MINI REVIEW

Impact of Anthropogenic Activities on Herbaceous Taxa of Faquir Gojri of Dhara Catchment, Jammu and Kashmir

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Abstract

To study the impact of anthropogenic activities on herbaceous taxa of Faquir Gojri of Dhara catchment, a study was carried out during 2021–2022. The main objective of the study was to understand the impact of Anthropogenic Activities on the phytodiversity and nutrient status of the soil of Faquir Gojar of Dhara catchment under anthropogenic activities. The study was conducted during two seasons, viz., summer and autumn. Absence of *Viola odorata* Linn and *Sisymbrium irio* Linn, *Oxytropis cachemiriana* Cambess, *Origanum vulgare* Linn, *Stachys floccosa* Benth. During summer and *Sisymbrium irio* Linn, *Oxytropis cachemiriana* Cambess *Stachys floccosa* Benth and *Rumex acetosa* Linn were lacking in the anthropogenic area during autumn. However, analysis of cumulative data of summer and autumn revealed the absence of *Viola odorata* Linn, *Sisymbrium irio* Linn, *Oxytropis cachemiriana* Cambess *Origanum vulgare* Linn *Rumex acetosa* Linn *Stachys floccosa* Benth in Anthropogenic area of Faquir Gojari. About 22 species belonging to 18 genera and 11 families were found growing in anthropogenic areas against 36 species of 32 genera and 18 families in forest areas. Members of Lamiaceae, Fabaceae, Brassicaceae and Violaceae were absent in anthropogenic areas in summer and Members of Brassicaceae, Fabaceae, Lamiaceae and Polygonaceae were absent in anthropogenic areas in autumn.

Keywords: *Anthropogenic Activities, Herbaceous taxa, Species composition.*

Highlights:

- Habitat loss and fragmentation: Urbanization, agriculture, and deforestation lead to the destruction and fragmentation of natural habitats, which directly reduces the population of herbaceous plants. This also isolates populations, leading to a decrease in genetic diversity.
- Invasive species introduction: Human activities often introduce non-native species to new environments, which can outcompete, displace, or hybridize with native herbaceous species, leading to their decline or extinction.
- Pollution: Industrial activities, agricultural runoff, and other forms of pollution (e.g., pesticides, heavy metals) can harm herbaceous plants by altering soil chemistry, reducing air and water quality, and directly causing physiological stress.
- Climate change: Anthropogenic climate change, driven by greenhouse gas emissions, affects temperature, precipitation patterns, and the frequency of extreme weather events, which can alter the distribution, phenology, and survival of herbaceous taxa.
- Land use changes: Conversion of natural landscapes into agricultural or urban areas significantly alters the ecosystem, often leading to a decline in herbaceous species that are adapted to specific conditions, resulting in shifts in community composition and ecosystem function.

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Introduction

Forest floor vegetation plays an important role in nutrient cycling, habitat conservation, and tree and shrub regeneration. The Kashmir Valley in our country has a rich repertoire of diverse flora due to its diverse topography and spatial heterogeneity (Dar *et al*., 2001). However, it is dramatically threatened by ongoing deforestation and the increased frequency of large-scale forest fires (Peres *et al*. 2010; Newbold *et al*. 2015) as a result of expanding timber production and agricultural boundaries. Recent estimates report a loss of about 770,000 km^2 of forest from 1970 to 2016, about 20% of the original forest cover (Butler 2017). Deforestation and inappropriate agricultural practices have undermined the productivity potential of approximately two billion hectares (ha) of the world's agricultural land (Rasul, 2009). Land use change, including the conversion of land to agricultural land, not only accelerates land degradation but also carbon dioxide (CO^2) emissions and the loss of biological resources (Jackson *et al*., 2008). One of the primary causes of global environmental change is tropical deforestation, but the question of what factors drive deforestation remains largely unanswered (Geist & Lambin, 2001). Agricultural expansion is by far the leading land use change.

