EVALUATION OF THE CONSERVATION STATUS OF ULMUS WALLICHIANA AND U. VILOSA IN PAKISTAN

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Abstract

In the present study, conservation status of *Ulmus wallichiana* and *U. villosa* have been evaluated according to IUCN Red List Categories and Criteria 2001. In Pakistan, the genus is represented by three species i.e., *Ulmus wallichiana* Planch., *U. villosa* Brandis ex Gamble and *U. chumlia* Melville & Heybroek, endemic to Hindu Kush and Himalayas within a small geographical range. During the field surveys from 2017 to 2019, *Ulmus wallichiana* was recorded in 52 localities and *U. villosa* in 66 localities. All these localities collectively encompass an area of 1632 km² for *Ulmus wallichiana* and 2544 km² for *Ulmus villosa* as extent of occurrence. The estimated area of occupancy in the observed localities was 68 km² and 156 km² for *Ulmus wallichiana* and *U. villosa*. Based upon the aforementioned estimations and IUCN Red List Categories and Criteria 2001, *U. wallichiana* has been evaluated as Critically Endangered (CR) and *U. villosa* as Endangered (EN). For effective conservation of these species, immediate in-situ and ex-situ conservation efforts are proposed.

Key words: Conservation status, Ulmus wallichiana, Ulmus vilosa, Critical Endangered, Endangered, Hazara division, Pakistan.

Introduction

Owing to its distinct topography and peculiar geographic position, Pakistan possesses enormous floral diversity. More than 6000 species of vascular plant have been reported from this region (Rahman et al., 2016a, 2019; Shaheen et al., 2016) where some 400 taxa are reported as endemic to Pakistan (Ali, 2008). However, to date, only 53 taxa have been evaluated according to the IUCN Red List Categories and Criteria 2001 (Anon., 2001; Muhammad et al., 2017). Of these, 21 species are Critically Endangered, 11 Endangered, 2 Vulnerable, 8 possibly extinct, 2 regionally extinct, 1 extinct and the remaining are Data Deficient (Ali, 2000; Abbas, 2010; Abbas et al., 2010; Alam & Ali, 2009; Alam & Ali, 2010; Ali, & Qaiser, 2010a, 2010b, 2010c, 2011, 2012; Muhammad et al., 2017). This hardly encompasses about 0.8% of the flora of Pakistan. Therefore, evaluation of the conservation status of the flora of Pakistan is warranted on urgent basis; and particularly the endemic taxa of Pakistan as the top priority.

Elms belong to the genus *Ulmus* L. (Ulmaceae Mirb.) are deciduous and semi-deciduous woody plants, native to the temperate and subtropics of Northern Hemisphere (Buchel, 2000; Ahmad, 2004). Globally, the genus is represented by some 45 species with widespread distribution in the Northern Hemisphere (Akhter, 1985), and three species extend into the tropics (Richens, 1983). In Pakistan, the genus is represented by three species i.e. *Ulmus wallichiana* Planch., *Ulmus villosa* Brandis ex Gamble and *Ulmus chumlia* Melville & Heybroek. *Ulmus wallichinia* is distributed from Afghanistan to Nepal within a range of 2200-3000 meters above the sea level

(Akhter, 1985). Several of the recent studies have shown that there is a continuous decline in the population of the *Ulmus wallichiana* (Ahmad, 2004; Batool *et al.*, 2014). *Ulmus villosa* is a medium to large size tree, distributed in the North West and Western Himalayas to Kulu within a range of 1200-2700 m. Compared to the *Ulmus wallichinia*, the species is relatively more common in Hazara and Kashmir regions of Pakistan (Akhter, 1985). Its wood is utilized in construction as well as in furniture industry and the population of the species is declining rapidly (Batool *et al.*, 2014).

Based on the field surveys carried out during 2017-2019, the current study aimed to evaluate the conservation status of *Ulmus wallichiana* and *Ulmus villosa* according to the IUCN Red List Categories and Criteria 2001 (Anon., 2001). Population size, quality of habitat, phenology, traditional uses and geographic distribution of the species was studied in their natural habitats.

Materials and Methods

Study area: Hazara division comprises the Eastern part of Khyber Pakhtunkhwa (KP) Province of Pakistan (Fig. 1). Its boundaries join the Northern Areas and Azad Kashmir on the North and East (Rahman *et al.*, 2021). Islamabad and the Punjab province are on its South, whilst towards the West is rest of the KP. The river Indus runs through the division in a North-South line, forming much of the western border of the division. Six districts, i.e., Abbottabad, Battagram, Haripur, Mansehra, Kohistan and Torghar makes Hazara Division. Population of the area was estimated to be over 4.5 million in 2005 and the total area was about 18013 km² (Akber, 2014).



Fig. 1. Map of Hazara Division showing the distribution pattern of *Ulmus wallichinana* (in green) and *Ulmus vilosa* (in red), and the pale colour indicates the study area (Hazara division, KP, Pakistan).

Experimental Design: Detailed and comprehensive field surveys were conducted during 2017-2019. Information regarding distribution, presence localities, elevation, geographical coordinates, population size (Tables 1 and 2) type of habitat(s), distribution range, anthropogenic threats like grazing, uprooting pressure, over-exploitation and habitat degradation were recorded and studied in their natural habitats. For population size, number of mature individuals were counted per unit area; individual plants found in flowering or fruiting were considered as a mature individual (Muhammad *et al.*, 2017). Nature of habitat was determined by considering grazing impact, accessibility to the locality,

deforestation, soil erosion, and other anthropogenic impacts. Identification of specimens followed the Flora of Pakistan (Akhter, 1985) and conservation status of the taxon was evaluated following the IUCN criteria (Anon., 2001). Maps were drawn as per the GIS standard protocols for the estimation of Extent of Occurrence (EOO) and Area of Occupancy (AOO). Plant samples of both the species were collected, processed according to standard herbarium techniques (Ijaz, 2014; Ijaz *et al.*, 2016; Rahman *et al.*, 2016b, 2018a,b; Bano *et al.*, 2018; Khan *et al.*, 2018) and the specimens were deposited in the herbarium of Hazara University Mansehra, Pakistan.

