RESEARCH PAPER | Environmental Science | Volume : 5 | Issue : 5 | May 2015 | ISSN - 2249-555X

Impact Assessment of Deforestation on Some Edaphic Attributes of Dhara Catchment Kashmir-India

KEYWORDS: EIA, Deforestation, nutrient status, Dhara, Kashmir

M.D.Shah
Department of Environmental Sciences, Government Degree College Bemina Srinagar (Kashmir)-India.190018

***Dr. Mubashir Jeelani**
Department of Environmental Sciences, Government Degree College Bemina Srinagar (Kashmir)-India.190018 *Corresponding author

ABSTRACT *The human activities play an important role in destruction of forests and are responsible for disappearance of a wide range of plants. Increased and indiscriminate felling of trees for timer, fodder, fuel, construction etc. has resulted into severe damages to the habitats. With the result the edaphic factor become inhospitable for the existing species. With this aim the present study was undertaken to know about the status of soil in the deforested area of Faquir Gojar of Dhara catchment. From the present study it is, therefore, concluded that the studied area under deforestation showed significant increase in pH and decrease in organic carbon (%), moisture content (%) and available N P K (ppm) during autumn and summer as compared to the forested area in the same catchment area.*

Introduction
The forests from time immemorial have provided valuable resources to the rural populations. At the end of 19th century, the population growth went separately with that of depletion of forest resources. Certainly, the link between the forest products with that of human numbers increasing along with urbanisation has resulted into speeding of deforestation in the next century. Besides tangible and intangible benefits it has pushed the forest resources under threat. In the study area, over grazing, timber, fodder and over collection of firewood has resulted into clearing of the forest area under study. The Dhara with total area of 21467 ha (Forest department of Kashmir) falls in the north of Kashmir division of J&K state between the latitudes 34°2'50" to 34°14'7" N latitude and 74°50'0" and 75°8'35" E longitude. The area is also the catchment of worlds famous Dal lake. The place is approximately 35 kms from the city. The area of Dhara is divided into Faqir Gojar, Tulpatnar, Cheki-Dhara and Naganar micro watersheds. However, for the present study, Faquir Gojar under forested and deforested areas which extends over 866ha has been selected. Keeping the versatile uses of forests in view a study entitled "Impact assessment of deforestation on some edaphic attributes of Dhara catchment" was undertaken.

Material and methods
Soil samples were collected from pre-selected sites viz. upper, middle and lower zones (altitude) of forested and deforested areas of Dhara catchment Kashmir, Faquir Gojar. Fifty soil samples were collected from soil surface (0-15 cm) of the quadrants (size 50×50 inches) laid for the present studies in all zones of forested and deforested areas. Soil samples of all zones were pooled to form the composite and samples. The soil samples were air dried under shade, crushed in mortar and pestle and then sieved through 2mm sieve. The processed samples from the composite were labelled and stored for subsequent analysis.

pH
The pH of the soil was determined by glass electrode pH meter by using 1:2.5 soil water suspensions (Jackson, 1958).

Organic Carbon
The organic carbon was determined by Walkley and Black's (1935) Rapid Titration method. Soil was treated with potassium dichromate, concentrated sulphuric acid, phosphoric acid with indicator and titrated with ferrous ammonium sulphate solution.

Moisture content
Soil moisture was measured on the basis of oven dry soil at 80°C for 24 hours (Mishra, 1968) and was calculated as percentage (%) moisture in soil = (x-y) x 100 (x) whereas, (x)=Moisture content in soil (y)=Weight of oven dry soil.

Available nitrogen
To the soil sample 0.32% $KMnO_4$ and 2.5% NaOH was added and distillation was carried out in 4% boric acid containing mixed indicator for the estimation of available nitrogen as per the method given by Subiah and Asija (1956).

Available Phosphorous
Available phosphorous was extracted with Olsen's extractant (0.5 N $NaHCO_3$) and intensity of colour developed from Ammonium molybdate and stannous chloride, was measured with spectrophotometer at 660 nm wavelength as described by Jackson (1958).

Available potassium
Available potassium was extracted with normal ammonium acetate (Henway and Heidal, 1952) and determination was carried out on Systronic flame photometer.