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Forests cover 7.6 sq km of total geographical area in India (Anonymous, 2001a). In the province of Jammu and Kashmir, 8,128 km^2 of Kashmir is under forest cover as against 12,066 and 36 km^2 of Jammu and Ladakh, respectively (Anonymous, 2000). Second only to agriculture in importance, the forests of

Kashmir are hidden in rich herbaceous vegetation. However, due to deforestation, forest cover has decreased from 59 percent to 51% (for 1997-1998) during the pre-planned era, affecting the vegetation richness of this ecosystem (Anonymous, 2001b). Forests in Kashmir, second only to agriculture in importance, harbor a rich herbaceous flora. However, due to deforestation, the forest cover has decreased to 51% (for the year 1997-1998) against 59% during the pre-planned era, which affects the vegetation richness of this ecosystem (Anonymous, 2001). The Dhara catchment of the world-famous Dal Lake, spread over an area of 21467 ha, consisting of 38 micro watersheds is one of the worst deforested areas of the valley (Ajaz, 2003).

Materials and Methods

Study area

In the north lies the Dhara basin of the world-famous Dal Lake Kashmir valley in the state of Jammu and Kashmir. An area covering Faqir Gojari, Tulpatnar, Cheki-Dhara and Naganar micro-watersheds extends from it $34^0 2'50''$ to $34^0\ 14'7''$ north latitude and $74^o 50'0''$ and $75^0 8'35''$ east longitude (Fig.1). The total area of the Dhara basin is 21467 ha according to the forest department Cashmere. However, only the micro-basin of Faquir Gojari under Anthropogenic Activities covers 866 ha.

Vegetation analysis

The study was conducted in the summer and autumn seasons year 2021-22. The main study area of Faquir Gojari was divided into three zones i.e. upper, middle and lower at 2640-2760, 2520-2640 and 2400-2520 masl, respectively. A forest area with the same zonation was taken as a control. Fifty 1 m^2 quadrants were randomly laid out in both of these three zones. Anthropogenic and forest area and herbaceous vegetation were studied from the point of view of frequencies, densities, and abundances after Risser and Rice (1971):

Frequency

This is indicative of the dispersion of a particular species in a community. It is denoted as the percentage of individuals of a particular species in several readings or observations. It was determined as follows: -

$$Frequency\ (\%) = \frac{Total\ No.\ of\ quadrants\ in\ which\ species\ has\ occurred}{Total\ No.\ of\ quadrants\ studied} \times 100$$

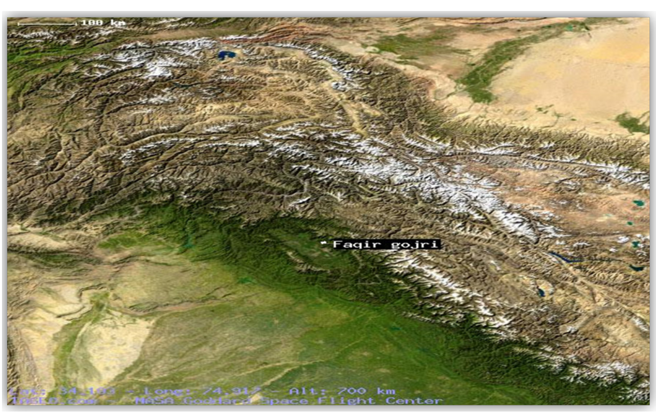

Fig.1: Study area map

Density

It is the number of individuals of a certain species on a unit area or volume. This is the primary character of the community. Community setting is affected to some extent by the density of the various species of community formation. The density of different species was determined the following formula:

$$Density\ \left(m^2\right) = \frac{Total\ number\ of\ individuals\ of\ the\ species}{Total\ number\ of\ quadrants\ studied}$$

Abundance

It is the total number of individual species in a certain area. The abundance of different species was calculated as follows:

$$Abundance = \frac{Total\ number\ of\ individuals\ of\ the\ species}{Total\ number\ of\ quadrants\ in\ which\ the\ species\ occurred}$$

