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Phytosociology and Structure of Some Forests of Skardu District of Karakorum Range of Pakistan

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Abstract: Quantitative description and structure of some forests of Skardu District of Northern areas of Pakistan were presented. Two gymnospermic tree species i.e *Pinus wallichiana* and *Juniperus execlsa* and an angiospermic tree i.e *Betula utilis* is recorded in these forests. In each stand gymnospermic species are widely distributed and dominant with the association of angiospermic species of *Betula utilis* in six stands. Highest density ha^{-1} (184.27) and basal area (42.38 m^2 ha^{-1}) were recorded from *Pinus wallichiana*,while *Juniperus execlsa* attained upto 129 ha^{-1} density and 14.63 basal area m^2 ha^{-1}. *Betula utilis* occupied up to 159 density ha^{-1} with 13.12 basal area m^2 ha^{-1}.Ground flora consisted as *Astragalus zanskarensis, Leontopodium himalyanum, Taraxacum baltistanicum, Potentilla anserina, Oxyria digyna, Hieracium lanceolatum, Tanactum artemisiodes, Rosa webbiana* and seedling of *Pinus wallichiana*. Size class structure shows gaps in each tree species indicating unstable conditions of these forests due to anthropogenic disturbances.

Key words: Forest · Phytosociology · Ground flora · Size class · Anthropogenic

INTRODUCTION

Skardu is the main town of Baltistan and the capital of Skardu District of Gilgit-Baltistan. Administratively the district divided in to three sub divisions Kharmang,Shigar and Rundo. Skardu perched at 2,438 meters above sea-level in the backdrop of the great peaks of 'The Karakoram Mountain Range. Baltistan also known as "Little Tibet" for its resemblance in geographic features with Tibet nestles world's greatest concentration of lofty peaks. A 100 km thick wall of majestic mountains separates it from China in the north. To the south is the mysterious Deosai Plateau lying between Kashmir and Baltistan. In the East lies Laddakh and in the west is Gilgit and Hunza-Nagar. Within an area of 26,000 sq. km contain 60 mountain peaks of above 7000 m. Five of these are above 8000m including K-2 (8611m), the second highest peak on earth. These mountains contain the greatest concentration of glaciers outside the Polar Regions. The climate of Skardu during the summer is moderated by its mountain setting and the intense heat of lowland Pakistan does not reach here. The mountains also block out the summer monsoon and summer rainfall therefore it receives a little rainfall due to these mountains resulting in very severe winter weather. During.

April to October tourist season, temperatures vary between a maximum of 27 °C and a minimum (in October) 8°C. However, temperatures can drop to below -10 °C in the December-to-January midwinter period. The lowest temperature of the year can reach -25°C Kharmang is one of the most isolated, remote and sensitive subdivision of Gilgit-Baltistan. Due to the extreme harsh weather many small forested areas or stands are distributed in inner valley where the conditions are suitable for tree growth and its survival.

On the basis of observational work Champion *et al.* [1] and Beg [2] described the forest types and vegetation of this area.

First quantitative and multivariate analysis of the vegetation around Skardu was presented by Ahmed [3], during a scientific expedition of Northern Areas of Pakistan. This was funded by Planning Commission of Pakistan, Pakistan Science Foundation and National Development and Volunteer Program of Government of Pakistan in 1973. Ahmed and Qadir [4], Ahmed [5, 6] also presented phytosociological investigation from Gilgit to Shandur and Gilgit to Astor respectively, during to the same expedition. Quantitative and vegetation work was carried out at Quetta plantation, regenerating juniper, *Juniperus execlsa* and *Pinus gerardiana* forests of

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Baluchistan [6-10]. Hussain *et al*. [11] phytosociologically described the vegetation of Mardan. Ahmed and Naqvi [12] and Ahmed *et al*. [13] presented results from *Picea smithiana* forest and structure and description of various forests belonging to various climatic zones of Pakistan.

Siddiqui *et al*. [14, 15] described *Pinus ruxburghii* and moist temperate forest of Pakistan. Wahab *et al*. [16,17] and Khan *et al*. [18-21] analyzed pine forests and *Monotheca buxifolia* forests of Dir District while. Structure and quantitative description of *Quercus baloot* and *Olia ferruginea* forests of Chitral [18-20, 22]. No quantitative phytosociology describing structure of forested areas of Skardu Division is presented so far. Therefore, this study explore this information from ten forested location of Skardu Division of Karakorum Range of Pakistan.