S.		Union council	Locality	Altitude		_	Plant status			
No	District			(m)	Ν	Е	(II 2017	1d1V1dua 2018	15) 2019	
1	Abbottabad	Nathia gali	Governor House	2406m	34.07665	73 3866	2017	2010	2019	
2	Abbottabad	Nathia gali	Governor House	2400m	34 7776	73 3882	1	1	1	
3.	Abbottabad	Nathia gali	Governor House	2391m	34.07788	73.38837	3	3	3	
4	Abbottabad	Nathia gali	Governor House	2402m	34.07798	73.38741	2	2	2	
5.	Abbottabad	Nathia gali	Donga gali	2377m	34 05211	73 40651	2	2	2	
6	Abbottabad	Nathia gali	Donga gali	2388m	34 05415	73 40823	1	1	1	
7.	Abbottabad	Nathia gali	Donga gali	2392m	34.05427	73.40806	1	1	1	
8.	Abbottabad	Nathia gali	Donga gali	2376m	34.05249	73,40705	1	1	1	
9.	Abbottabad	Nathia gali	Donga gali	2378m	34 0518	73 40672	3	3	3	
10.	Abbottabad	Nathia gali	Donga gali	2376m	34.05177	73.40668	6	6	6	
11.	Abbottabad	Namli maira	Namli maira	1874m	34,10485	73.37735	1	0	0	
12	Abbottabad	Namli maira	Ali pad Ghalari	1877m	34 1049	73 3775	1	0	ů 0	
13.	Abbottabad	Namli maira	Maira khurd	1967m	34 09528	73 38416	1	0	ů 0	
14.	Abbottabad	Namli maira	Maira khurd	1966m	34 09538	73 3843	1	1	ů 0	
15	Abbottabad	Namli maira	Maira khurd	1956m	34 09528	73 38428	1	1	0	
16.	Abbottabad	Pluck	Avaubia	2358m	34 0286	73 40633	1	1	1	
17.	Abbottabad	Pluck	Avaubia	2366m	34 0286	73 40653	1	1	1	
18	Abbottabad	Baroot	Avaubia national park	2356m	34 02957	73 40524	1	1	1	
19	Abbottabad	Baroot	Avaubia national park	2363m	34 02812	73 40992	1	1	1	
20	Abbottabad	Baroot	Avaubia national park	2339m	34 0308	73 40259	1	1	1	
20.	Abbottabad	Baroot	Avaubia national park	2359m	34 02818	73 41035	1	1	1	
21.	Abbottabad	Baroot	Avaubia national park	2359m	34 02805	73 41012	1	1	1	
22.	Abbottabad	Baroot	Avaubia national park	2355m	34 02813	73 41058	1	1	1	
23. 24	Abbottabad	Baroot	Avaubia national park	2358m	34 02827	73 41050	1	1	1	
25	Abbottabad	Nagri bala	Rara gali campus	2330m	34 09019	73 35638	1	1	1	
25.	Abbottabad	Nagri bala	Bara gali campus	2280m	34 09024	73 35679	2	2	2	
20.	Abbottabad	Nagri bala	Bara gali campus	2200m 2294m	34.00024	73 35709	1	1	2	
27.	Abbottabad	Nagri bala	Bara gali campus	22) iii 2312m	34 09036	73 35634	8	8	8	
20. 29	Abbottabad	Tai val	Kooza gali	2312m 2442m	34 01553	73 39209	1	1	1	
29. 30	Abbottabad	Pluck	Kooza gali	2465m	34.01523	73 39202	1	1	1	
31	Abbottabad	Tai val	Kooza gali	2439m	34.01553	73 39196	1	1	1	
32	Abbottabad	Taj val	Kooza gali	2470m	34.01255	73 30001	3	3	3	
33	Abbottabad	Taj val	Moorti	2453m	34 01387	73 39003	1	1	1	
34	Abbottabad	Taj val	Moorti	2452m	34 01374	73 79007	1	1	1	
35	Abbottabad	Taj val	Moorti	2450m	34.01595	73 38027	1	1	1	
36	Abbottabad	Pluck	Changa gali	2507m	33 9984	73 38274	1	1	1	
37	Abbottabad	Seer mashriqi	Khara gali	2307m	33 982	73 3988	1	1	1	
38	Abbottabad	Seer mashriqi	Khara gali	2319m	33 98051	73 3975	1	1	1	
39	Abbottabad	Seer maghrahi	Khara gali	2337m	33 98331	73 39921	1	1	1	
40	Kohistan (Kuz nalas)	Bar sherval	Doga	2337m 2415m	34 99411	73.06381	1	1	1	
41	Kohistan (Kuz palas)	Bar sherval	Doga	2460m	34 99447	73.06427	1	1	1	
42	Kohistan (Kuz palas)	Bar sherval	Doga	2355m	34 99439	73.06582	2	2	0	
43	Kohistan (Kuz palas)	Bar sherval	Madian chapri	2270m	34 98827	73.00502	1	1	1	
44	Kohistan (Kuz palas)	Bar sherval	Voudoon abad bela	1965m	34 99816	73.078867	1	1	1	
45	Kohistan (Kuz palas)	Bar sherval	Speen gala	2170m	34 987635	73 080962	1	0	0	
46	Kohistan (Kuz palas)	Bar sherval	Thoki dheri nala	2097m	34,989346	73 0838	1	0	0	
47	Kohistan (nalas)	Kuz sherval	Kuz khuroe	2128m	35,038653	73.068754	1	1	1	
48	Kohistan	Mada khell	Baila (Pallas)	2118m	34 964725	72 963767	1	1	0	
49. 49	Kohistan	Mada khell	Baila (Pallas)	2090m	34 9647471	72 9641747	1	1	1	
50	Kohistan	Mada khell	Baila (Pallas)	2112m	34 964479	72 96456	1	1	1	
51	Battagram(Allai)	Rashange	Ganga val	1936m	34,82929	73,17526	5	5	3	
52.	Battagram(Allai)	Rashange	Jabba ganga val	1980m	34.82487	73.18026	1	1	1	

Table 1. Details of population size of Ulmus wallichiana in different known localities.

Table 2. Details of population size of *Ulmus villosa* in different known localities.