Results and Discussion:
In order to know the impact of deforestation on chemical attributes of soil, impact on pH, organic carbon (%) and moisture content (%) was worked out during present study (Table 2). Significant increase was recorded in soil pH in deforested area of Faquir Gojar during both summer and autumn seasons. Increase in pH in deforested area is attributed to decrease in organic matter accumulation due to decrease in forest cover. Thus pH values are negatively correlated with organic carbon. Further significant increase in soil pH with decrease in altitude is also attributed to decrease in organic matter accumulation. These observations

Volume : 5 | Issue : 5 | May 2015 | ISSN - 2249-555X

are in line to the findings of Verma et al.(1990). Zargar et al. (2005) also reported increase in pH in degraded forests. The data presented in the Table 4 and 5 reflects significant decrease in organic carbon content in deforested area in both seasons. Decrease in organic carbon could be due to relatively high decomposition in deforested area due to high temperature as a result of decrease in forest cover. Our results are in conformity to the findings of Ajaz (2003). Significant decrease in organic carbon content of soil with decrease in altitude is attributed to increase in temperature.

During present study significant decrease in moisture content of soil was recorded in deforested area of Faquir Gojar. Decrease in moisture content in deforested area is attributed to increase in temperature due to direct sunlight which in turn enhances rate of evaporation thereby reducing moisture content of soil. Significant decrease in moisture content with decrease in altitude is again attributed to increase in temperature. To know the impact of deforestation on nutrient status of soil, available nitrogen, phosphorus and potassium were studied during summer and autumn in deforested and forest area (Table 3). Significant decrease in available nitrogen content of soil was recorded in deforested area in both summer and autumn seasons. Decrease in available nitrogen in deforested area is ascribed to decrease in organic carbon, latter being bank of soil nitrogen. Verma et al. (2005) and Zargar et al. (2005) also reported significant decrease in available nitrogen in degraded forests whileas, Singh (2004) reported medium to high available nitrogen content in forest soils of Kashmir valley. Significant decrease in available nitrogen content with decrease in altitude is also attributed to decrease in organic carbon content of soil. In present study significant decrease in available phosphorus and potassium was recorded during summer and autumn in deforested area. Decrease in these macronutrients of soil could be due to decrease in forest litter under degraded 79 conditions. Though Singh (2004) reported medium to high available phosphorus and potassium in forest soils of Kashmir. However, Zargar et al. (2005) reported significant decrease in available phosphorus and potassium in degraded forests of Kashmir. Verma et al. (2005) also reported significant decrease in available phosphorus and potassium in degraded forests. Thus these impact studies suggest a need for more work to be done for seeking solutions to these problems and must be looked at from the social and economic point of view.

Table 1: Depicting the total taxa recorded at the studied sites of of Dhara catchment Kashmir

S. No.	TAXA	FOREST AREA	DEFORESTED AREA
1	Artemisia scoparia Waldst. & Kit.	+	+
2	Fragaria nubicola Lindl.*	+	-
3	Euphrasia officinalis Linn.	+	+
4	Viola odorata Linn.*	+	-
5	Geranium pamiricum Linn.	+	+
6	Sisymbrium irio Linn. *	+	-
7	Chenopodium murale Linn.	+	+
8	Astragalus candolleanus Royle	+	+
9	Chenopodium album Linn.	+	+
10	Artemisia absinthium Linn.	+	+
11	Bistorta amplexicaulis (D.Don)Greene	+	+
12	Artemesia parviflora Wight	+	+
13	Thalictrum foliosum Dc.	+	+
14	Aster flaccidus Bunge.	+	+
15	Rheum emodi Wall.	+	+
16	Lepchinnella microcarpa (Boiss.)Riedl.	+	+
17	Geum elatum Wall.	+	+
18	Oxytropis cachemiriana Cambess.	+	+
19	Rumex acetosa Linn.	+	+
20	Arnebia benthamii (Wall. ex G.Don.) I.M. Jonston.	+	+
21	Hypericum perforatum Linn.	+	+
22	Origanum vulgare Linn.	+	+
23	Thymus serpyllum Linn.	+	+
24	Marrubium vulgare Linn.	+	+
25	Plantago lanceolata Linn.	+	+
26	Polygonum aviculare D.Don.	+	+
27	Nepeta eriostachya Benth.	+	+
28	Nepeta clarkei Hk.f.	+	+
29	Taraxacum officinale Wigg.	+	+
30	Clinopodium vulgare Linn.	+	+
31	Lychnis coronaria Lamk.	+	+
32	Lychnis apetala Linn.	+	+
33	Stachys floccosa Benth.	+	+
34	Verbascum thapsus Linn.	+	+
35	Morina longifolia Wall.	+	+
36	Erigeron Canadensis Linn.	+	+
37	Malva neglecta Wallr	+	+

* Species absent in deforested area.

