

Supplementary Table

Supplementary Table S1: Details of selected Forest Type Group in Uttarakhand and Himachal Pradesh

Subgroup type (Himachal Pradesh)	Area (km ²)	Subgroup type (Uttarakhand)	Area (km ²)
12. Himalayan Moist Temperate Forests			
<i>C1. Lower Western Himalayan Temperate Forests</i>			
12/C1a. Ban oak forest [BOF-III]	811.26	12/C1a. Ban oak forest (Two) – [BOF-I; BOF-I]	5009.21
12/C1b. Moru oak forest	13.36	12/C1b. Moru oak forest(Two) – [MOF-I; MOF-II]	978.92
12/C1c. Moist deodar forest [MDF-I]	2269.11	12/C1c. Moist deodar forest [MDF-I]	486.36
12/C1d. Western mixed coniferous forest	2079.34	12/C1d. Western mixed coniferous forest [WMCF]	541.95
12/C1e. Moist temperate deciduous forest	277.67	12/C1e. Moist temperate deciduous forest(Two) [MTDF-I; MTDF-I]	264.29
12/C1f. Low-level blue pine forest [LLBPF]	497.81		
12/C1/DS1. Oak scrub	323.64	12/C1/DS1. Oak scrub	76.5
12/C1/DS2. Himalayan temperate secondary scrub	5.07	12/C1/DS2. Himalayan temperate secondary scrub	25.02
<i>C2. Upper West Himalayan Temperate Forests</i>			
12/C2a. Kharsu oak forest	26.07	12/C2a. Kharsu oakforest [KOF]	244.59
12/C2b. West Himalayan Upper oak – fir forest	12.54	12/C2b. West Himalayan Upper oak – fir forest [WHHLBPF]	1131.34
		12/C2c. Moist temperate deciduous forest.	317.71
12/DS1. Montane bamboo brakes	15.63		
12/1S1. Alder forest	4.4	12/1S1. Alder Forest	10.16
		12/2S1. Low-level blue pine forest	3.99
13. Himalayan Dry Temperate Forest			
<i>Western Types</i>			
13/C1. Dry broadleaved and coniferous forest [DBCF]	14.04		
13/C2a. Neoza pine forests [NPF]	120.68		
13/C2b. Dry deodar forest	225.43	13/C2b. Dry deodar forest [DDF]	362.96
13/C3. West Himalayan dry temperate deciduous forest	6.56		
13/C4. West Himalayan high level dry blue pine forest [WHHLBPF]	99.95		
13/C5. West Himalayan dry juniper forest	482.24		
		13/1S1 <i>Hippophae/Myricaria scrub</i>	85.8
13/1S2 <i>Populus-Salix</i> forest	5.39		
<i>Eastern Types</i>			
13/1S3 (Western high-level dry blue pine forest).	1.78		

The text in parenthesis under Subgroup type is the number of sites. The text in bold under Subgroup reflects the selected type. The symbols for the studied forests are reported as [x].

Supplementary Table S2: Site description of selected Forest Type Group in Uttarakhand and Himachal Pradesh