S.No District Union council Locality (p) N I Interpretation In	6 N			T	Altitude	N .T	F	Plant status			
1. Muschn Chatter plain Baila Zinet 1970 34 6085 32.12873 1 1 0 1 2. Manschn Chatter plain Baila Noor gul 15788 34.0614 73.12873 1 1 0 0 4. Manschn Chatter plain Baila Noor gul 15788 34.0614 73.12873 4 4 4 5. Battagram Shumli Bests Shuft 15586 34.0614 73.13835 4 2 1 <	S.No	District	Union council	Locality	(m)	N	E	(II 2017	2017 2018 2019		
2. Manschra Chatter plain Hail Noor gul 1578m 34.61237 73.13036 1 0 0 4. Manschra Chatter plain Batta Insor gul 1578m 34.61234 73.13258 4 4 4 6. Battagram Shumi Lachi Inang Ziant 1588m 34.6124 73.1139 1 1 7. Battagram Shumi Battamori Shingri 1221m 34.6886 73.0681 1 1 1 8. Battagram Battamori Battamori Lingram 73.173 2 12 12 10. Manschra Gariat Uswara 951m 34.5120 73.5361 2 2 2 1 11. Manschra Shohal Korbala Waras 951m 34.5127 73.5363 20 14 14 Manschra Thalata Thalata Thalata 851m 34.5217 35.537 1 1 1	1.	Mansehra	Chatter plain	Baila Ziarat	1597m	34.6085	73.12873	1	1	0	
3. Manschra Chatter plain Bails Noor gul 1574m 34.6024 73.1036 1 0 0 4. Manschra Chatter plain Shumi Battagram Shumi Shumi Shumi Shumi Shumi Shumi 11 1 7. Battagram Battamori Battamori Shumori Start 121m 34.6885 73.0581 1 1 1 7. Battagram Battamori Battamori Battamori Start 1 <th1< th=""></th1<>	2.	Mansehra	Chatter plain	Baila Noor gul	1578m	34.61277	73.13036	1	1	1	
4. Manschra Chatter plain Lachi mang Zinata 158km 34.0914 73.1128 1 1 5. Battogram Shumii Becas khi 1526m 34.71107 73.11139 1 1 1 8. Battagram Battamori Shingri 1212m 34.68867 73.0801 1 1 1 9. Masschra Gariat Lown ranzha 955m 34.5502 73.5365 2 2 2 2 10. Manschra Gariat Lown ranzha 955m 34.4509 73.5564 1 1 1 1 11. Manschra Thalata Thalata 895m 34.4501 73.3564 2 2 2 2 15. Manschra Thalata Thalata Ragal 875m 34.4291 73.35763 1 1 1 16. Manschra Garia habb Jageer Gari Habb/Jallah 835m 34.6282 73.5763 1 1	3.	Mansehra	Chatter plain	Baila Noor gul	1574m	34.61234	73.13036	1	0	0	
5. Bottagram Shumi Bottagram Shumi Beta shift 120m 34.70107 73.11483 1 1 1 7. Bottagram Battamori Batt	4.	Mansehra	Chatter plain	Lachi mang Ziarat	1588m	34.60814	73.13258	4	4	4	
6. Battagram Batta	5.	Battagram	Shumli	Shumli Bazar	1498m	34.70391	73.11483	1	1	1	
7. Battagram Battamori Shingri 1212m 34.6886 73.08701 1 1 1 9. Manschra Gailat Luwer narraha 976m 34.53302 73.3020 1 1 1 9. Manschra Gailat Luwer narraha 976m 34.5332 73.3565 2 2 2 11. Manschra Gailat Kawa 976m 34.45216 73.3566 2 2 2 13. Manschra Tinlata Halat 897 34.45216 73.3564 2 2 2 14. Manschra Tinlata Balat 897 34.4217 73.3564 1 1 1 15. Manschra Gair Habb Uhh Gair pull 897 34.9242 73.5768 1 1 1 19. Manschra Gaogr mang Googr mang Googr mang Gaogr habb Caba	6.	Battagram	Shumli	Beesa khit	1526m	34.71107	73.11139	1	1	1	
8. Battageram Battamori 1281m 34.8362 73.0029 15 12 12 10. Mansebra Garlat Usman Chowk Narraha 995m 34.53202 73.3502 1.5 1 1 0 11. Mansebra Garlat Khawas 993m 34.45985 73.3564 1 1 1 12. Mansebra Shohal Kot bala 994m 34.45985 73.35648 1 1 1 13. Mansebra Thalata Rafor 34.4501 73.6244 32 30 30 16 Mansebra Gari Public Mans Gari Public Mansebra Gari Public Mansebra Gari Public Mansebra G	7.	Battagram	Battamori	Shingri	1212m	34.68866	73.0681	1	1	1	
9. Mansehra Garlat Lower narmha 976m 34.53062 73.3505 4 2 2 11. Mansehra Garlat Kinavas 993m 34.5392 73.3576 4 2 2 12. Mansehra Shohal Kot bala 993m 34.6598 73.3576 1 1 0 13. Mansehra Shohal Kot bala 993m 34.45216 73.3564 2 2 14. Mansehra Thialata Ragal 837m 34.45216 73.3614 2 2 2 15. Mansehra Thialata Ragal 807m 34.44157 73.6618 20 14 14 17. Mansehra Gari Habiu Ilah Gari pull 809m 34.4921 73.3766 1 1 1 19. Mansehra Boogar mang Googar mang Moogar mang Mo	8.	Battagram	Battamori	Battamori	1281m	34.68851	73.08701	1	1	1	
10. Mansebra Garlat Usman Chowk Narraha 995m 34.5328 73.5357 1 1 0 12. Mansebra Shohal Kot bala 939m 34.5282 73.53564 1 1 13. Mansebra Shohal Kot bala 949m 34.4699 73.35648 1 1 1 14. Mansebra Thalata Thalata 895m 34.45216 73.36148 1 1 15. Manschra Thalata Kagal 897m 34.44215 73.36244 32 2 2 2 2 1 1 1 16. Mansebra Gari Habib Ullah Ed gala Chowk 877m 34.39999 73.35764 1 1 1 20. Mansebra Boogar mang Gariz haba Ziarat 1207m 34.56302 73.2559 1 1 1 21. Mansebra Jaboori Booz baila 136in 34.59102 73.2553 1 1	9.	Mansehra	Garlat	Lower narraha	976m	34.53662	73.35029	15	12	12	
11. Mansehra Garifat Khavas 993m 34.2582 7.3.556 2 2 2 13. Mansehra Shohal Kot bala 949m 34.4598 7.3.5566 2 2 2 13. Mansehra Shohal Kot bala 949m 34.45216 7.3.5648 2 2 2 14. Mansehra Thialata Roman 34.42216 7.3.5648 2 3 0 30 16. Mansehra Thialata Roman 34.4191 7.3.6624 32 30 30 17. Mansehra Gari Habb ullah Gari pulz 807m 34.4190 7.3.6638 1 1 1 19. Mansehra Googer mang	10.	Mansehra	Garlat	Usman Chowk Narraha	985m	34.53392	73.35365	4	2	2	
12. Manschra Shohal Kot bala 949m 34.4598 73.5564 1 1 13. Manschra Thalata Thalata Palata 895m 34.45216 73.3644 32 2 2 14. Manschra Thalata Thalata 895m 34.45216 73.3644 32 20 14 14 15. Manschra Thalata Kagal 877m 34.44135 73.8638 20 14 14 17. Manschra Gari Habib ullah Eager Gari Habibullah 353m 34.2424 73.3576 1 1 1 18. Manschra Boogar mang Boogar mang Chazi baba Ziarat 1207m 34.56802 73.25799 1 1 1 22. Manschra Boogar mang Chazi baba Ziarat 1207m 34.56802 73.2579 1 1 1 23. Manschra Jaboori Booz baila 1365m 34.59706 73.2574 1 1 1 24. Abbotabad Baldheri Olympia ferm	11.	Mansehra	Garlat	Khawas	993m	34.52828	73.35372	1	1	0	
15. Mansehra Shohal Kot bala 997m 34.4005 73.3048 1 1 1 14. Mansehra Thalata Thalata 857m 34.4509 73.3048 1 1 15. Mansehra Thalata Kagal 857m 34.4402 73.3763 1 1 16. Mansehra Gari Habbi ullah Gari Habbi ullah 835m 34.42942 73.3763 1 1 19. Mansehra Gari Habbi ullah Boogar mang Carseng 12.89m 34.5602 73.25759 1 1 1 21. Mansehra Boogar mang Chazi baba Ziarat 1207m 34.5602 73.25739 1 1 1 23. Mansehra Baboori Booz baila 1303m 34.5919 73.2624 1 1 1 24. Mansehra Jaboori Booz baila 1365m 34.4606 73.20424 1 1 1 25. Mansehra	12.	Mansehra	Shohal	Kot bala	939m	34.45985	73.3586	2	2	2	
14. Manschra Inalata 892m 34-3240 53-0244 32 2 2 15. Manschra Talata Kagal 877m 34-4321 73-36244 32 0 10 16. Manschra Gari Habbi ullah Gari Habbi ullah Edaper Gari Habbi ullah 835m 34-4242 73-35748 1 1 17. Manschra Gari Habbi ullah Gari Habbi ullah Gari Habbi ullah 757m 34-5302 73.3576 1 1 1 18. Manschra Boogar mang Glozz baila 1367m 34-55802 73.2579 1 1 1 20. Manschra Boogar mang Chazi baba Ziarat 1207m 34-56802 73.2579 1 1 1 24. Manschra Jaboori Booz baila 1363 34.9790 73.3244 3 0 25. Manschra Sachian Sachian 1480m 34.6181 73.2574 1 1 1 1<	13.	Mansehra	Shohal	Kot bala	949m	34.46059	/3.35648	1	1	1	
15. Manschra Inalata Inalata Symm 14, 44, 901 15, 32, 633 20 30 16. Manschra Gari Habi ullah Gari Habi ullah Kargal 87, 753 43, 43992 73, 3763 1 1 17. Manschra Gari Habi ullah Gari Habi ullah 83, 566 73, 25763 1 1 1 19. Manschra Boogar mang Gari Habi ullah 83, 566 73, 2579 1 1 1 21. Manschra Boogar mang Ghazi baba Zirant 1207m 34, 5602 73, 2559 1 1 1 23. Manschra Boogar mang Chazi baba Zirant 1236m 34, 58615 73, 2632 1 1 1 24. Manschra Baboori Booz baila 1303m 34, 59708 73, 2644 1 1 1 25. Manschra Sachian Sachian Booz baila 1367m 34, 4410 73, 347443 3 0 34, 459708	14.	Mansenra	I halata		895m	34.45216	/3.36149	2	2	2	