MATERIALS AND METHODS

Point Centered Quarter (PCQ) Method of Cottam and Curtis [23] was used in various forests of Skardu for quantitative sampling. In each stand 28 points were taken at 20-meter intervals. Vegetation sampling was done according to the criteria that it contained trees at least 60 cm Dbh (diameter at breast high), with no sign of recent disturbances and covering at least two hectares in area. Lower plants were ignored. Phytosociological attributes (relative density, relative frequency and relative basal area) and absolute values (density ha^{-1} and basal area of species m^2 ha^{-1}) were calculated, according to the method described by Mueller-Dombois and Ellenberg [24]. Geographical coordinates and aspect were recorded using GPS, angles were recorded using by slope meter, while height of trees were recorded using clinometer. Importance Value Index [25] was used to rank each species and the plant species with the highest importance value in the stand was considered the dominant species. The plant community was named on the basis of dominant species and the floristic composition. The forest trees individuals were classified in a series of dbh size classes at the intervals of 10cm dbh in different stands. Size structure of pine and associated angiospermic trees are presented as graph saving data in computer in MS Excel. A species list with a relative frequency for understorey (ground flora) plants (<10 cm dbh) is presented, using a circular plot (1.5 m diameter) at each sampling point. Plants specimens were collected from the studied area and identified with the help of flora of Pakistan.

RESULTS AND DISCUSSION

Location of the sampling sites is shown in Fig.1. Summary of sites characteristics are given in Table 1,while the phytosociological summary and absolute values are presented in Table 2.These stands were located at higher elevation from 3414m to 3700 m closed to the timber line

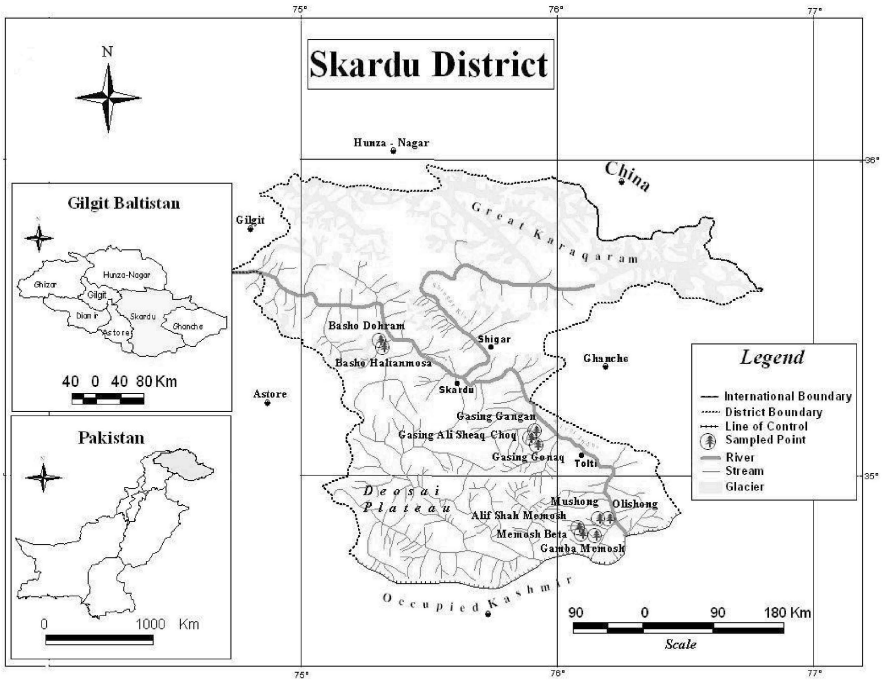

Fig. 1: Map showing the 10 sampling sites of Skardu District, marked by trees in circular.
Source of Map: GIS Arc Map Geography Department of FUUAST.

Table 1: Main Location and sites

Stn	Main Location and sites	Lat (N)	Long (E)	Ele (M)	Aspect	Slope (°)	Canopy
1	Basho Haltanmosa	35°17	75°38	3700	NE	35	Mdr
2	Basho Dohram	35°17	75°38	3550	NE	30	Opn
3	Gasing Gangan	35°09	75°98	3500	E	25	Mdr
4	Gasing Ali Sheaq Choq	35°09	75°98	3400	W	20	cls
5	Gasing Gonaq	35°09	75°98	3600	N	27	Opn
6	Olishong	34°43	76°06	3586	E	20	sct
7	Mushong	34°44	76°06	3463	N	15	Opn
8	Gamba Memosh	34°42	76°06	3463	NE	35	Opn
9	Memosh Beta	34°42	76°06	3414	E	30	Opn
10	Alif Shah Memosh	34°42	76°06	3477	E	23	Mdr

