; b. *Alnus nepalensis* D.Don [Betulaceae]; c. *Anisadenia saxatilis* Wall. ex Meisn. [Linaceae]; d. *Anthogonium gracile* Wall. ex Lindl. [Orchidaceae]; e. *Astilbe rivularis* Buch.-Ham. ex D.Don [Saxifragaceae]; f. *Cassiope fastigiata* (Wall.) D.Don [Ericaceae]; g. *Clematis buchananiana* DC. [Ranunculaceae]; 8. *Colquhounia coccinea* Wall. [Lamiaceae]

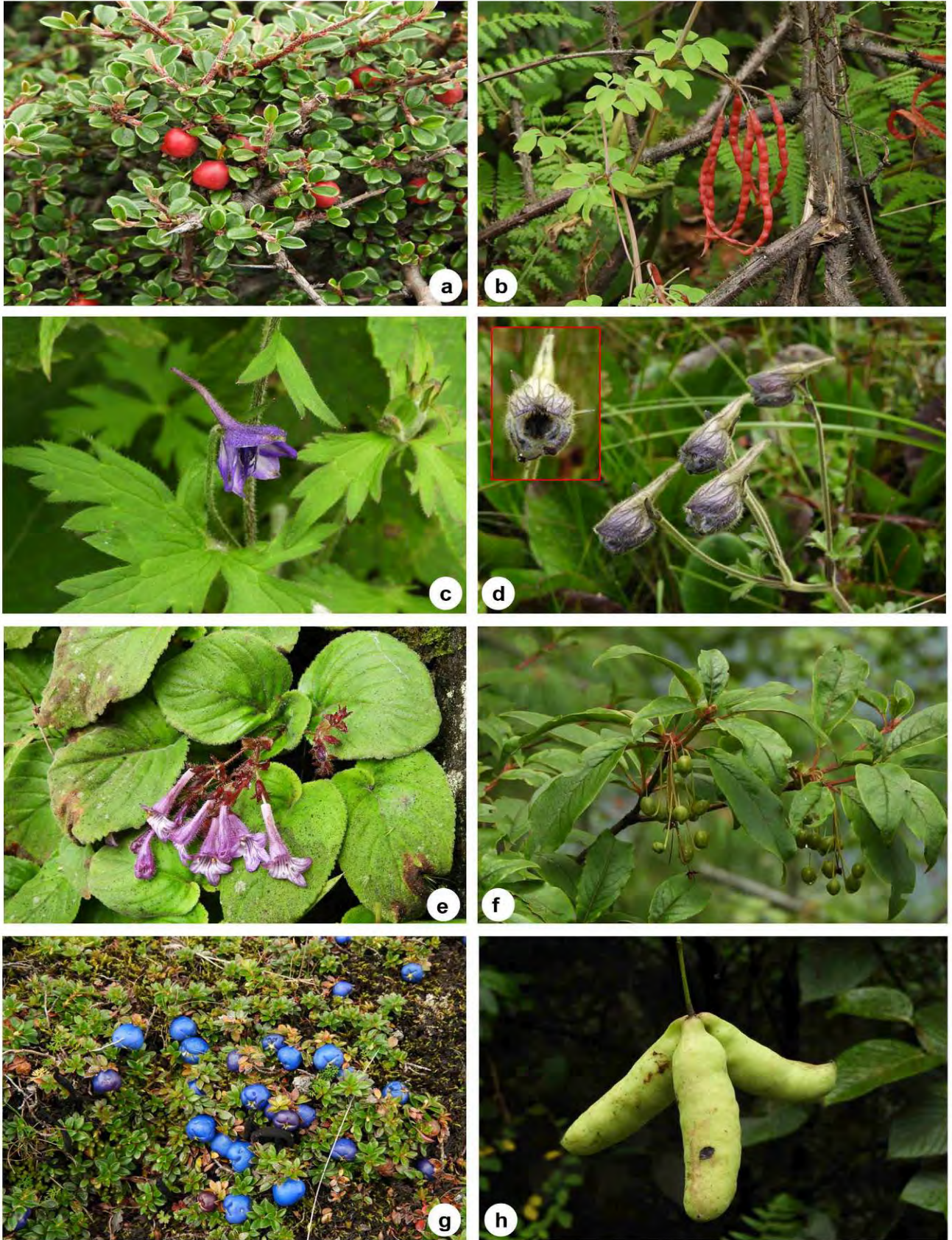


Fig. 38- a. *Cotoneaster microphyllus* Wall. ex Lindl. [Rosaceae]; b. *Dactylicapnos torulosa* (Hook.f. & Thomson) Hutch. [Fumariaceae]; c. *Delphinium pyramidale* Royle [Ranunculaceae]; d. *Delphinium vestitum* Wall. ex Royle [Ranunculaceae]; e. *Didymocarpus pulcher* C.B.Clarke [Gesneriaceae]; f. *Enkianthus deflexus* (Griff.) C.K.Schneid. [Ericaceae]; g. *Gaultheria trichophylla* Royle [Ericaceae]; h. *Holboellia latifolia* Wall. [Lardizabalaceae]