10. Namschra Landata Kagat 6.51m 9.444135 7.3083 20 1.4 1.4 18. Manschra Gari Habbi ullah Edig and Chowk 775m 34.3999 73.37643 1 1 1 19. Manschra Gari Habbi ullah Edig and Chowk 775m 34.3999 73.37643 1 1 1 10. Manschra Boogar mang Bobaz Ziarat 1207m 34.56302 73.25359 1 1 1 23. Manschra Boogar mang Ghazi baba Ziarat 1207m 34.56302 73.2642 1 1 1 24. Manschra Jaboori Booz baila 130m 34.59195 73.2641 1 1 1 25. Manschra Jaboori Booz baila 130m 34.59195 73.26427 1 1 1 26. Manschra Sachian Sachian Sachian 14467 33.2072 10 8 8 <tr< td=""><td>15.</td><td>Mansehra</td><td>I halata Thalata</td><td>I nalata Kacal</td><td>896m 857m</td><td>34.45091</td><td>/3.36244</td><td>32</td><td>30 14</td><td>30</td></tr<>	15.	Mansehra	I halata Thalata	I nalata Kacal	896m 857m	34.45091	/3.36244	32	30 14	30	
11. Manschra Gari Habbi ulla Gari puit 607ml 547.5926 73.7563 1 1 1 19. Manschra Karnool Jageer Gari Habbi ullah 835m 34.42842 73.37563 1 1 1 10. Manschra Boogar mang Ghazi baba Ziarat 1207m 34.56302 73.25539 1 1 1 21. Manschra Boogar mang Ghazi baba Ziarat 1207m 34.56302 73.25539 1 1 1 23. Manschra Boogar mang Chazi baba Ziarat 1207m 34.56302 73.2624 1 1 1 24. Manschra Jaboori Booz baila 1303m 34.9708 73.2644 1 </td <td>10.</td> <td>Manaahra</td> <td>Thalata Comi Hobib ulloh</td> <td>Kagai</td> <td>800m</td> <td>24.44133</td> <td>13.3030</td> <td>20</td> <td>14</td> <td>14</td>	10.	Manaahra	Thalata Comi Hobib ulloh	Kagai	800m	24.44133	13.3030	20	14	14	
16. Manschra Can runory unan Par gance Grows 7/211 34-35729 7.33336 1 1 1 19. Manschra Boogar mang Boogar mang 1280m 34-5682 73.23337 1 1 1 20. Manschra Boogar mang Ghazi baba Ziarat 1207m 34-56302 73.2539 1 1 1 21. Manschra Boogar mang Ghazi baba Ziarat 1207m 34-56302 73.2539 1 1 1 23. Manschra Jaboori Booza baila 130m 34.59195 73.2641 1 1 24. Manschra Sachian Sachian 14466 73.2042 1 1 1 25. Manschra Sachian Sachian 14466 73.2042 1 1 1 26. Abbottabad Deva minal Sai to ziarat 1435m 34.0023 73.2471 0 8 8 8 1 1 1 1	17.	Mansahra	Gari Habib ullah	Gari pull Fid gaba Chowle	809m 775m	24.39928	72 27562	1	1	1	
Data Ration Daget Data Habitation Description Description<	10.	Mansehra	Karnool	Liqueer Gari Habibullah	835m	34.39999	73 35376	1	1	1	
	20	Mansehra	Rainoon Boogar mang	Boogar mang	1280m	34.56862	73 25700	1	1	1	
2.2. Manschra Boogar mang Bogar mang Andrasi 1207n 34.5602 73.2556 1 1 23. Manschra Boogar mang Boor Ghazi boba Ziant 1207n 34.5602 73.2555 1 1 23. Manschra Booor Booz baila 1303n 34.59195 73.2623 1 1 24. Manschra Jaboori Booz baila 1303n 34.59195 73.2644 1 1 25. Manschra Jabori Booz baila 1303n 34.59195 73.2644 1 1 1 24. Abbottabad Kehal GPCC Abbottabad 124m 34.4681 73.22843 2 2 29. Abbottabad Balcheri Olympia ferm 124m 34.46107 73.2874 3 3 0 30. Manschra Jaber Devli Treeda 167m 34.6417 73.23734 8 8 8 31. Manschra Sachian Dornel 1509m <td>20.</td> <td>Mansehra</td> <td>Boogar mang</td> <td>Ghazi haba Ziarat</td> <td>1207m</td> <td>34 56302</td> <td>73 25539</td> <td>1</td> <td>1</td> <td>1</td>	20.	Mansehra	Boogar mang	Ghazi haba Ziarat	1207m	34 56302	73 25539	1	1	1	
23. Manschra Boogar mang Boogar mang Boor baila 1286m 34.58615 73.26382 1 1 24. Manschra Jaboori Booz baila 1303m 34.59103 73.2624 1 1 25. Manschra Sabori Booz baila 1303m 34.59103 73.264 1 1 26. Manschra Sachian Sachian 14666 73.22042 1 1 27. Abbottabad Deva minal Sig to ziarat 1436m 34.0029 73.2874 3 0 30. Manschra Jaber Devli Treeda 1675m 34.6410 73.23724 8 8 8 31. Manschra Jaber Devli Treeda 1711m 34.64103 73.23092 37 37 27 35. Manschra Sachian Domel 1488m 34.6320 73.2562 1 1 36. Manschra Sachian Domel 1509m 34.64103 73.230641<	21.	Mansehra	Boogar mang	Ghazi baba Ziarat	1207m	34 56302	73 25559	1	1	1	
24.MansehraJabooriBooz baila1303m34.59195 73.26227 9 7 25.MansehraJabooriBooz baila1363m 34.59195 73.26217 1 1 12.MansehraSachianSachian1363m 34.61811 73.2317 5 4 27.AbbottabadKehalGPCC Abbottabad $1214m$ 34.16661 73.22042 1 1 1 28.AbbottabadBaldheriOlympia ferm $1246m$ 34.0293 73.26843 2 2 2 29.AbbottabadBaldheriOlympia ferm $1246m$ 34.64704 73.23734 8 8 8 30.MansehraJaber DevliTreeda $1712m$ 34.64704 73.2372 20 18 17 31.MansehraJaber DevliTreeda $1712m$ 34.6524 73.2372 20 18 17 33.MansehraSachianDomel $1488m$ 34.63108 73.2372 20 18 77 35.MansehraSachianDomel $1488m$ 34.63108 73.2372 20 18 77 36.MansehraGanoolRojori $1170m$ 34.6326 73.23614 6 4 47 37.MansehraGanoolDoiria $1387m$ 34.60808 73.38795 20 15 15 39.MansehraGanoolDoiria $1387m$ 34.60807 73.4256 1 </td <td>23</td> <td>Mansehra</td> <td>Boogar mang</td> <td>Andrasi</td> <td>1286m</td> <td>34 58615</td> <td>73 26382</td> <td>1</td> <td>1</td> <td>1</td>	23	Mansehra	Boogar mang	Andrasi	1286m	34 58615	73 26382	1	1	1	
25.ManschraJabooriBooz baila1363m 34.9708 73.264 11126.ManschraSachianSachianSachian1486m 34.61811 73.2317 54427.AbbottabadDeeva minalSaji kot ziarat1436m 34.14666 73.22042 11128.AbbottabadDeeva minalSaji kot ziarat1436m 34.0299 73.23874 3030.ManschraJaber DevliTreeda1675m 34.64074 73.23672 109831.ManschraJaber DevliTreeda1711m 34.64704 73.23972 20181733.ManschraJaber DevliTreeda1711m 34.64704 73.23972 20181734.ManschraSachianDomel1488m 34.63206 73.23242 50474734.ManschraSachianDomel1488m 34.6326 73.23242 50474735.ManschraGanoolRojori1170m 34.67598 73.36766 55340.ManschraGanoolKolian1365m 34.60821 73.38766 55340.ManschraGanoolGolian1385m 34.60221 73.41818 1041.ManschraKavaiKavai mor1489m 34.6221 73.41818 1042.ManschraGa	24	Mansehra	Jaboori	Booz baila	1303m	34,59195	73.26227	9	9	7	
	25.	Mansehra	Jaboori	Booz baila	1363m	34.59708	73.264	1	1	1	
$ \begin{array}{ccccccccccccccccccccccccccccccccccc$	26.	Mansehra	Sachian	Sachian	1486m	34.61811	73.23317	5	4	4	
28. Abbottabad Decva minal Saji kot ziarat 1436m 34.0293 73.26843 2 2 2 29. Abbottabad Baldheri Olympia ferm 1246m 34.24299 73.23874 3 3 0 30. Manschra Jaber Devli Treeda 1675m 34.6404 73.23724 8 8 8 32. Manschra Jaber Devli Treeda 1675m 34.64104 73.23724 8 8 8 32. Manschra Jaber Devli Treeda 1712m 34.62104 73.2372 7 7 6 34. Manschra Sachian Domel 1488m 34.63368 73.23542 50 47 47 75. Manschra Ganool Rajoori 1170m 34.57598 73.38795 20 15 15 39. Manschra Ganool Doibria 1387m 34.6082 73.43256 1 1 1 41	27.	Abbottabad	Kehal	GPGC Abbottabad	1214m	34.14666	73.22042	1	1	1	
29. Abbottabad Baldheri Olympia ferm 1246m 34.2499 73.23874 3 3 0 30. Manschra Jaber Devli Treeda 1675m 34.6404 73.23672 10 9 8 31. Manschra Jaber Devli Treeda 1711m 34.64179 73.23734 8 8 8 32. Manschra Jaber Devli Treeda 1712m 34.65224 73.23734 8 8 8 33. Manschra Sachian Nawaz Abad 1585m 34.64103 73.23022 37 37 27 34. Manschra Sachian Domel 1509m 34.6326 73.23542 50 47 47 37. Manschra Ganool Rajoori 1170m 34.5758 73.6041 6 4 4 38. Manschra Ganool Dibria 1387m 34.60807 73.43256 1 1 1 48. Manschra Ganool Dommala 1385m 34.62251 73.41818 1	28.	Abbottabad	Deeva minal	Saji kot ziarat	1436m	34.00293	73.26843	2	2	2	