Note: stn=Number of stand,Lat=Latitude,Long=Longitude,Ele=Elevation,
Opn=open,Mdr=Moderate,Sct=Scatted,Cls=Close

Table2: Phytosociological attributes,rank,and absolute values of 10 stands in District Skardu

		Phytosociological Attributes					Absolute Values	
Main Location and sites	Name of Species	R F	R D	R B.A	IVI	Rank	D.ha^{-1}	Ba m^2 ha^{-1}
Stn.N Skardu								
1. Basho Haltanmosa	*Pinus wallichiana*	75.73	91.07	96.66	87.8	1st	184.27	42.38
	Juniperus excelsa	24.32	8.93	3.34	12.2	2nd	18.06	14.63
2. Basho Dohram	*Pinus wallichiana*	77.78	92.85	91.32	87.3	1st	159.50	32.39
	Juniperus excelsa	22.22	7.14	8.67	12.7	2nd	12.26	3.09
3. Gasing Gangan	*Pinus wallichiana*	49.12	67.86	73.73	63.2	1st	132.02	16.17
	Juniperus excelsa	35.08	21.43	16.67	24.4	2nd	41.69	3.70
	Betula utilis	15.97	10.71	10.59	12.4	3rd	20.83	2.35
4.Gasing Ali Sheaq Choq	*Pinus wallichiana*	39.43	35.71	39.12	28.1	2nd	141.70	10.38
	Juniperus excelsa	30.98	24.10	11.41	22.2	3rd	95.63	3.02
	Betula utilis	29.57	40.17	49.46	39.7	1st	159.4	13.12
5.Gasing Gonaq	*Pinus wallichiana*	19.14	11.61	11.32	14	2nd	18.88	1.00
	Juniperus excelsa	59.57	79.46	77.95	72.3	1st	129.28	6.93
	Betula utilis	21.27	8.92	10.73	13.6	3rd	14.51	0.95
6.Olishong	*Pinus wallichiana*	73.68	88.39	91.94	84.7	1st	73.34	7.97
	Juniperus excelsa	26.31	11.61	8.05	15.3	2nd	9.65	0.70
7. Mushong	*Pinus wallichiana*	87.5	94.64	96.94	93	1st	38.78	5.26
	Juniperus excelsa	12.49	5.36	3.05	6.76	2nd	3.20	0.17
8.Gamba Memosh	*Pinus wallichiana*	75	88.39	80.83	81.4	1st	113.88	17.35
	Juniperus excelsa	16.66	8.92	17.05	14.2	2nd	11.49	3.65
	Betula utilis	8.33	2.67	2.10	4.36	3rd	3.44	0.45
9. Memosh Beta	*Pinus wallichiana*	75.68	91.96	91.96	86.5	1st	158.38	26.60
	Juniperus excelsa	13.51	4.46	5.76	7.93	2nd	7.68	1.66
	Betula utilis	10.22	3.57	2.28	5.36	3rd	6.15	0.22
10. Alif Shah Memosh	*Pinus wallichiana*	68.29	85.71	85.30	79.8	1st	179.99	21.74
	Juniperus excelsa	22	10.71	7.82	13.5	2nd	22.49	3.35
	Betula utilis	9.75	3.57	6.78	6.7	3rd	7.49	1.43

Note: R.F= Relative Frequncy, R.D= Relative density, R.B.A = Relative Basal area, IVI = Importance value Index
D ha^{-1} = Density/hectar of species, BA m^2 ha^{-1} = Basal area of species m^2/hectar, 1st = Frist dominent species,
2nd = Second dominent species, 3rd = Thrid dominent species, Stn.N = Stand Number

from gentle (15°) to steep (35°) slopes,facing N,E,W and N/E aspect. Most of the stands, canopy was moderately open to fairly open due to a long history of human disturbance.

The basis of phytosociological analysis, floristic composition and IVI following tree communities were described.

- *Pinus-Juniperus* community
- *Betula-Pinus* community
- *Juniperus-Betula* community

Pinus-Juniperus Community: This community was recorded from eight different locations of sampling area of Skardu (Table 1). Most of the sites were facing east, on

steep slope and elevation ranges from 3414 to 3700m. In this community, *Pinus wallichiana* occupied from 63% to 93% important value, while co-dominant species *Juniperus execlsa* showed 7% to 22% important value. At Gasing Gangan (stand 3),Gamba Memosh (stand 8), Memosh Beta (stand 9) and Alif Shah Memosh (stand 10), *Betula utilis* was associated with 4.36% to 12.39% important value.