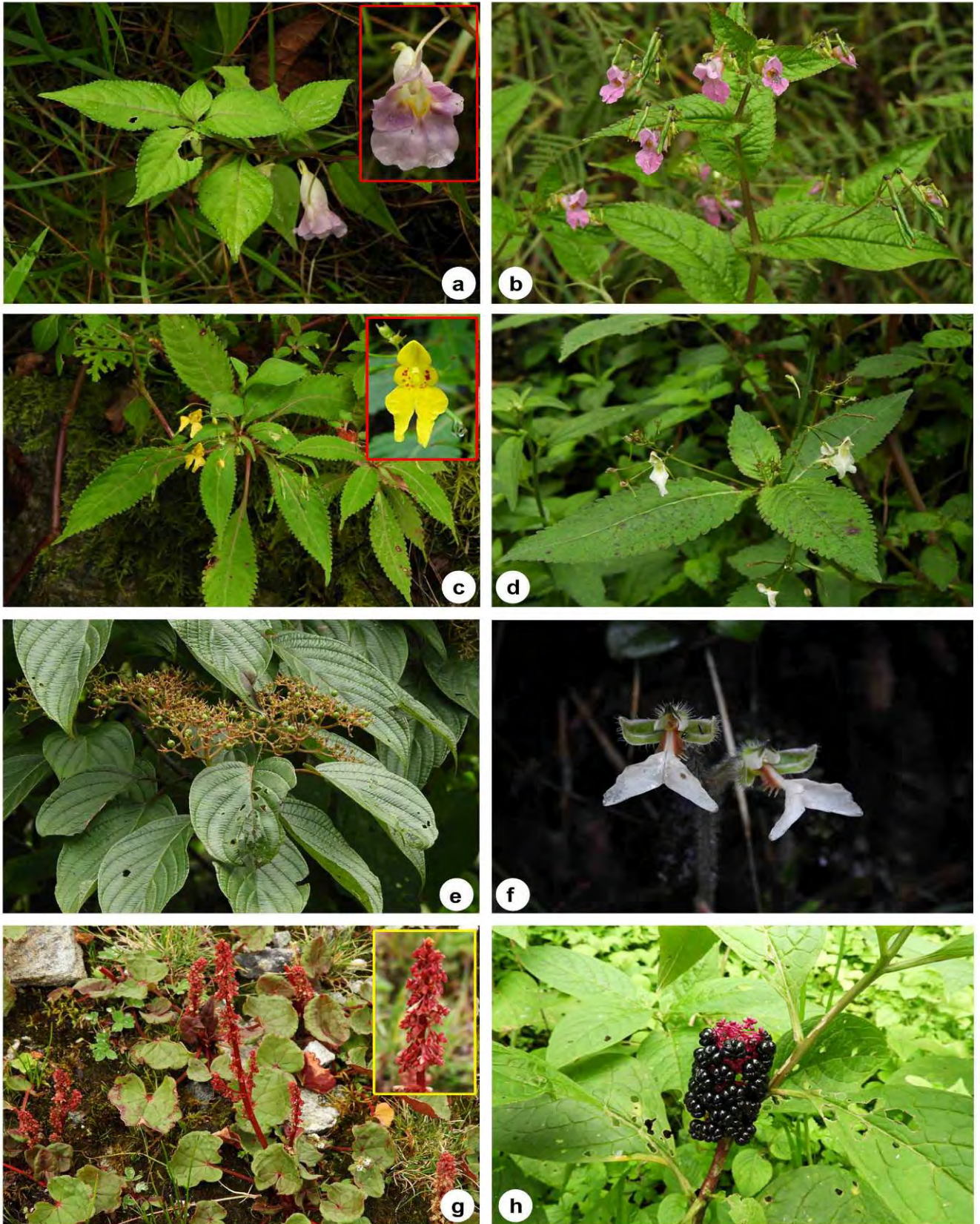


Fig. 39- a. *Impatiens arguta* Hook. f. & Thomson [Balsaminaceae]; b. *Impatiens chungtienensis* Y.L. Chen [Balsaminaceae]; c. *Impatiens racemosa* DC [Balsaminaceae]; d. *Impatiens radiata* Hook.f. [Balsaminaceae]; e. *Nothapodytes nimmoniana* (J.Graham) Mabb. [Icacinaceae]; f. *Odontochilus elwesii* C.B. Clarke ex Hook. f. [Orchidaceae]; g. *Oxyria digyna* (L.) Hill [Polygonaceae]; h. *Phytolacca acinosa* Roxb. [Phytolaccaceae]