30.MansehraJaber DevliTreeda1675m 34.6404 73.23672 109831.MansehraJaber DevliTreeda1711m 34.64107 73.23734 88822.MansehraJaber DevliTreeda1712m 34.64704 73.23972 20181733.MansehraJaber DevliTreeda1712m 34.64704 73.23922 20181734.MansehraSachianDomel1885m 34.64104 73.23924 504777635.MansehraSachianDomel1885m 34.63268 73.23542 50474737.MansehraGanoolRajoori117m 34.57598 73.36041 64438.MansehraGanoolDibria1387m 34.60821 73.38765 55340.MansehraGanoolDoomdar1385m 34.60821 73.41818 10042.MansehraGanoolGamonaka kaghan road1467m 34.62251 73.41818 10044.MansehraHilkotSathian gali1912m 34.61274 73.20134 222245.MansehraHilkotSathian gali1912m 34.61274 73.20134 222244.MansehraHilkotSathian gali1916m 34.6127 73.20134 22 <td>29.</td> <td>Abbottabad</td> <td>Baldheri</td> <td>Olympia ferm</td> <td>1246m</td> <td>34.24299</td> <td>73.23874</td> <td>3</td> <td>3</td> <td>0</td>	29.	Abbottabad	Baldheri	Olympia ferm	1246m	34.24299	73.23874	3	3	0	
31.MansehraJaber DevliTreeda1711m34.6417973.23734888832.MansehraJaber DevliTreeda1695m 34.64170 73.2397220181733.MansehraSachianNawaz Abad1585m 34.64103 73.2309237372735.MansehraSachianDomel1488m 34.63266 73.2354250474736.MansehraSachianDomel1509m 34.63296 73.2354250474737.MansehraGanoolKolian1365m 34.60206 73.3879520151539.MansehraGanoolDibria1387m 34.60208 73.3876655340.MansehraGanoolDoomdar1385m 34.6213 73.4181811041.MansehraGanoolGamoonaka kaghan road1467m 34.6213 73.4181811042.MansehraHilkotSathian gali1912m 34.61236 73.20141322245.MansehraHilkotSathian gali1912m 34.61236 73.2014222246.MansehraHilkotSathian gali1912m 34.61237 73.2014222247.MansehraHilkotSathian gali1912m 34.60125 73.173321004	30.	Mansehra	Jaber Devli	Treeda	1675m	34.6404	73.23672	10	9	8	
32.ManschraJaber DevliTreeda1695m34.6470473.2397220181733.ManschraJaber DevliTreeda1712m34.6522473.2415277634.ManschraSachianDomel1488m34.6522473.2415277635.ManschraSachianDomel1488m34.6336873.2309237372736.ManschraGanoolRajoori1170m34.5759873.604164438.ManschraGanoolKolian1365m34.6082173.3879520151539.ManschraGanoolDibria1387m34.6080873.38766553340.ManschraGanoolGamoondka kaghan road1487m34.623173.4118111042.ManschraGanoolGamoondka kaghan road1467m34.623673.3706110044.ManschraHilkotSathian gali1920m34.612673.20141322245.ManschraHilkotSathian gali1920m34.612773.2014322246.ManschraHilkotSathian gali1920m34.612773.2014222246.ManschraHilkotSathian gali1920m34.612773.2013211146.Mansc	31.	Mansehra	Jaber Devli	Treeda	1711m	34.64179	73.23734	8	8	8	
33.ManschraJaber DevliTreeda $1712m$ 34.65224 73.24152 7 7 6 34.ManschraSachianDomel $1585m$ 34.64103 73.2302 37 37 27 36.ManschraSachianDomel $159m$ 34.63266 73.23542 50 47 47 37.ManschraGanoolRajoori $1170m$ 34.63267 73.32542 50 47 47 38.ManschraGanoolKolian $1365m$ 34.60821 73.38795 20 15 15 39.ManschraGanoolDibria $1387m$ 34.60807 73.43256 1 1 1 41.ManschraGanoolDoomdar $1385m$ 34.60217 73.411 12 9 7 43.ManschraGanoolGamoonaka kaghan road $1467m$ 34.61236 73.20141 3 2 2 45.ManschraHilkotSathian gali $192m$ 34.61267 73.20141 3 2 2 2 46.ManschraHilkotSathian gali $192m$ 34.6127 73.20142 2 2 2 47.ManschraHilkotSathian gali $192m$ 34.6127 73.20132 2 2 2 46.ManschraHilkotSathian gali $192m$ 34.6127 73.20132 2 2 2 2 2 2 2 2 2 2 <t< td=""><td>32.</td><td>Mansehra</td><td>Jaber Devli</td><td>Treeda</td><td>1695m</td><td>34.64704</td><td>73.23972</td><td>20</td><td>18</td><td>17</td></t<>	32.	Mansehra	Jaber Devli	Treeda	1695m	34.64704	73.23972	20	18	17	
34.ManschraSachianNawaz Abad188tm34.6410373.2309237372735.ManschraSachianDomel1488m34.6336873.2354250474736.ManschraGanoolRajoori1170m34.6529673.2354250474737.ManschraGanoolKolian1365m34.6082073.2354250474738.ManschraGanoolDibria1387m34.6080873.3876655340.ManschraKavaiKavai mor1489m34.6340773.4876655340.ManschraGanoolGamoonaka kaghan road1385m34.621373.41110044.ManschraKavaiRasha pull1489m34.6121373.41110044.ManschraHilkotSathian gali1920m34.6127473.20053322246.ManschraHilkotSathian gali1920m34.6127473.20134222247.ManschraHilkotSumbul1708m34.6032773.013210049.ManschraMalkianGali gadian1839m34.603773.03021211140.Suthian gali1920m34.612773.2013210049.ManschraHilkotSumbul1708m34.603	33.	Mansehra	Jaber Devli	Treeda	1712m	34.65224	73.24152	7	7	6	
35. Mansehra Sachian Domel 1488m 34.63368 73.23542 50 47 47 36. Mansehra Ganool Rajoori 1170m 34.57598 73.36041 6 4 4 38. Mansehra Ganool Kolian 1365m 34.60821 73.38795 20 15 15 39. Mansehra Ganool Dibria 1387m 34.6080 73.38766 5 5 3 40. Mansehra Ganool Doomdar 1385m 34.6213 73.411 12 9 7 41. Mansehra Ganool Gamoonaka kaghan road 1467m 34.6213 73.411 12 9 7 43. Mansehra Hilkot Sathian gali 1912m 34.61267 73.20141 3 2 2 2 44. Mansehra Hilkot Sathian gali 192m 34.61274 73.20141 3 2 2 2 2 47. Mansehra Hilkot Sathian gali 192m 34.6127	34.	Mansehra	Sachian	Nawaz Abad	1585m	34.64103	73.23092	37	37	27	
36.MansehraSachianDomel150m 34.63296 73.23542 50 47 47 37.MansehraGanoolRajoori1170m 34.5798 73.36795 20 15 15 39.MansehraGanoolDibria1387m 34.60808 73.38795 20 15 15 39.MansehraGanoolDibria $1387m$ 34.60808 73.38795 5 5 3 40.MansehraKavaiKavai mor $1489m$ 34.62251 73.41818 1 1 0 42.MansehraGanoolGamoonaka kaghan road $1467m$ 34.6213 73.4706 1 0 0 43.MansehraKavaiRasha pull $1489m$ 34.6213 73.4706 1 0 0 44.MansehraHilkotSathian gali $1920m$ 34.61274 73.20141 2 2 2 46.MansehraHilkotSathian gali $1920m$ 34.61277 73.2013 2 2 2 47.MansehraHilkotSathian gali $1920m$ 34.6127 73.2012 2 1 1 48.MansehraHilkotSathian gali $1920m$ 34.6127 73.2013 2 2 2 46.MansehraHilkotSambul $1708m$ 34.60355 73.17332 1 0 0 49.MansehraMalkianGali gadian $1839m$ 34.60458	35.	Mansehra	Sachian	Domel	1488m	34.63368	73.23587	10	8	7	
37. Mansehra Ganool Rajoori 1170m 34.57598 73.36041 6 4 4 38. Mansehra Ganool Kolian 1365m 34.60821 73.38766 5 5 3 40. Mansehra Ganool Dibria 1387m 34.60807 73.43256 1 1 1 41. Mansehra Ganool Gamoonka kaghan road 1467m 34.62151 73.41181 1 0 42. Mansehra Ganool Gamoonka kaghan road 1467m 34.6213 73.411 2 2 2 43. Mansehra Hilkot Sathian gali 1912m 34.61247 73.20134 2 2 2 46. Mansehra Hilkot Sathian gali 192m 34.61247 73.2013 2 2 2 47. Mansehra Hilkot Sathian gali 1916m 34.6127 73.2013 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 <td< td=""><td>36.</td><td>Mansehra</td><td>Sachian</td><td>Domel</td><td>1509m</td><td>34.63296</td><td>73.23542</td><td>50</td><td>47</td><td>47</td></td<>	36.	Mansehra	Sachian	Domel	1509m	34.63296	73.23542	50	47	47	
38.MansehraGanoolKolian1365m34.6082173.3879520151539.MansehraGanoolDibria1387m34.6080873.3876655340.MansehraGanoolDoomdar1489m34.6340773.4325611141.MansehraGanoolGamoonaka kaghan road1467m34.621373.411129743.MansehraGanoolGamoonaka kaghan road1467m34.621373.411129743.MansehraHilkotSathian gali1912m34.6123673.20141322245.MansehraHilkotSathian gali1920m34.6127473.20134222246.MansehraHilkotSathian gali1916m34.602573.1733210047.MansehraHilkotSumbul1708m34.6045873.18181222250.BattagramAjmaraOairy chapar gram1123m34.6045873.0527533 <td< td=""><td>37.</td><td>Mansehra</td><td>Ganool</td><td>Rajoori</td><td>1170m</td><td>34.57598</td><td>73.36041</td><td>6</td><td>4</td><td>4</td></td<>	37.	Mansehra	Ganool	Rajoori	1170m	34.57598	73.36041	6	4	4	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	38.	Mansehra	Ganool	Kolian	1365m	34.60821	73.38795	20	15	15	