As far as ground flora is concerned these stands showed some floristic similarities.Some non tree angiospermis species were *Astragalus zanskarensis, Tanactum artemisiodes, Oxyria digyna, Rosa webbiana,Potentilla anserine,Hieracium lanceolantum.*

Ahmed *et al.* [10] observed a density of 54 to 154 ha^{-1} with 9.0 to 77 m^2 ha^{-1} basal area from Juniper forest of Rodhmallazi, Balochistan. The density of Juniper (> 6cm dbh) ranged from 56 to 332 trees ha^{-1} with a range of 9.0 to 152 m^2 ha^{-1} basal area was reported by Ahmed *et al.* [8] from *Juniper* track of Baluchistan. Ahmed *et al.* [13] also presented stand density and basal area values from various Himalayan forests of Pakistan. For example, a Chir pine community from upper pine forest showed a density of 732 individual's ha^{-1} with 31 m^2 ha^{-1} basal areas. Broad leaved communities or forests generally showed higher density with low values of basal area. On the basis of these investigations, it is stated that density and basal area values recorded during the present study is in accordance with previous values.

Betula-Pinus Community: This community was located at Gasing Ali Sheaq choq (stand 4) elevation 3400 on west facing 20° slope. *Betula utilis* attained 39.73% important value with 45 individual /ha and 13.12 $m^2 ha^{-1}$ basal area while in this stand *Pinus wallichian* appeared as a co-dominant species showed 28% important value with 40 individual/ha and 10.38 m^2 ha^{-1} basal area,*Juniperus execlsa* was also associated with 22% important value,

Seventeen species including seedling of leading dominant tree species were recorded from forest floor in which, *Tanactum artemisioides, Potentilla anserine, Oxyria digyna,Fragaria nubicola, Berberis orthobotrys,* were found as most dominant.

Juniperus-Pinus Community: Gasing Gonaq site(stand 5) on 3600 elevation was located North facing gentle slope where,*Juniperus execlsa* attained 72% important value with 89 individual and 6.39 $m^2 ha^{-1}$ basal area, while co-dominant *Pinus wallichiana* occupied 14.2% important value with13 individual /ha and 1 m^2 ha^{-1} basal area. In this stand angiospermic tree species *Betula utilis* was associated showing 13.64% important value with 10 individual /ha and 0.95m 2 /ha basal areas. There was slightly difference between co-dominant and associated tree species, in numerical values.

Ground flora was comprised of eighteen species including seedling of leading dominant tree species,*Tymus linearis, Tanactum artemisioides* and *Artemisia obsinthium*, were recorded as most dominant species under the canopy of tree species. Ahmed *et al.* [13] recorded mixed forest of *Pinus wallichiana, Betula utilis* and Juniperus *execlsa* from Astore near Rama where *Pinus wllichiana* occupied 70% of important value. Hussain and Illahi [11] considered it under the sub-alpine Blue pine forest. Ahmed *et al.* [22] during the phytosociological study of *Pinus roxburghii* observed the highest basal area 118 m^2 ha^{-1}, lowest (9 m^2 ha^{-1}), highest density (769 ha^{-1}) and lowest density (41 ha^{-1}). Ahmed *et al.* [9] reported the same investigation from Juniper forest of Baluchistan.

Except in two stand *Pinus wallichiana* attained 63% to 93% important value. *Juniperus execlsa* occupied 72% of important value in one stand otherwise it I.V.I values ranged from 7 to 22%. Highest value (40%) of *Betula utilis* is recorded from stand NO.4 while in other stands it has from 4 to 14% I.V.I.

Highest density (397 ha^{-1}) was recorded from a closed canopy stand of Gasing Ali Sheaq choq while the lowest stand density (42 ha^{-1}) was obtained from Mushong (stand7).Basho Haltanmosa site occupied highest (57.01 m^2 ha^{-1}) basal area while Mushong site has lowest (5.43 m^2 ha^{-1}) basal area value. *Pinus wallichiana* has highest density (184 ha^{-1}) and basal area (42.38 m^2 ha^{-1}) at stand one while lowest density (19 ha^{-1}) with lowest (1.0 m^2 ha^{-1}) basal area was recorded from stand No.5.Highest density (129 ha^{-1}) of *Juniperus execlsa* was recorded at Gasing Gonaq while highest basal area (14.63 m^2 ha^{-1}) was from Basho Haltanmosa. Density of *Betula utilis* ranged from 3 individual ha^{-1} from Gamba Memosh to 159 individuals ha^{-1} (stand NO.4). It also attained the highest (13.12 m^2 ha^{-1}) basal area in stand NO. 4. Present results shows that higher density stands do not necessary occupy higher basal area. As mentioned before, these areas are highly disturbed due to legal and illegal cutting and other disturbances. Regression analysis between over all density and basal area values indicated that there is no significant relation between these two variables. During the circular plot or vegetation study under these forested area, total 55 plant species of