Forest subtype	Symbol	State	Site	Latitude	Longitude	Elevation(m)	Slope (°)	Aspect
12/C1a Ban Oak Forest (<i>Q.leuchotricophora</i>)	BOF-I	Uttarakhand	Binog, Mussoorie	30°27'51.0006"- 30°28' 22.0008" N	78°1'50.0016" - 78°2'2.0004" E	1611-1764	5.04°-42.99°	N, E, S and W
12/C1a Ban Oak Forest	BOF-II	Uttarakhand	Pangot, Nainital	29°24.575' N – 29°25.502' N	79°25.358' E- 79°25.512' E	2015-2033	20.76°-28.63°	NE and NW
12/C1a Ban Oak Forest (<i>Q.leuchotricophora</i>)	BOF-III	Himachal Pradesh	McLeodganj	32.2426° N - 32.2451° N	76.3214° E - 76.3228° E	1721-1777	11.74°-28.09°	W, SW and S
13/C1 Dry Broadleaved and Coniferous Forest (<i>Q.ilex- P. gerardiana</i>)	DBCF	Himachal Pradesh	Kalpa	31.53025° N - 31.53118° N	78.26365° E - 78.26615° E	2410-2482	9.42°-29.21°	SE and E
13/C2 Dry Deodar Forest	DDF	Uttarakhand	Harshil, Uttarkashi	31°1'57.0216"- 31° 2'20.4786" N	78°45'8.6178" - 78°45'2.5308" E	2257- 2608	28.97°-37.97°	N
12/C2a Kharsu Oak Forest	KOF	Uttarakhand	Kunjikharak, Nainital	29°30.293' N – 29°30.194' N	79°19.064' E- 79°19.232' E	2480-2547	1.64° - 32.24°	NE, S, E, SW, W and NW
12/C1f Low-Level Blue Pine Forest (<i>P.wallichiana</i>)	LLBPF	Himachal Pradesh	Manali	32.2936° N - 32.2971° N	77.1829° E- 77.1840° E	2252-2311	20.87°-44.29°	NW and W
12/C1c Moist Deodar Forest	MDF-I	Uttarakhand	Jageshwar, Almora	29.62675° N - 29.62661° N	79.83839° E - 79.84166° E	1897-1941	10.91°-18.07°	NW, N, W and E
12/C1c Moist Deodar forest (<i>Cedrusdeodara</i>)	MDF-II	Himachal Pradesh	Dalhousie	32.5258° N - 32.5270° N	76.0059° E- 76.011° E	2270-2380	10.1°-26.77°	NW, W and SW
12/C1b Moru Oak Forest	MOF-I	Uttarakhand	Deoriatat, Rudraprayag	30°31'22.94"- 30°31'31.94" N	79°07'36.76"- 79°08'40.14" E	2388-2586	3.20°- 29.33°	N, E, S and W
12/C1b Moru Oak Forest	MOF-II	Uttarakhand	Kilbury, Nainital	29°24.905' N – 29°25.320' N	79°26.248' E- 79°26.181' E	2125-2290	10.12° - 31.00°	SW, NE, N and SE
12/C1e Moist Temperate Deciduous Forest	MTDF-I	Uttarakhand	Sutol, Chamoli	30°15'58.4"- 30°16'06.1" N	79°37'02.3"- 79°37'03.4" E	2245-2309	9.97°- 43.07°	N and NW
12/C1e Moist Temperate Deciduous Forest	MTDF-II	Uttarakhand	Dunagiri, Almora	29.84067° N - 29.838969° N	79.44530° E - 79.445294° E	1905 - 2167	17.63° - 37.27°	NE and N and NW
13/C2a Neoza Pine Forest (<i>P.gerardiana</i>)	NPF	Himachal Pradesh	Akpa	31.5887° N - 31.5934° N	78.383° E- 78.4264° E	2496-2789	5.31°-25.8°	SW, S and SE
13/C4 West Himalayan High Level Blue Pine Forest	WHHLBPF	Himachal Pradesh	Narkanda	31.2385° N - 31.2479° N	77.4339° E- 77.4476° E	2610-2714	13.07°-31.46°	W, SW and SE
12/C2b West Himalayan Upper Oak/fir Forest	WHUO/FF	Uttarakhand	Maid,Tehri	30°36'0.1686" - 30° 36'40.1112" N	78°34'48.471"- 78°34'34.0602"E	2506 -2784	7.11°- 30.87°	N and E
12/C1d Western Mixed Coniferous Forest	WMCF	Uttarakhand	Deoban, Chakrata	30°45.155'- 30°45.393' N	77°52.386'- 77°52.491' E	2586-2720	15.33°-42.46°	N, NE and NW

Supplementary Table S3: Spatio-temporal details of climatic parameters of study sites