40.MansehraKavaiKavai mor1489m 34.63407 73.43256 11141.MansehraGanoolDoomdar1385m 34.62251 73.41818 11042.MansehraGanoolGamoonaka kaghan road1467m 34.6213 73.4111 129743.MansehraKavaiRasha pull1489m 34.66048 73.4706 10044.MansehraHilkotSathian gali1912m 34.61236 73.20141 32245.MansehraHilkotSathian gali1920m 34.61274 73.20134 22246.MansehraHilkotSathian gali1916m 34.61277 73.2012 11148.MansehraHilkotSumbul1708m 34.60357 73.17322 10049.MansehraMalkianGali gadian1839m 34.60488 73.141812 22250.BattagramAjmaraDairy chapar gram1123m 34.66123 73.04856 542252.BattagramAjmaraChaper gram moh: Tal1084m 34.66088 73.04836 542253.BattagramAjmaraTamai Ziarat1073m 34.60482 73.04836 542255.BattagramShumliBeela tarla1419m 34.66088 73.04893 3 <td>39.</td> <td>Mansehra</td> <td>Ganool</td> <td>Dibria</td> <td>1387m</td> <td>34.60808</td> <td>73.38766</td> <td>5</td> <td>5</td> <td>3</td>	39.	Mansehra	Ganool	Dibria	1387m	34.60808	73.38766	5	5	3	
41. Mansehra Ganool Doomdar 1385m 34.62251 73.41818 1 1 0 42. Mansehra Ganool Gamoonaka kaghan road 1467m 34.6213 73.411 12 9 7 43. Mansehra Kavai Rasha pull 1489m 34.60148 73.4706 1 0 0 44. Mansehra Hilkot Sathian gali 1912m 34.6127 73.20134 2 2 2 45. Mansehra Hilkot Sathian gali 1916m 34.61277 73.2013 2 1 1 48. Mansehra Hilkot Sathian gali 1916m 34.6127 73.201 2 1 1 48. Mansehra Malkian Gali gadian 1839m 34.60458 73.18181 2 2 2 2 50 Battagram Ajmara Chaper gram moh: Tal 1089m 34.66109 73.04856 5 4 2 2 2 53 Battagram Ajmara Chaper gram moh: Tal 1084m 34.66967 <td< td=""><td>40.</td><td>Mansehra</td><td>Kavai</td><td>Kavai mor</td><td>1489m</td><td>34.63407</td><td>73.43256</td><td>1</td><td>1</td><td>1</td></td<>	40.	Mansehra	Kavai	Kavai mor	1489m	34.63407	73.43256	1	1	1	
42.ManschraGanoolGamoonaka kaghan road1467m34.6213 73.411 129743.ManschraKavaiRasha pull1489m34.66048 73.4706 10044.ManschraHilkotSathian gali1912m 34.61236 73.20141 32245.ManschraHilkotSathian gali1920m 34.61274 73.20134 22246.ManschraHilkotSathian gali1920m 34.61277 73.20134 22247.ManschraHilkotSathian gali1916m 34.61277 73.2012 1148.ManschraHilkotSumbul1708m 34.604557 73.17332 10049.ManschraMalkianGali gadian1839m 34.604587 73.18181 222250.BattagramAjmaraChaper gram moh: Tal1094m 34.65967 73.04856 54222252.BattagramAjmaraChaper gram moh: Tal1094m 34.65967 73.05021 322253.BattagramAjmaraTamai Ziarat1073m 34.65957 73.05021 322254.BattagramAjmaraTamai Ziarat1073m 34.65957 73.05021 11155.BattagramShumliBeela tarla1396m 34.69823 <td>41.</td> <td>Mansehra</td> <td>Ganool</td> <td>Doomdar</td> <td>1385m</td> <td>34.62251</td> <td>73.41818</td> <td>1</td> <td>1</td> <td>0</td>	41.	Mansehra	Ganool	Doomdar	1385m	34.62251	73.41818	1	1	0	
43.MansehraKavaRasha pull1489m 34.66048 73.4706 10044.MansehraHilkotSathian gali1912m 34.61236 73.20141 32245.MansehraHilkotSathian gali1920m 34.61274 73.20134 22246.MansehraHilkotSathian gali1928m 34.61277 73.20134 22247.MansehraHilkotSumbul1708m 34.60255 73.17332 10049.MansehraMalkianGali gadian1839m 34.60458 73.18181 22250.BattagramAjmaraDairy chapar gram1123m 34.66123 73.05275 33351.BattagramAjmaraChaper gram moh: Tal1089m 34.66109 73.04856 54252.BattagramAjmaraChaper gram moh: Tal1084m 34.66088 73.04893 33354.BattagramAjmaraTamai Ziarat1073m 34.66962 73.10862 11155.BattagramShumliBeela tarla1396m 34.69962 73.10862 11156.BattagramShumliMoh: Amin Abad1490m 34.70409 73.11855 10058.BattagramShumliBansair1447m 34.70409 73.11855 100<	42.	Mansehra	Ganool	Gamoonaka kaghan road	1467m	34.6213	73.411	12	9	7	
44.MansehraHikotSathan gali1912m 34.61236 73.20141 3 2 2 45.MansehraHilkotSathian gali1920m 34.61274 73.20134 2 2 46.MansehraHilkotSathian gali1928m 34.61127 73.20053 3 2 2 47.MansehraHilkotSathian gali1916m 34.61227 73.201 2 1 1 48.MansehraHilkotSumbul1708m 34.60355 73.17332 1 0 0 49.MansehraAjmaraDairy chapar gram $1123m$ 34.60458 73.05275 3 3 3 50.BattagramAjmaraChaper gram moh: Tal1089m 34.66123 73.05275 3 3 3 51.BattagramAjmaraChaper gram moh: Tal1084m 34.66088 73.04893 3 3 3 52.BattagramAjmaraChaper gram moh: Tal1094m 34.6596 73.05021 3 2 2 53.BattagramAjmaraTamai Ziarat1073m 34.65958 73.04893 3 3 3 54.BattagramShumliBecla tarla1419m 34.69823 73.10862 1 1 1 55.BattagramShumliBecla tarla1396m 34.69823 73.10862 1 1 1 57.BattagramShumliBansair1447m <t< td=""><td>43.</td><td>Mansehra</td><td>Kavai</td><td>Rasha pull</td><td>1489m</td><td>34.66048</td><td>73.4706</td><td>1</td><td>0</td><td>0</td></t<>	43.	Mansehra	Kavai	Rasha pull	1489m	34.66048	73.4706	1	0	0	
45.MansehraHilkotSathian gali1920m 34.61274 73.20134 2 2 2 46.MansehraHilkotSathian gali1928m 34.61197 73.20053 3 2 2 47.MansehraHilkotSathian gali1916m 34.61227 73.201 2 1 1 48.MansehraHilkotSumbul1708m 34.60355 73.17332 1 0 0 49.MansehraMalkianGali gadian1839m 34.66123 73.05275 3 3 3 51.BattagramAjmaraChaper gram moh: Tal1094m 34.65109 73.04856 5 4 2 52.BattagramAjmaraChaper gram moh: Tal1094m 34.6596 73.0521 3 2 2 53.BattagramAjmaraChaper gram moh: Tal1084m 34.66109 73.04893 3 3 3 54.BattagramAjmaraChaper gram moh: Tal1084m 34.65958 73.05016 1 1 1 55.BattagramShumliBeela tarla1419m 34.69622 73.11137 1 0 0 58.BattagramShumliBansair1447m 34.70409 73.11851 0 0 58.BattagramShumliBansair1447m 34.70409 73.11845 1 0 59.MansehraIcharianBai tarli wali Ziarat1294m	44.	Mansehra	Hilkot	Sathian gali	1912m	34.61236	73.20141	3	2	2	
46.MansehraHilkotSathian gali1928m34.6119773.2005332247.MansehraHilkotSathian gali1916m34.6122773.20121148.MansehraHilkotSumbul1708m34.6025573.1733210049.MansehraMalkianGali gadian1839m34.6045873.1818122250.BattagramAjmaraDairy chapar gram1123m34.6612373.0527533351.BattagramAjmaraChaper gram moh: Tal1089m34.6610973.0485654252.BattagramAjmaraChaper gram moh: Tal1084m34.6608873.0489333354.BattagramAjmaraTamai Ziarat1073m34.6595873.0501611155.BattagramShumliBeela tarla1419m34.6082373.111371056.BattagramShumliBeela tarla1490m34.7040973.111371058.BattagramShumliBansair1447m34.7040673.1112910058.BattagramShumliBansair1447m34.7040673.112910058.BattagramShumliBansair1447m34.7040673.114091222260.MansehraIcharianBai tarli wal	45.	Mansehra	Hilkot	Sathian gali	1920m	34.61274	73.20134	2	2	2	
47.MansehraHilkotSathian gali1916m 34.61227 73.201 2 1 1 48.MansehraHilkotSumbul1708m 34.60355 73.17332 1 0 0 49.MansehraMalkianGali gadian1839m 34.60458 73.18181 2 2 2 50.BattagramAjmaraDairy chapar gram $1123m$ 34.66123 73.05275 3 3 3 51.BattagramAjmaraChaper gram moh: Tal $1089m$ 34.66109 73.04856 5 4 2 52.BattagramAjmaraChaper gram moh: Tal $1094m$ 34.6596 73.05021 3 2 2 53.BattagramAjmaraChaper gram moh: Tal $1094m$ 34.6596 73.04856 3 3 3 54.BattagramAjmaraTamai Ziarat $1073m$ 34.6596 73.04893 3 3 3 55.BattagramShumliBeela tarla $149m$ 34.6962 73.11137 1 0 56.BattagramShumliBeela tarla $1396m$ 34.6982 73.10862 1 1 57.BattagramShumliBansair $1447m$ 34.70406 73.11385 0 0 58.BattagramShumliBansair $1447m$ 34.70406 73.11091 2 2 2 60.MansehraAttar sheeshaAttar sheesha Bazar $109m$ <	46.	Mansehra	Hilkot	Sathian gali	1928m	34.61197	/3.20053	3	2	2	