Table2: Chemical attributes of soil of Faquir Gojar at different zones and habitats.

S.no	Altitude (a.s.m.l) meters	Forest Area		Deforested Area	
		Range	Average	Range	Average
1	**pH**				
	Upper (2640-2760)	6.2-6.5	6.3	6.9-7.1	7.0
	Middle (2520-2640)	6.4-6.7	6.5	7.2-7.5	7.3
	Lower (2400-2520)	6.7-6.8	6.7	7.7-7.9	7.8
2	**Organic Carbon (%)**				
	Upper (2640-2760)	2.20-2.28	2.24	1.99-2.05	2.02
	Middle (2520-2640)	2.10-2.20	2.15	1.84-1.90	1.87
	Lower (2400-2520)	2.05-2.14	2.0	1.18-1.20	1.19
3	**Moisture content (%)**				
	Upper (2640-2760)	27.46-29.46	28.46	17.88-20.81	19.34
	Middle (2520-2640)	25.20-27.20	26.20	17.75-20.01	18.88
	Lower (2400-2520)	24.95-25.95	25.45	16.62-19.80	18.21
4	**Available Nitrogen (ppm)**				

Volume : 5 | Issue : 5 | May 2015 | ISSN - 2249-555X

	Upper (2640-2760)	230-244	237	177-180	178.5
	Middle (2520-2640)	221-230	225.5	156-160	158
	Lower (2400-2520)	201-215	208	118-120	119
5	**Available Phosphorus (ppm)**				
	Upper (2640-2760)	23-26	24.5	19-21	20
	Middle (2520-2640)	20-24	22	17-18	17.5
	Lower (2400-2520)	19-22	20.5	16-17	16.5
6	**Potassium (ppm)**				
	Upper (2640-2760)	139-148	143.5	108-110	109
	Middle (2520-2640)	136-143	139.5	106-108	107
	Lower (2400-2520)	133-140	136.5	106-107	106.5

Table3: Seasonal variation in number of taxa recorded.

Altitude (a.s.m.l) meters	**Forest Area**		**Deforested Area**	
	Summer	Autumn	Summer	Autumn
Upper (2640-2760)	28	12	20	13
Middle (2520-2640)	27	18	22	12
Lower (2400-2520)	22	13	14	09

Acknowledgments

The authors are thankful to all those who have been helpful in providing necessary facilities to carry out this paper. Thanks are also due to Prof.(Mrs.) Yasmin Kawoos, Principal Government Degree College Bemina for rendering help to compile the manuscript. The authors are also thankful to various researchers for providing literature

REFERENCE

Ajaz, G, S. (2003). Studies on soil characteristics in relation to erodibility in Dhara watershed of Dal catchment. M.Sc. thesis submitted to Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar, Srinagar, 85−94. | Henway, J.J., & Heidal, W. (1952). Soil analysis methods as used in Iowa State College Soil Testing Laboratory. Bulletin of the Iowa State College 57 : 1-13. | Jackson, M.L. (1958). Soil Chemical Analysis. Printice Hall of India. New Delhi. | Mishra, R. (1968). Ecology Work Book. Oxford and IBH Publishing Co., Calcutta, India. | Singh, A. (2004). Characterization and Classification of some forest soils of Kashmir valley. M.Sc. Thesis submitted to Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar, Srinagar.pp. 23. | Subiah, B.V., & Asija, C.L. (1956). A rapid procedure for estimation of available nitrogen in soils. Current Science 25 : 328. | Verma, K.S., Shyampura, R.L., & Jain, S.P. (1990). Characterization of soils under forest of Kashmir valley. Journal of Indian Society of Soil Science 38 : 107-115. | Verma, R.K., Kapoor, K.S., Rawat, R.S., Subramani, S.P., & Kumar, Surinder. (2005). Analysis of plant diversity in degraded and plantation forests in Kunihar forest division of Himachal Pradesh. Indian Journal of Forestry 28(1): 11−16. | Walkey, A., & Black. M. (1935). An examination of methods for determining organic carbon and nitrogen in soils. Journal of Agricultural Science 25 : 589-609. | Zargar, M.Y., Khan, M.A., Khurshid, Abrak, Mir, Ahmad, Irshad, & Khurshed, Siaima. 2005. Impact of degradation on physicochemical characteristics and microbial status of forest soils dominated by Fir and Spruce. Asian Journal of Microbiology Biotechnology and Environmental Sciences 7(1) : 45-48. |