Table 3: Plants associated with Dominant tree species of the study area

S.No	Name Of Plants species	PRST	RF in stands (range)	Family
1	*Acantholimon lycopodioides* (Girad) Boiss.,	2	4.7--5.2	Plimbaginaceae
2	*Anaphalis nepalensis*(spreg.) Hand.	2	1--2.7	Compositae
3	*Anaphalis virgata* T.T.ex Clarke	4	3.1--11.3	Compositae
4	*Aquilegia moorcroftiana* Wall.ex	2	0.7--1.8	Ranunculaceae
5	*Artemisia brevifolium* (Wall.ex DC) lingandY.R.Ling	2	2.8--4.3	Compositae
6	*Artemisia obsinthium* L.	1	5.43	Compositae
7	*Astragalus rhizanthus* Royle exBth.	3	1.8--6.06	Fabaceae
8	*Astragalus zanskarensis* Bth.ex Bunge,	10	0.9--10.4	Fabaceae
9	*Berberis lycium* Royle	1	2.8	Barberidaceae
10	*Berberis orthobotrys* Bien ex Aitch.,J.L.S	6	0.9--9.7	Barberidaceae
11	*Bergenia stracheyi* (H.andT.) Engl.	4	1.5--5.8	Barberidaceae
12	*Betula utilis* D.Don,	2	2.1--1.08	Betulaceae
13	*Bistorta affinis*(D.Don) Green	3	2.2--6.6	Polygonaceae
14	*Cerastium alpinum*	1	2.8	Celastraceae
15	*Cicer songaricum* Steph.ex DC.,	5	2--5.6	Fabaceae
16	*Cotoneaster integerrima* Medik.,	3	1.5--6.5	Rosaceae
17	*Daphne oleoides* Scherb.,	1	3.2	Thyeleaceae
18	*Dictyolimon macrorrhabdos* (Boiss.) Rech.f.	3	1.5--3.2	Plambagiaceae
19	*Ephedra gerardiana* Wall ex Stapf,	3	0.9--1.5	Caryophylaceae
20	*Epilobium angustifolium* L.,	3	0.9--1.9	Ornagraceae
21	*Erigeron multicaulis* Wall.ex DC.,	3	1--3	Compositae
22	*Fragaria nubicola* Lindl.ex Lacaita	4	2.8--6.5	Rosaceae
23	*Geranium partens* L.,	5	0.9--4.1	Geraniaceae
24	*Geranium wallichianum*.D.Don.ex Sweet,	1	1.8	Geraniaceae
25	*Hippophae rhamnoides* L.,	2	0.9--1.5	Elaegnaceae
26	*Hieracium lanceolatum* Hk.,f.,	8	0.9--10.4	Compositae
27	Impatiens balfourii Hook.f.	3	1.5--3.6	Balsaminaceae
28	*Inula rhizocephala* Wend,	4	0.9--2.2	Compositae
29	*Juniperus communis* L.	6	1--7.5	Cupressaceae
30	*Juniperus excelsa* M.B.,	4	0.9--7.6	Cupressaceae
31	*Leontopodium himalayanum* D.C.,	10	3--14.9	Compositae
32	*Leonurus cardiaca* L.,	2	3.1--4.7	Labiatae
33	*Myostis asiatica* Schischk.andSerg.,	3	1--2.3	Boraginaceae
34	*Nepeta discolor* Role ex Bth.	2	1.5--5.4	Labiatae
35	*Oxyria digyna* (L.) Hill,	8	2.7--11.9	Polygonaceae
36	*Pinus wallichiana* A.B. Jackson	10	1--13.9	Pinaceae
37	*Potentilla anserina* L.,	8	3.5--12.8	Rosaceae
38	*Pseudomertensia echioides* Riedl	3	3.1--5.2	Boraginaceae
39	*Ribes orientale* Desf.,	6	1--6.7	Grossulariaceae
40	Rosa webbiana Wall.ex Royle,	9	0.9--9.7	Rosaceae
41	*Rubus irritans* Hk.f.,	2	0.9--1.5	Rosaceae
42	*Rumex dentatus* L.	1	2.8	Polygonaceae
43	*Rumex hastatus* D.Don,	2	2--2.8	Polygonaceae
44	*Silene moorcroftiana* Wall.ex Bth.	4	0.9--6.9	Umbelliferae
45	*Silene vulgaris* (Moench) Garche,	4	0.9--2.3	Umbelliferae
46	*Spiraea canescens* D.Don,	4	1--5.43	Rosaceae
47	*Tamarix indica* Willd.,	3	0.9--1.9	Tamaricaceae
48	*Tanactum artemisioides* Sch.Bip.exHk.f.,	8	3.7--15.2	Compositae
49	*Tanactum fruticulosum* Clarke,	1	3.7	Compositae
50	*Taraxacum baltistanicum* v.Soet	7	2--10	Compositae
51	*Thymus linearis* Benth.,	6	6.2--15.10	Labiatae
52	*Tragopogon orientalis* L.	2	6.5--7.7	Compositae
53	*Trifolium partense* L.	2	2.8--3.8	Fabaceae
54	*Trifolium repens* L.	4	1.8--5.5	Fabaceae
55	*Urtica dioica* L.	3	2.3--5.2	Urticaceae