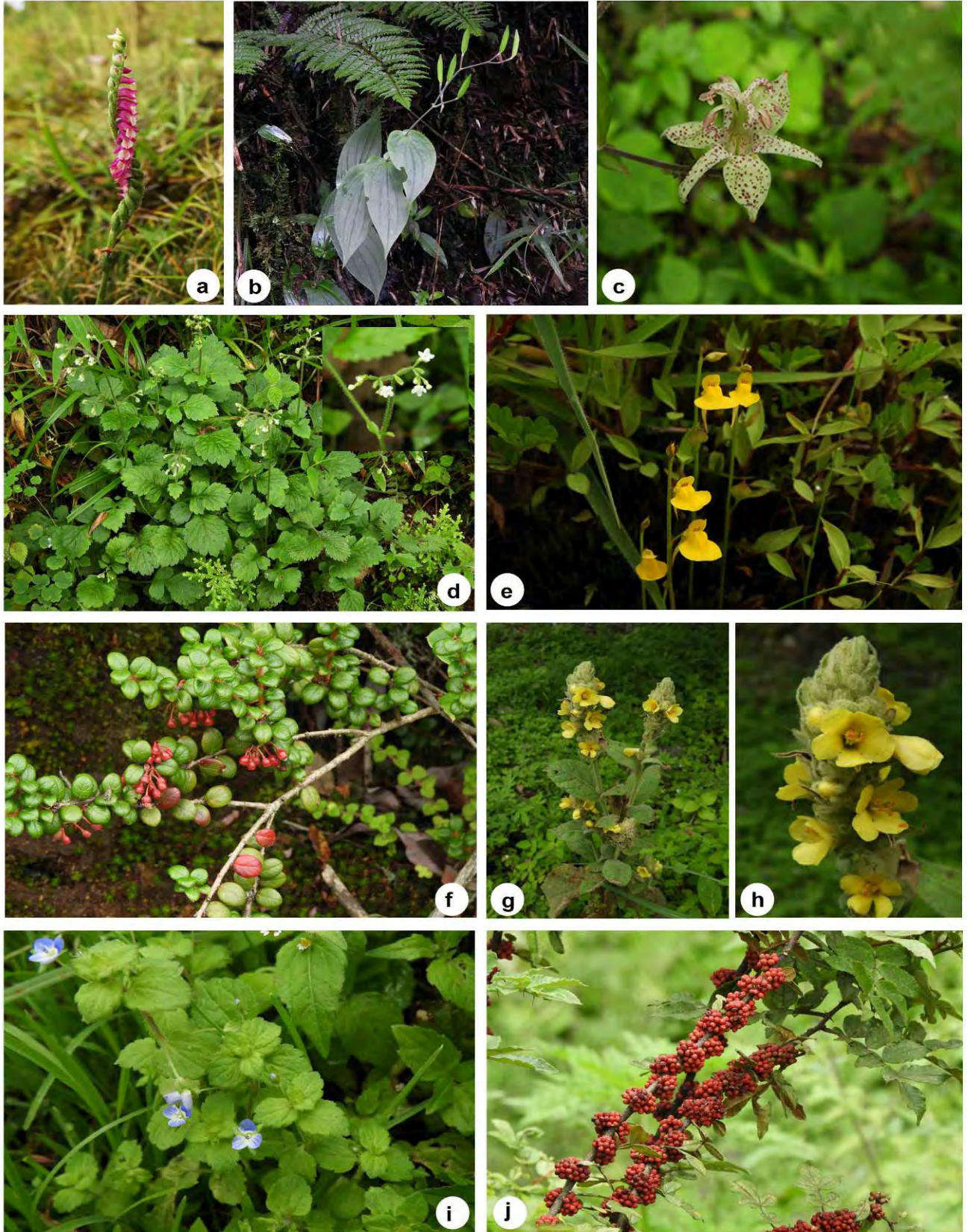


Fig. 40- a. *Spiranthes sinensis* (Pers.) Ames [Orchidaceae]; b & c. *Tricyrtis maculata* (D. Don) J.F. Macbr. [Liliaceae]; d. *Triplostegia glandulifera* Wall. ex DC. [Valerianaceae]; e. *Utricularia scandens* subsp. *firmula* (Oliv.) Z. Yu Li [Lentibulariaceae]; f. *Vaccinium nummularia* Hook. f. & Thomson ex C.B. Clarke [Ericaceae]; g & h. *Verbascum thapsus* L. [Scrophulariaceae]; i. *Veronica persica* Poir. [Scrophulariaceae]; j. *Zanthoxylum acanthopodium* DC. [Rutaceae]