State	Site	2010			2013			2016			2018		
		T _{min} (°C)	T _{max} (°C)	Rainfall (mm)	T _{min} (°C)	T _{max} (°C)	Rainfall (mm)	T _{min} (°C)	T _{max} (°C)	Rainfall (mm)	T _{min} (°C)	T _{max} (°C)	Rainfall (mm)
Uttarakhand	Harshil	4.12	13.27	97.17	3.85	12.6	125.05	4.83	13.62	94.25	5.48	12.93	115.38
	Maid, Tehri	9.38	18.3	141.68	9.03	17.52	165.9	10.06	18.63	136.46	10.6	17.88	159.73
	Mussoorie	12.82	22.04	173.71	12.51	21.31	187.31	13.48	22.36	168.1	14.11	21.63	189.94
	Deoria Tal	7.52	16.98	133.34	7.13	16.15	172.37	8.15	17.26	134.38	8.66	16.51	162.76
	Sutol	9.98	20.43	111.83	9.63	19.63	141.76	10.67	20.76	110.23	11.12	19.95	132.02
	Chakrata	10.47	19.07	123.65	10.21	18.37	142.26	11.17	19.42	125.55	11.8	18.73	136.42
	Pangot	11.95	20.77	138.7	11.38	19.82	176.26	12.44	20.95	146.84	12.91	20.23	159.04
	Kilbury	11.95	20.77	138.7	11.38	19.82	176.26	12.44	20.95	146.84	12.91	20.23	159.04
	Jageshwar	12.26	21.7	122.51	11.67	20.7	157.89	12.77	21.85	134.53	13.19	21.05	150.37
	Dunagiri	12.91	23.97	120.75	12.49	21.37	155.84	13.51	22.46	127.46	13.98	21.66	144.12
	Kunjkharak	12.1	20.94	142.07	11.6	20.04	179.72	12.63	21.15	148.43	13.12	20.43	162.62
Himachal Pradesh	Manali	5.88	14.91	67.02	5.65	14.54	86	6.64	15.34	75.48	7.28	14.76	75.72
Pradesh	Narkanda	8.57	16.81	89.06	8.29	16.14	110.73	9.25	17.17	97.47	9.89	16.53	100.94
	Akpa	6.16	15.88	56.93	5.96	15.39	78.97	6.92	16.27	59.29	7.61	15.62	73.33
	Kalpa	7.67	16.81	62.78	7.46	16.28	85.18	8.44	17.21	66.47	9.12	16.55	77.89
	Dalhousie	8.94	18.06	153.27	8.59	17.62	172.83	9.66	18.51	161.24	10.28	18.08	146.19
	McLeodGanj	14.17	23.01	199.25	13.8	22.49	225.38	14.89	23.45	206.43	15.5	22.91	203.69

Source: WorldClim (<https://www.worldclim.org/data/monthlywth.html>)

Supplementary Table S4: Forest cover of Uttarakhand and Himachal Pradesh (at 1000-3000 m amsl elevation)

State	Forest	2015 (in Km ²)	2019 (in Km ²)
Uttarakhand	Very dense forest	3140	3072
	Moderate dense forest	8822	8551
	Open forest	3675	4022
Himachal Pradesh	Very dense forest	2429	2554
	Moderate dense forest	3429	3616
	Open forest	2594	2849

Source: India State of Forest Report 2015; 2019

Supplementary Table S5: Change in forest area under different temperate forest types of Uttarakhand and Himachal Pradesh

State	Forest	2015(%)	2019 (%)
Uttarakhand	Dry Deodar Forest	1.46	0.73
	West Himalayan upper Oak/fir Forest	4.57	5.49
	Ban Oak Forest (<i>Q.leucotricophora</i>)	20.23	13.86
	Moru Oak Forest	3.95	0.47
	Moist Temperate Deciduous Forest type	1.28	0.79
	Western Mixed Coniferous Forest	2.19	5.01
Himachal Pradesh	Moist Deodar Forest	1.96	1.55

Kharsu Oak Forest	0.99	3.08
Low-Level Blue Pine Forest (<i>P.wallichiana</i>)	3.38	2.79
West Himalayan High Level Blue Pine	0.68	0.65
Neoza Pine Forest (<i>P.gerardiana</i>)	0.82	0.63
Dry Broadleaved and Coniferous Forest (<i>Q.ilex- P.gerardiana</i>)	0.09	0.04
Moist deodar Forest (Cedrus)	15.38	11.40
Ban Oak Forest (<i>Q.leucotricophora</i>)	5.5	4.43

Source: India State of Forest Report 2015; 2019