Note: PRST =Number of stand in which a species occur, RF= Relative frequency

tree seedling, shrubs and herbs are recorded in which *Astragalus zanskarensis,Leontopodium homalayanum* and seedling of *Piuns wallichiana* are distributed in all stands.It showed the regenerating potential of this pine species. It is suggested that suitable protection of these forests would conserve and maintain a balanced population structure in these forests,*Taraxacum baltistanicum, Potentilla anserina, Oxyria digyna, Hieracium lanceolantum, Tanactum artemisiodes* and *Roza webbiana* were recorded in 7 to 9 stands. Distribution of other plants are listed in Table 3.

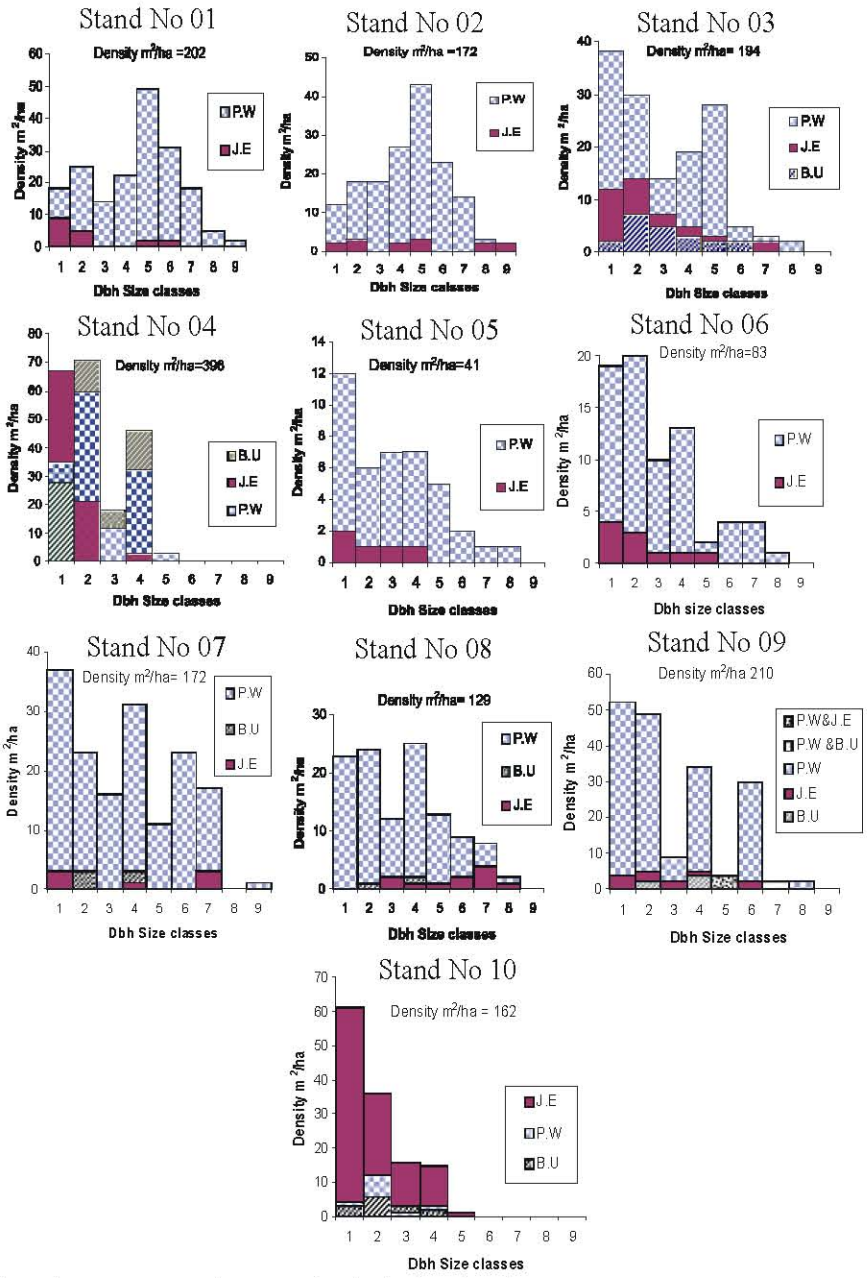

Fig. 2: Diameter Size Class structure of ten stands of District Skardu

In general whole area is considered as a *Pinus wallichiana –Juniperus execlsa* community in which *Betula utilis* is associated as a third dominating species in four locations. *Juniperus execlsa* and *Betula utilis* appeared as a leading dominating species in Gasing Gonaq and Gasing Ali Sheaq Choq sampling sites respectively. *Pinus wallichiana* considerd as a moist temperate species and *Betula utilis* is regarded as timber line angiospermic species presence of *Pinus wallichiana* show that pine species is growing on it highest altitudinal limits in dry temperate areas. Close to the timber line showing under ecological amplitude.Density size class structure is postulated in Fig.2.These structure of various stands show the present status and possible future trend of these forests. As mentioned earlier that seedlings of *Pinus wallichiana* are recorded in all stands despite the leading dominant of *Juniperus execlsa* and *Betula utilis* in two stands.These graphs show that except stand No.4 and 5 no gaps are found in *Pinus wallichiana* diagram. In addition presence of seedling and large number of tree in

small size classes (stand 3, 6, 7, 8, 9, 10) indicated a good regeneration pattern and recruitment, which may persist in future if human disturbances are minimized.