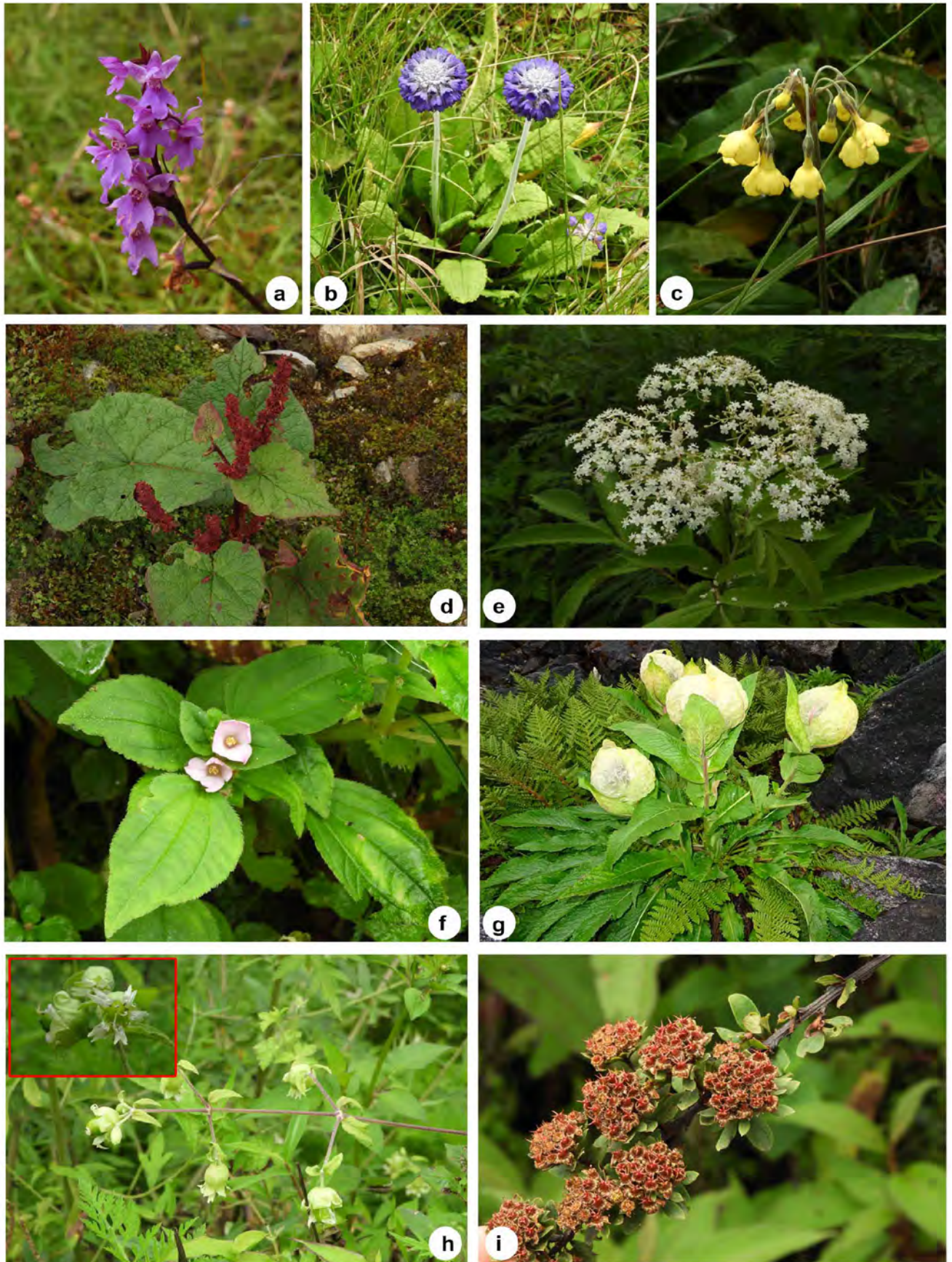


Fig. 41- a. *Ponerorchis chusua* (D.Don) Soó [Orchidaceae]; b. *Primula glomerata* Pax [Primulaceae]; c. *Primula sikimensis* Hook. [Primulaceae]; d. *Rheum australe* D. Don [Polygonaceae]; e. *Sambucus javanica* Blume [Sambucaceae]; f. *Sarcopyramis napalensis* Wall. [Melastomaceae]; g. *Saussurea obvallata* (DC.) Edgew. [Asteraceae]; h. *Silene baccifera* (L.) Roth [Caryophyllaceae]; i. *Spiraea arcuata* Hook. f. [Rosaceae]