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51.BattagramAjmaraChaper gram moh: Ial1089m34.6610973.0485654252.BattagramAjmaraChaper gram moh: Tal1094m34.659673.0502132253.BattagramAjmaraChaper gram moh: Tal1084m34.660873.0489333354.BattagramAjmaraTamai Ziarat1073m34.6595873.0501611155.BattagramShumliBeela tarla1419m34.6996273.1113711056.BattagramShumliBeela tarla1396m34.6982373.1086211157.BattagramShumliBansair1447m34.7040973.1138510058.BattagramShumliBansair1447m34.7040673.1112910059.MansehraIcharianBai tarli wali Ziarat1294m34.5340273.1409122260.MansehraAttar sheeshaAttar sheesha Bazar1099m34.3915673.06384461.Battagram(Allai)RashangeJangri Ganga val1848m34.821473.1620911162.Battagram(Allai)RashangeSokai Rashange1852m34.8198273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.819273.05662111 <tr< td=""><td>50.</td><td>Battagram</td><td>Ajmara</td><td>Dairy chapar gram</td><td>1123m</td><td>34.66123</td><td>73.05275</td><td>3</td><td>3</td><td>3</td></tr<>	50.	Battagram	Ajmara	Dairy chapar gram	1123m	34.66123	73.05275	3	3	3	
52.BattagramAjmaraChaper gram moh: Ial1094m 34.6596 73.05021 3 2 2 53.BattagramAjmaraChaper gram moh: Tal $1084m$ 34.66088 73.04893 3 3 3 54.BattagramAjmaraTamai Ziarat $1073m$ 34.65958 73.05016 1 1 1 55.BattagramShumliBeela tarla $1419m$ 34.69962 73.11137 1 1 0 56.BattagramShumliBeela tarla $1396m$ 34.69823 73.10862 1 1 1 57.BattagramShumliMoh: Amin Abad $1490m$ 34.70409 73.11385 1 0 0 58.BattagramShumliBansair $1447m$ 34.70406 73.11129 1 0 0 59.MansehraIcharianBai tarli wali Ziarat $1294m$ 34.53402 73.14091 2 2 2 60.MansehraAttar sheeshaAttar sheesha Bazar $1099m$ 34.8214 73.16209 1 1 62.Battagram(Allai)RashangeSokai Rashange $1852m$ 34.82042 73.11304 9 9 6 64.Battagram(Allai)BiriBiri Khas $1492m$ 34.83192 73.0903 1 1 1 65.Battagram(Allai)BiriKarag Bazar $1332m$ 34.83192 73.05666 1 1 1 66.Bat	51.	Battagram	Ajmara	Chaper gram moh: Tal	1089m	34.66109	73.04856	5	4	2	
53.BattagramAjmaraChaper gram moh: Tal $1084m$ 34.66088 73.04893 3 3 3 3 54.BattagramAjmaraTamai Ziarat $1073m$ 34.65958 73.05016 1 1 1 55.BattagramShumliBeela tarla $1419m$ 34.69962 73.11137 1 1 0 56.BattagramShumliBeela tarla $1396m$ 34.69823 73.10862 1 1 1 57.BattagramShumliMoh: Amin Abad $1490m$ 34.70409 73.11385 1 0 0 58.BattagramShumliBansair $1447m$ 34.70406 73.11129 1 0 0 59.MansehraIcharianBai tarli wali Ziarat $1294m$ 34.53402 73.14091 2 2 2 60.MansehraAttar sheeshaAttar sheesha Bazar $1099m$ 34.39156 73.30638 4 4 61.Battagram(Allai)RashangeJangri Ganga val $1848m$ 34.8214 73.16209 1 1 62.Battagram(Allai)RashangeSokai Rashange $1852m$ 34.82042 73.11304 9 9 6 64.Battagram(Allai)BiriBiri Khas $1492m$ 34.83192 73.0903 1 1 1 65.Battagram(Allai)BiriKarag Bazar $1332m$ 34.83192 73.05606 1 1 1 66. <td>52.</td> <td>Battagram</td> <td>Ajmara</td> <td>Chaper gram moh: Tal</td> <td>1094m</td> <td>34.6596</td> <td>73.05021</td> <td>3</td> <td>2</td> <td>2</td>	52.	Battagram	Ajmara	Chaper gram moh: Tal	1094m	34.6596	73.05021	3	2	2	
54.BattagramAjmaraTamai Ziarat1073m34.6595873.0501611155.BattagramShumliBeela tarla1419m34.6996273.1113711056.BattagramShumliBeela tarla1396m34.6982373.10862111157.BattagramShumliMoh: Amin Abad1490m34.7040973.1138510058.BattagramShumliBansair1447m34.7040673.1112910059.MansehraIcharianBai tarli wali Ziarat1294m34.5340273.1409122260.MansehraAttar sheeshaAttar sheesha Bazar1099m34.3915673.3063844461.Battagram(Allai)RashangeJangri Ganga val1848m34.821473.1620911162.Battagram(Allai)RashangeSokai Rashange1852m34.8204273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.819873.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1332m34.8318473.05606111	53.	Battagram	Ajmara	Chaper gram moh: Tal	1084m	34.66088	73.04893	3	3	3	
55.BattagramShumliBeela tarla1419m34.6996273.1113711056.BattagramShumliBeela tarla1396m34.6982373.1086211157.BattagramShumliMoh: Amin Abad1490m34.7040973.1138510058.BattagramShumliBansair1447m34.7040673.1112910059.MansehraIcharianBai tarli wali Ziarat1294m34.5340273.1409122260.MansehraAttar sheeshaAttar sheesha Bazar1099m34.3915673.3063844461.Battagram(Allai)RashangeJangri Ganga val1848m34.821473.1620911162.Battagram(Allai)RashangeSokai Rashange1852m34.8204273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.819873.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1341m34.8318473.05606111	54.	Battagram	Ajmara	Tamai Ziarat	1073m	34.65958	73.05016	1	1	1	
56.BattagramShumliBeela tarla1396m34.6982373.1086211157.BattagramShumliMoh: Amin Abad1490m34.7040973.1138510058.BattagramShumliBansair1447m34.7040673.1112910059.MansehraIcharianBai tarli wali Ziarat1294m34.5340273.1409122260.MansehraAttar sheeshaAttar sheesha Bazar1099m34.3915673.3063844461.Battagram(Allai)RashangeJangri Ganga val1848m34.821473.1620911162.Battagram(Allai)RashangeSokai Rashange1852m34.8204273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.819873.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1341m34.8318473.05606111	55.	Battagram	Shumli	Beela tarla	1419m	34.69962	73.11137	1	1	0	
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59. Mansehra Icharian Bai tarli wali Ziarat 1294m 34.53402 73.14091 2 2 2 60. Mansehra Attar sheesha Attar sheesha Bazar 1099m 34.39156 73.30638 4 4 61. Battagram(Allai) Rashange Jangri Ganga val 1848m 34.8214 73.16209 1 1 1 62. Battagram(Allai) Rashange Sokai Rashange 1852m 34.82042 73.15033 2 2 2 63. Battagram(Allai) R ashange Rashange khas 1597m 34.81982 73.11304 9 9 6 64. Battagram(Allai) Biri Biri Khas 1492m 34.8159 73.0903 1 1 1 65. Battagram(Allai) Biri Karag Bazar 1332m 34.83192 73.05662 1 1 1 66. Battagram(Allai) Biri Karag Bazar 1341m 34.83184 73.05606 1 1 1	58.	Battagram	Shumli	Bansair	1447m	34.70406	73.11129	1	0	0	
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61.Battagram(Allai)RashangeJangri Ganga val1848m34.821473.1620911162.Battagram(Allai)RashangeSokai Rashange1852m34.8204273.1503322263.Battagram(Allai)R ashangeRashangeRashange1597m34.8198273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.815973.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1341m34.8318473.05606111	60.	Mansehra	Attar sheesha	Attar sheesha Bazar	1099m	34.39156	73.30638	4	4	4	
62.Battagram(Allai)RashangeSokai Rashange1852m34.8204273.1503322263.Battagram(Allai)R ashangeRashange khas1597m34.8198273.1130499664.Battagram(Allai)BiriBiri Khas1492m34.815973.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1341m34.8318473.05606111	61.	Battagram(Allai)	Rashange	Jangri Ganga val	1848m	34.8214	73.16209	1	1	1	
63.Battagram(Allai)R ashangeRashange khas1597m34.8198273.1130499664.Battagram(Allai)BiriBiriBiri Khas1492m34.815973.090311165.Battagram(Allai)BiriKarag Bazar1332m34.8319273.0566211166.Battagram(Allai)BiriKarag Bazar1341m34.8318473.05606111	62.	Battagram(Allai)	Rashange	Sokai Rashange	1852m	34.82042	73.15033	2	2	2	
64. Battagram(Allai) Biri Biri Khas 1492m 34.8159 73.0903 1 1 1 65. Battagram(Allai) Biri Karag Bazar 1332m 34.83192 73.05662 1 1 1 66. Battagram(Allai) Biri Karag Bazar 1341m 34.83184 73.05606 1 1 1	63.	Battagram(Allai)	R ashange	Rashange khas	1597m	34.81982	73.11304	9	9	6	
65. Battagram(Allai) Biri Karag Bazar 1332m 34.83192 73.05662 1 1 1 66. Battagram(Allai) Biri Karag Bazar 1341m 34.83184 73.05606 1 1 1	64.	Battagram(Allai)	Biri	Biri Khas	1492m	34.8159	73.0903	1	1	1	
66. Battagram(Allai) Biri Karag Bazar 1341m 34.83184 73.05606 1 1 1	65.	Battagram(Allai)	Biri	Karag Bazar	1332m	34.83192	73.05662	1	1	1	
	66.	Battagram(Allai)	Biri	Karag Bazar	1341m	34.83184	73.05606	1	1	1	