Juniperus execlsa size class structure was highly unstable except in stand 3 and 5.Many stands shown uneven distribution with many gaps. *Juniperus* seedling was recorded only in four stands, indicating low regeneration potential of this species. Lack of large size trees seems to be related with cutting of these trees for fuel and other purposes.*Betula utilis* was the 1st leading species in stand number 4 showing bell shape structure which also indicate human disturbances. Small size classes indicate that there was no regeneration in the last 20 to 40 years and less number of higher classes showed unstable and degraded situations. If they would not be maintained, there would be possibility of losing these forests in future Siddiqui *et al*. [14]. In Pakistan, Ahmed *et al*. [22] reported the cause of these gaps which have never been studied and most of the conclusions were based on the studies of disturbed forests. It is suggested that gaps in the middle, may result from tree fall by storm or cutting. In many stands, there was no or very few number of trees showed in smallest size class. In different forests, gaps had been frequently reported by various workers in the population structure of many tree species [10, 16, 19-21]. Size frequency distribution of low density stands showed a flattened structure with some comparatively large trees and gaps. Gaps were defined as classes with no individual present than those on either side [26]. On the basis of disturbed nature and past cutting history of these forests, it may be suggested that gaps in these stands may be due to removal of the particular sized trees recruitment. This pattern of tree structure indicated inadequate recruitment producing unstable population. Therefore it may be concluded that due to anthropogenic disturbances these forests are unstable and in degrading stage so prompt conservation and management steps should be immediately taken to save these ecological and economically important forests and species.

On the basis of above results and discussion it may be suggested that in general these forests and species need proper management. Prolonged and continued human disturbances may eliminate these ecological important forests forever.