NMHS Progress Report

(Period from April 2017 to September 2017)

1. Project Information

Project ID:	NMHS/2015-16/LG-05	Sanction Date:	31-3-2016
Project Title:	Biodiversity Assessment through Long-term Monitoring Plots in Indian Himalayan Landscape		
BTG:	Conservation and Sustainable Use of Biodiversity		
PI and Affiliation (Institution):	Dr. Kailash Chandra Director Zoological Survey of India Kolkata		
Name & Address of the Co-PI, if any:			

Structured Abstract-detailing the current year progress [Word Limit 250 words]:	<p>Current project was initiated by recruiting project staffs of three Research Associates, five Junior Project Fellows and two Field Assistants. Permission Letters for survey and collection within the protected areas were sent and granted within time. A brief training was provided to the recruits on the procedure of collection and preservation of the faunal specimens in the beginning and after while they were taken to the field sites for their field training and reconnaissance survey. Collection of secondary data from the literatures were initiated and completed on the selected taxa from the project. Based on literatures important taxa were identified. Their collection or observation methods were procured and staffs were trained. Maps of the study areas were prepared. Grids on the study sites were laid and were visited. Specimens from the fields were collected, preserved and brought back to lab for identifications. Proper methods for survey and monitoring with trials and errors were selected within the project sites. GPS locations of the selected grids were taken for further monitoring. Data on relevant environmental parameters have also been recorded. A total of 7300 specimens from approximately 26 taxa were collected and 1091 specimens have already been identified. Collected specimens are also under the process of DNA Barcoding to ensure the establishment of Gen bank for the Indian Himalayan species. During the study several important species and genus has been encountered which are under publication review or communicated. During the current study immense assistance from the state forest officials, local forest authorities were provided to the survey teams. Supports were also contributed by the administrative personnel working at ZSI, Kolkata as well as Scientists and Zoological Assistants to complete the project tasks within time</p>
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Project Partner Name	Affiliations	Role & Responsibilities
Partner1	Botanical Survey of India (BSI), Kolkata, West Bengal	Floral biodiversity assessment through long-term monitoring plots in Indian Himalayan Landscape
Partner2		
Partner3		
[Add]		

2. Project Site Details

Project Site	(1) Great Himalayan National Park (2) Valley of Flowers (3) Kyangnosla Alpine Sanctuary, (4) Gnathang plateau (East District) (5) Neora Valley National Park (6) Tawang district, Arunachal Pradesh (7) Namdapha National Park, Arunachal Pradesh.
IHR States Covered	Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh
Long. & Lat.	
Site Maps	
Site Photographs	

3. Project Activities Chart w.r.t. Time frame [Gantt or PERT]

PROJECT ACTIVITIES	WORK UNDERTAKEN						OUTPUT
	Year 2016-2017						
	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 5	Qtr 6	
Project Activity 1: Recruitment of JPF/RA/ Tech Staff							Three RAs, five JPFs, Two FAs are recruited
Project Activity 2: Reconnaissance survey and Identification of study Landscape							Trails, Vantage Points etc in Study Areas Identified
Project Activity 3: Field training of Staff							Trainings conducted for project staff in ZSI and in fields
Project Activity 4: Preparation of Maps and Establishment of Permanent Plots							Areas for monitoring are chosen
Project Activity 5: Data Compilation							Important taxa are Identified
Project Activity 6: Field Surveys							Specimens & Environmental data are collected
Project Activity 7: DNA Barcoding of Targeted Species							Precise Identification of the Collected Specimens and Establishment of Gene-bank are in progress
Project Activity 8: Compilation & Submission of Progress Report							Progress Report and Future Plans

4. Financial and Resource Information

Note: A separate bank account is expected to be opened for NMHS Project as per the provision of Direct Beneficiary Account (DBA) as laid out by the Govt. of India and also facilitate the audit of accounts. The interest earned out of the NMHS project funds should be reported clearly in the utilization certificate.