Fig. 2. Extent of Occurrence of *Ulmus wallichiana* in different localities of Hazara division.

Results

Habit and habitat: Elms are all woody perennials of allogamous and hermaphroditic reproductive nature, flowers being small, perfect and apetalous, are wind-pollinated. Flowers appear in late winter or early spring before foliation but a small number of species flower in late summer or fall. These species grow at an elevation range of 2200-3000m. Most individuals of the taxon were found growing in areas with slopes, on limestone cliffs and at the rocks edges in dense as well as in fragmented form.

Distribution

These taxa are confined to Himalayan ranges mostly. During the current study, *Ulmus wallichiana* was recorded in 52 localities (Table 1) and *U. villosa* in 66 localities (Table 2 and Fig. 1). The species were predominantly distributed on slopes as well as rocky areas. However, in some cases, some individuals of the taxon were found within the dense forests of *Pinus wallichiana*, *Abies*



Fig. 3. Extent of Occurrence of *Ulmus villosa* in different localities of Hazara division.

pindrow, Picea smithiana and *Pinus roxburgii*. All these localities collectively encompassed an area of 1632 km² for *Ulmus wallichiana* and 2544 km² for *Ulmus villosa* as extent of occurrence (Table 3). The highest area of occupancy was observed in locality 4 followed by locality 6 and the remaining localities were less than 11 km² area. The estimated area of occupancy in the observed localities was about 68 km² and 156 km² for *Ulmus wallichiana* (Fig. 2) and *U. villosa* (Fig. 3) respectively.

Population size: Observed population size in different localities has been given in the Table 3. A total of 70 individuals of *Ulmus wallichiana* and 283 individuals of *U. villosa* were recorded in these localities (Table 4). Locality-wise, the highest number of *U. wallichiana* individuals (8) were observed in Bara gali (Abbottabad), followed by 6 individuals. The remaining localities had less than 6 plant individuals each (Table 3). Similarly, maximum number of individuals of *U. villosa* (47) were recorded in Domel, Mansehra.

Natural threats: As this taxon inhabiting in the subalpine zone where heavy snowfall damages the seedlings of taxon and young branches inclined due to the snow avalanches. Heavy rainfall is also a severe threat because of the greater run-off at higher altitude. The topsoil of the habitat is degraded due to heavy rainfall.

Anthropogenic impact: These taxa grows at high altitudinal ranges of the Hazara division and facing serious anthropogenic disturbances (Fig. 4). Due to the

harsh climatic condition and chilling weather in winter, the inhabitants mostly depend upon the fuel wood due to the lack of other alternative facilities. The taxa are mostly traded both for construction as timber as well as fuel wood which reflects in the habitat degradation and continuous decline in the survival of *U. wallichiana* and *U. villosa*. Roads are under construction in different parts of Hazara division, the CPEC has also been completed in November 2019 and those road crosses added serious threats in the habitat rich spots.



Fig. 4. Buildings and houses construction within the natural habitat of *Ulmus villosa*. Right hand side is an old tree of *U. villosa* struck by thunderstorm.

Table 3.	Ulmus	wallichiana	and U.	villosa:	Summa	ary of	geogra	phical range	e
	(Ex	tent of occu	rrence &	& Area (of occup	oancy	in km ²).	

Investigated plant species	Extent of occurrence	Area of occupancy in km ²
Ulmus wallichiana	1632 km^2	68 km ²
Ulmus villosa	2544 km^2	156 km^2

Table 4. Summary of known localities, population size, geographical range and various anthropogenic an	nd
natural threat observed in the study taxa.	

Taxa	Known Localities	Population size	Geographic range		Anthropogenic and natural threat					
	Localities	(individuals)	E.O Km ²	A.O Km ²	Α	В	С	D	Е	
Ulmus vilosa	52	283	2544	156	+	+	+	+	+	
Ulmus wallichiana	66	70	1632	68	+	+	+	+	+	

Key: E.O; Extent of occurrence, A.O; Area of occupancy, A) Deforestation, B) Soil erosion, C, Medicinal uses, D) Browsing, E) Road construction. (+ present:- absent).

Discussion

Initial efforts of ecological significance and rapid decline in *U. wallichiana* population from its natural habitats in Pakistan were led by Ahmad (2004). The current assessed the conservation issues and biodiversity loss of *Ulmus* species. More recently, conservation of species has been one of the most serious issues around the world as conservation and biodiversity of species ensures the survival of human being itself (Sala *et al.*, 2000). Unfortunately, this issue has not been taken much seriously and it is particularly alarming in the developing

world including Pakistan. Over the years, only 55 taxa have been evaluated in Pakistan so far, in connection to the risks of extinction (Abbas *et al.*, 2010; Alam & Ali, 2009, 2010; Ali & Qaiser, 2010; Muhammad *et al.*, 2017). Moreover, these studies have highlighted that 51 taxa (92.60%) are endemic to Pakistan, while the remaining 4 taxa are rare for Pakistan (Muhammad, 2013).

Endemic species have less ability to compete as compared to the widely distributed species (Rabinowitz, 1981; Majid *et al.*, 2019). In case of the *Ulmus villosa* and *U. wallichiana*, their distribution is restricted to 1200-2700m and 2200-3000m altitudinal range, respectively.

Both the species were recorded in the Cliffs and dense forests. These results suggest that the taxon have the ability of competition and can easily survive in different habitats.

Fragmentation of habitat and deforestation is also considered to be a primary serious threat for survival of species (Anon., 2001; Barbosa & Marquet, 2002; Muhammad et al., 2017). As for as the population size is concerned, 52 localities have been recorded for U. wallichiana which collectively support 70 individuals only. On the other hand, U. villosa was found in 66 different localities residing its 283 individuals (Table 4). These results suggest that, distribution pattern is not uniform and in major portion of the distribution range, individuals of the taxon are absent. Distribution pattern in connection with survival of a species in a habitat is a key component and strong and important parameter (Muhammad et al., 2017). Moreover, these localities are alarmingly exposed to browsing and deforestation. Based on its distribution pattern, both the taxa faced mitigating natural and anthropogenic impact. Nonetheless, climate change, soil erosion and habitat fragmentation put severe pressure in this connection (Singh, 2009).

Ulmus wallichiana: was thoroughly assessed based on IUCN Red Categories and Criteria 2001 (Anon., 2001). Criterion A could not be applied being data deficiency. As per criterion B Extent of Occurrence (EOO) was 1632 Km² (B1) along severely fragmented populations (a) and continuous decline in number of mature individuals (v). While area of occupancy (AOO) was determined to be 68 Km (less than 500 Km²) hence species qualifies for Endangered category [EN B1 ab(v)]. While applying Criterion C total number of mature individuals were reported to be 70 (<250) in final year of assessment having less than 50 individuals in largest sub population C2 a (i) thus qualified for Critically Endangered [CR C C2 a(i)]. Applying Criterion D number of individuals are less than 250 individuals thus classified as Endangered (EN D1). Criterion E Could not be applied due data deficiency. U. wallichiana is assigned Critically Endangered (CR) category. Keeping in view the IUCN guidelines stating that "the precautionary approach is to take the highest category shown".

Ulmus villosa: was assessment is based on IUCN Red Categories and Criteria 2001 (Anon., 2001). As per criterion B Extent of Occurrence (EOO) was 2544 Km² (less than 5000 Km² (B1) along severely fragmented populations (a) and continuous decline in number of mature individuals (v). While area of occupancy (AOO) was determined to be 156 Km² (less than 500 Km²) hence species qualified for Endangered category [EN B1 ab(v)]. While applying Criterion C total number of mature individuals were reported to be 283 (<2500) in the last year having less than 250 individuals in largest sub population C2 a (i) thus qualified for Endangered category [EN C C2 a(i)]. While applying Criterion D, the number of individuals are 283 (<2500) assigning it in to a Vulnerable (VU D1) category. Criterion E Could not be applied due data deficiency. U. villosa is assigned Endangered (EN) category at regional level keeping in view the IUCN guidelines where precautionary approach may be applied.

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(Received for publication 28 December 2019)