REFERENCES

1. Champion, G.H. and S.K. Seth, 1965. Forest types of Pakistan. Pak. For. Inst of Peshawar, pp: 233.
2. Beg, A.R., 1975. Wlidlife habitats of Pakistan. Bull. Pak. For. Inst. Peshawer, No. 5.
3. Ahmed, M., 1976. Multivaritae analysis of the vegetation around Skardu. Agri.Pak, XXVII, No2.
4. Ahmed, M. and S.A. Qadir, 1976. Phytosiological studies along the way of Gilgit to Gopis, Yasin and Shunder. Pak. J. For, 26: 93-104.
5. Ahmed, M., 1986. Vegetation of some foothill of Himalayan range in akistan. Pak. J. Bot., 18: 261-269.
6. Ahmed, M.,1988. Population studies of some planted tree species of Quetta. J. Pure. Appl. Sci., 7: 25-29.
7. Ahmed, M., 1988. Plant communities of some northern temperate forests of Pakistan. Pak. J. For., 38: 33-40.
8. Ahmed, M., I. Ahmed and P. Anjum, 1989. A study of natural regeneration of *Juniperus execlsa* M.B. in Bluchistan. Pak. J. Bot., 21: 118-127.
9. Ahmed, M., S.S. Shaukat and A.H. Buzadar, 1990. Population structure and dynamics of Juniperus execlsa in Balouchistan. J. Veg. Sci., 1: 271-276.
10. Ahmed, M., M. Ashfaq, M. Amjad and M. Saeed, 1991. Vegetation structure and dynamics of *Pinus gerardiana* forests of Balouchistan. J. Veg. Sci., 2: 119-124.
11. Hussain, F. and I. Illahi, 1991. Ecology and vegetation of lesser Himalayan Pakistan. Bot. Dept. Uni. Peshawar, pp: 187.
12. Ahmed, M. and S.H. Naqvi, 2005. Tree ring chronologies of *Picea smithiana* (wall.) Boiss and its quantitative vegetation description from Himalayan range. Pak. J. Bot., 37: 697-707.
13. Ahmed, M., T. Hussain, A.H. Sheikh, S.S. Hussain and M.F. Siddiqui, 2006. Phytosociology and structure of Himalayan forests from different climatic zones of Pakistan. Pak. J. Bot., 38: 361-383.
14. Siddiqui, M.F., M.M. Ahmed, M. Wahab and N. Khan, 2009. Phytosociology of *Pinus roxburghii* sergeant (Chir Pine) in lesser Himalayan and Hindu Kush range of Pakistan. Pak. J. Bot., 41: 2357-2369.
15. Siddiqui, M.F., M. Ahmed, M. Khan, N. Hussain and I.A. Khan, 2010. A quantitative descriptiob of moist temperate conifer forest of Himalayan region of Pakistan and Azad Kashmir. Int. Biol. Biotech., 7: 175-185.
16. Wahab, M., M. Ahmed and N. Khan, 2008. Phytosociology and dynamics of some pine forests of Afghanistan. Pak. J. Bot., 40: 1071-1079.
17. Wahab, M., M. Ahmed, N. Khan and A.M. Sarangzai, 2010. A phytosociological study of pine Forest from district Dir, Pakistan Int. Biotech., 7: 219-226.

18. Khan, N., M. Ahmed, M. Wahab and M. Ajaib, 2010. Studies along an altitudinal gradient in *Monotheca buxfoloia* forest of District Dir Lower Pakistan. Pak. J. Bot., 42: 3029-3038.
19. Kahn, N., M. Ahmed, M. Wahab and M. Ajaib, 2010. Size class structure and regeneration of *Monotheca buxfolia* and associated tree species District Dir Lower Pakistan Pakistan. Pak. J. Bot., 42: 3029-3038.
20. Khan, N., M. Ahmed, M. Wahab and A. Ajaib, 2010. Phytosociology, structure and physiochemical analysis of soil in *Quricus baloot* Griff, Forest District Chitral Pakistan. Pak. J. Bot., 42: 2429-2441.
21. Khan, N., M. Ahmed, M. Wahab and S.S. Shaukat, 2011. A community analysis in *Quricus baloot* Forest District Dir upper Pakistan. Frontier Agriculture China, 5: 106-121.
22. Ahmed, M., N. Khan, M. Wahab, H. Salma, F. Siddiqui, K. Nazim and U. Khan, 2009. Description and structure of *Olea ferruginea* (Royle) forests of Dir Lower District of Pakistan. Pak. J. Bot., 41: 2683-2695.
23. Cottam, G. and J.T. Curtis, 1956. The use of distance measures in Phytosociologyical Sampling. Eco., 37: 451-460.
24. Mueller-Dombois, D. and H. Ellenburg, 1974. Aims and methods of vegetation Ecology. Jhon Iviley and sons. Inc., New York, pp: 547.
25. Brown, R.J. and J.J. Curtis, 1952. The upland conifer-hardwood communities of southern Wisconsin. Ecol. Monog., 22: 217-234.
26. Ahmed, M. and J. Ogden, 1987. Population dynamics of the emergent conifer *Agathis australis* (D.Don) Lindl. (Kauri) in New Zealand. Population structures and tree growth rates in mature stands. New Zealand J. Bot., 25: 217-229.