Total Grant:	1,14,44,400/- (for 2017-18)	Grant Received Date:	30 th August 2017
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Project Partner(s)	Affiliations/ Institution	Budget Allocated to	Work Done
Partner1	Zoological Survey of India (ZSI), Kolkata, West Bengal	57,22,200/-	Annexure III
Partner2	Botanical Survey of India (ZSI), Kolkata, West Bengal	57,22,200/-	
Partner3			
[Add]			

Project Staff Information:

S. No.	Name	Qualification	Designation	Fellowship/ Wages paid	Remarks
1.	Dr. Jagdish Saini	Ph.D. (Zoology)	Research Associate	36000/- + HRA (20%)	
2.	Dr. Hirdesh Kumar	Ph.D. (Zoology)	Research Associate	36000/- + HRA (20%)	
3.	Dr. Krishnendu Mondal	Ph.D. (Wildlife Science)	Research Associate	36000/- + HRA (20%)	
4.	Sh. Deepak C.K.	M.Sc. (Wildlife Science)	Junior Project Fellow	16000 + HRA (20%)	
5.	Sh. S.K. Sajan	M.Sc. (Wildlife and Biodiversity conservation)	Junior Project Fellow	16000 + HRA (20%)	
6.	Sh. Dibyajyoti Ghosh	M.Sc. (Zoology)	Junior Project Fellow	16000 + HRA (20%)	
7.	Sh. Arajush Payra	M.Sc. (Wildlife and Biodiversity conservation)	Junior Project Fellow	16000 + HRA (20%)	
8.	Sh. Paromit Chatterjee	M.Sc. (Conservation Biology)	Junior Project Fellow	16000 + HRA (20%)	
9.	Sh. Pritam Kumar Dey	M.Sc. (Zoology)	Field Assistant	10000 + HRA (20%)	
10.	Ms. Soumyashree Sen	M.Sc. (Environmental Science)	Field Assistant	10000 + HRA (20%)	

5. Equipment and Asset Information

S. No.	Equipment Name (Qty)	Details (Make/Model)	Cost	Date of Installation	Photographs of Equipment	Lowest Quotation, IF NOT purchased
1.	No equipment was procured					
[Add]	[Add]					

No equipment was procured under this project

6. Expenditure Statement and Utilization Certificate

Please update the annual Expenditure Statement and Utilization Certificate (UC) periodically.

Expenditure Information:

S.No.	Financial Position/Budget Head	Funds Sanctioned+ Carried forward from previous financial year	Expenditure	% of Total cost
I	Salaries/Manpower cost	3811856/-	1483355/-	38.9%
II	Travel	1362640/-	660000/-	48.4%
III	Expendables & Consumables	1034230/-	128000/-	12.4%
IV	Contingencies	502795/-	25000/-	5%
V	Activities & Other Project cost			
VI	Institutional Charges			
VII	Equipment's			
	Capacity building	375000/-	-	0%
	Total	7086521/-	2296355/-	32.4%
	Interest earned			
	Grand Total			

Period	Expenditure Statement	Utilization Certificate (UC)
Annual	Attached as Annexure I	Attached as Annexure II

7. Project Progress Summary (as applicable to the project)

Description	Total(Numeric)	Description
<i>IHR States Covered</i>	Himachal Pradesh, Uttarakhand, Sikkim, West Bengal, Arunachal Pradesh	
<i>Project Site/Field Stations Developed:</i>	(1) Great Himalayan National Park (2) Valley of Flowers (3) Kyangnosla Alpine Sanctuary, (4) Gnathang plateau (East District) (5) Neora Valley National Park (6) Tawang district, Arunachal Pradesh (7) Namdapha National Park, Arunachal Pradesh.	
<i>No. of Patents filed(Description):</i>	Nil	Nil
<i>Article/Review/Research Paper/Publication:</i>		<ol style="list-style-type: none"> 1) Book prepared on “Long-term monitoring protocols for selected indicator taxa in the Indian Himalaya”. 2) Book chapters accepted in “Current Status of Faunal Diversity of Indian Himalaya” (Published by the Director, Zool. Survey India, Kolkata.
<i>New Methods/Modellings Developed (descriptionin250words):</i>		The previous methods are being followed.
<i>No. of Trainings (No. of Beneficiaries):</i>	Two	

Workshop:	One	1) Training Workshop on “Modern Approaches in Biodiversity Studies”, was organized in ZSI. 2) Training Workshop on “Application of Taxidermy” was organized in ZSI.
Demonstration Models(Site):	Nil	Nil
Livelihood Options:	Nil	Nil
Training Manuals:	Nil	
Processing Units:	Nil	Nil
Species Collection:	7300	Details of specimen collected and identified are given in Annexure III
Species identified:	1091	
Database/Images/GIS Maps:	14	

8. Project Linkages (with nearby Institutions/State Agencies)

S. No.	Institute/ Organization	Type of Linkages	Brief Description
1	West Bengal Forest Department, Govt. of West Bengal	Official	
2	Department of Environment and Forests, Govt. of Arunachal Pradesh	Official	
3	Forest Environment and Wildlife Management Department, Govt. of Sikkim	Official	
4	Department of Environment and Forests, Government of Uttarakhand	Official	
5	Himachal Pradesh Forest Department, Govt. of Himachal Pradesh	Official	
6	Botanical Survey of India, Kolkata	Project Partner	
7	GBPIHESD, Sikkim Unit	Project Partner	
8	Wildlife Institute of India, Dehradun	Research personnel registered for PhD degree	Mr. Sajan S.K., Junior Project Fellow of this project has registered for Ph.D. on "Systematics and diversity of terrestrial gastropods (Mollusca; gastropoda) in Great Himalayan National Park and Valley of Flowers National Park, India"
9	University of Calcutta, Kolkata	Research personnel registered for PhD degree	Mr. Paromit Chatterjee, Junior Project Fellow of this project has registered for Ph.D. on "Diversity, distribution and habitat use of rodents (Mammalia: rodentia) in Central Himalayas, India" from University of Calcutta
10	Alipurduar Nature Club	Himalayan Stakeholder	
11	BAMOS, Sikkim	Himalayan Stakeholder	

9. Additional (publication, recommendations, etc.)

Time Period	Publications (Research Papers, Information Material, Policy drafts, Patents, etc.)
Annual [2017]	Attached as Annexure IV

10. Project Concluding Remark

Kindly update the following Progress Parameters for the Reporting Period:

Project Objectives	Project Output against each objective	Progress made against Monitoring Indicators (specified in Sanction Letter)	Remarks
To create a geospatial and genetic database on the fauna of Himalaya and the climate-change-induced impact on faunal diversity of the region.	Distribution of the faunal species at the Indian Himalayan Region (IHR) will be known. Genetic database will be established for the fauna of IHR. Past distributional records from ZSI archive and literatures have also been collected.	Indicator and important taxa for long term monitoring have been identified.	
To establish long-term faunal diversity monitoring plots across the Himalayan region	Change in the faunal community over time in the IHR will be known.	Past records have been acquired. Grids over the study sites have been laid and have been studied	
To develop long-term monitoring protocols for selected indicator taxa in the region	Monitoring of the selected indicator and important taxa can be monitored by the forest officials at IHR	Methodologies have been developed after trials and errors. A detailed manual book on Monitoring protocol of	

To develop local level capacity building among students, teachers and NGO's in long-term monitoring through training programs and publications	Capacity of the forest staffs and new generation students as well as local inhabitants will be empowered towards the monitoring, sustainable use and protection of the faunal species at IHR	Forest guards at the site locations were trained by the updated methods to monitor the fauna at IHR. Capacity building workshop were arranged for the stakeholders, forest officials and for the students of various	
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Methodology(in brief):			
Major Research Achievements:	<ul style="list-style-type: none"> • 3669 specimens from the Indian Himalayan Region has been collected and preserved at the ZSI, Headquarters. • Elevational maps of the study areas has been prepared. • Many Important findings have been achieved which are currently under review of various journals. • Capacity of the field staffs, forest guards as well as students from Universities/Colleges/Schools are empowered on the long term monitoring of fauna of IHR. 		
Brief Conclusion -the current year progress-during the reporting period (point-wise):	<ul style="list-style-type: none"> • 3669 specimens collected from IHR. • Past data on fauna of IHR have been collected. • Study area maps and elevational maps have been prepared. • Modelling on species distribution of indicator and important taxa from IHR has been initiated. 		
Progress Achieved (%):	Objective	1 st year	percentage
	Geospatial & genetic database	Base point data gathred	50% of 100
	Monitoring Plots	Grids laid down and surveyed	40% of 100
	Monitoring protocols for indicator taxa	Methodologies have been prepared	95 % of 100
	Capacity building	Workshop arranged	33 % of 100
	Total progress – 54.5% out of 100		

Remaining work to be done:	<ul style="list-style-type: none"> ▪ More field studies ▪ Field collection ▪ Monitoring the grids for final selection of monitoring plots ▪ Species distribution modelling of the indicator taxa ▪ Genetic database establishment ▪ More arrangement of capacity building workshops in the IHR.
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Submitted to:

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Please fill the NMHS Progress Report proforma as applicable with respect to time and other requirements and return via post/e-mail. In case of any query, please contact at: nmhspmu2016@gmail.com

Book Prepared

1. Monitoring protocol for faunal diversity in Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).

Book chapters accepted

1. Chandra, K and Kumar, H. 2017. Insecta: Orthoptera. In: Current status on faunal diversity of mangrove ecosystems in India. Published by Director, Zoological Survey of India.
2. Chandra, K., Gupta D. and Kumar, H. 2017. Insecta: Mecoptera. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
3. Chandra, K., Mukherjee, T., Gupta, D. and Saini, J. 2017. Insecta: Siphonaptera. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
4. Chatterjee, P., Payra, A. and Sen, S. 2017. Insecta : Phthiraptera. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
5. Deepak, C.K. and Ghosh, D. 2017. Insecta: Dermaptera (Earwigs). In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
6. Dey, P.K. and Mondal, K. 2017. Tardigrada. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
7. Kumar, H., Saini, J., Ghosh, J., Das, P., Gupta, D. and Chandra, K. 2017. Insecta: Megaloptera. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
8. Mandal, C.K. and Kumar, H. 2017. Annelida : Hirudinea (Leeches). In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
9. Mandal, C.K. and Kumar, H. 2017. Annelida : Oligochaeta (Earthworms). In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
10. Mondal, K., Bhattacharya, K., Chatterjee, P., Dey, P.K., Maheswaran, G. and Alam, I. 2017. Aves (Birds). In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
11. Rajmohana, K., Saini, J., Kumar, P.G. and Patra, S. 2017. Insecta: Hymenoptera. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
12. Rizvi, A.N., Sen, D., Maity, P. and Kumar, H. 2017. Soil Inhabiting Nematodes (Nematoda). In: Current Status of Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).

13. Saini, J., Kumar, H., Das, P., Ghosh, J., Gupta, D. and Chandra, K. 2017. Insecta: Acanthocephala. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
14. Tripathy, B., Sajan, S.K., and Mukhopadhyay, A. 2017. Mollusca. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).
15. Varadaraju and Deepak, C.K. 2017. Reptilia. In: Faunal Diversity of Indian Himalaya (Published by the Director, Zool. Surv. India, Kolkata).

Research papers accepted

1. Gupta, R.K. and Saini, J. 2017. A new species of cleptoparasitic bee genus *Sphecodes* Latreille (Insecta, Hymenoptera, Apoidea, Halictidae, Halictinae, Halictini) from Almora, Uttarakhand, India. *Environment and Biosciences*.
2. Payra, A., Deepak, C.K., Tripathy, B., Mondal, K. and Chandra, K. 2017. New Distributional Record of *Megalestes irma* Fraser, 1926 (Odonata: Zygoptera: Synlestidae), a damselfly from Arunachal Pradesh, Eastern Himalayas, India. *Euroasian journal of Entomology*.

Research papers communicated

1. Biswas, T., Sajan, S.K., Varadaraju and Tripathy, B. 2017. On Land and Freshwater Molluscs of some parts of Eastern Ghats, India. *Tropical Natural History*.
2. Chatterjee, P., Mondal, K., Chandra, K., and Tripathy, B. 2017. First photographic evidence of Asian Golden Cat (*Catopuma temminckii* Vigors & Horsfield, 1827) from Neora Valley National Park, Central Himalayas, India. Proceedings of Zoological Society, Kolkata, Springer.
3. Kumar, H. and Chandra, K. 2017. A new brachypterous grasshopper genus (Orthoptera: Acrididae) from Indian Himalayan Landscape. *Annales de la Société Entomologique de France*.
4. Kumar, H. and Chandra, K. 2017. A new species of *Anaptygus* Mistshenko, 1951 (Orthoptera: Acrididae) from Indian Himalayan Landscape. *Oriental Insects*.
5. Kumar, H., Chandra, K., Saini, J., Deepak, C.K. and Payra, A. 2017. First record of genus *Mesambria* Stal, 1878 (Orthoptera: Acrididae: Catantopinae) from India with description of a new species. *Entomological News*.
6. Kumar, H., Usmani, M.K. and Chandra, K. 2017. Notes on the taxonomic position of the genus *Siruvania* Henry, 1940 (Orthoptera: Acrididae).

7. Payra, A., C K, D., Saini,J. and Tripathy, B. 2017. First record of *Pseudagrionpruinsum*(Burmeister, 1839) (Odonata: Coenagrionidae) from Mainland India- *NotulaeOdonatologicae*

Abstract published

1. Sajan, S.K., Tripathy, B., Sivakumar, K., Biswas, T. 2017. Associated terrestrial Malacofauna of Alpine forests in Western Himalaya, India. In: Nat. Sem. on Forest Resources: Conserv. Issues and Magmt., Jadavpur Universit, Kolkata (9 th September, 2017)