Result and Discussion

To determine the impact of Anthropogenic Activities on quantitative characteristics of herbaceous taxa revealed low frequency (10%) *Thalictrum foliosum* Dc, *Lepchinnella microcarpa* (Boiss.) Riedl, *Rumex acetosa* Linn and *Hypericum perforatum* Linn *(20%) in Artemisia scoparia* Waldst. & Kit, *Chenopodium album* Linn, *Artemisia absinthium* Linn, *Bistorta amplexicaulis* (D. Don) Greene, *Atemesia parviflora* Wight *Rheum emodi* Wall, *Arnebia benthamii* (Wall. ex G.Don.) I.M. Jonston, *Thymus serpyllum* Linn, *Plantago lanceolata* Linn, *Nepeta eriostachya* Benth and *Nepeta clarkei* Hk.f in the Dhara watershed study, species such as *Viola odorata* and *Sisymbrium irio* were absent in areas affected by human interference, highlighting the selective impact of anthropogenic pressure on flora (Ajaz, 2003) (Table 1).

In the middle zone (20%) *Euphrasia officinalis* Linn, *Chenopodium murale* Linn, *Astragalus candolleanus* Royle, *Chenopodium album* Linn, *Artemisia absinthium* Linn, *Aster flaccidus* Bunge, *Lepchinnella microcarpa* (Boiss.) Riedl, *Rumex acetosa* Linn, *Hypericum perforatum* Linn, *Thymus serpyllum* Linn, *Polygonum aviculare* D.Don, *Clinopodium vulgare* Linn, *Lychnis coronaria* Lamk and *Stachys floccosa* Benth. (10%) *Geranium pamiricum* Linn, *Bistorta amplexicaulis* (D. Don) Greene *Geum elatum* Wall, *Arnebia benthamii* (Wall. ex G.Don.) I.M. Jonston, *Origanum vulgare* Linn, *Plantago lanceolata* Linn, *Nepeta clarkei* Hk.f. *Taraxacum officinale* Wigg, *Lychnis apetala* Linn.*Verbascum thapsus* Linn and *Malva neglecta* Wall This phenomenon has also been observed globally, where human-modified landscapes have led to a loss of biodiversity in forest ecosystems, with species richness and diversity decreasing in comparison to undisturbed areas (Peres *et al*., 2010) (Table 1).

In lower zone of deforested area of Faquir Gojar in summer (10%) *Geranium pamiricum* Linn. *Astragalus candolleanus* Royle *Lepchinnella microcarpa* (Boiss.) Riedl. *Geum elatum* Wall. *Origanum vulgare* Linn. *Plantago lanceolata* Linn. *Nepeta eriostachya* Benth. *Taraxacum officinale* Wigg.and *Lychnis apetala* Linn. Forest ecosystems, in particular, serve as carbon sinks, and their destruction releases stored carbon, contributing to global warming (Jackson *et al*., 2008). Moreover, biodiversity loss affects the resilience of ecosystems, making them less capable of withstanding and recovering from disturbances (MEA, 2005) (Table 1).

Table 1: Impact of anthropogenic activities on herbaceous taxa of Faquir Gojar in summer.

S. No	*Parameter*	*Frequency (%)*						*Density (m-2)*						*Abundance*					
	Habitat	*Anthropogenic area*			*Forest area*			*Anthropogenic area*			*Forest area*			*Anthropogenic area*			*Forest area*		
	Zone	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*
	Species																		
1	*Artemisia scoparia* Waldst. & Kit.	20	30	20	30	20	20	0.5	0.5	0.2	0.7	0.5	0.4	2.3	1.7	1	2	2.5	2
2	*Fragaria nubicola* Lindl.	40	40	20	40	30	30	1.2	0.8	0.4	1	0.7	0.5	3	2	2	3	2.3	1.7
3	*Euphrasia officinalis* Linn.	0	20	20	60	50	20	0	0.4	0.3	0.8	0.8	0.4	0	2	1.5	1	1.6	2
4	*Viola odorata* Linn*.	0	0	0	70	30	30	0	0	0	1	0.5	0.4	0	0	0	1	1.7	1.3
5	*Geranium pamiricum* Linn.	0	10	10	30	30	30	0	0.2	0.1	0.6	0.7	0.6	0	2	1	2	2.3	2
6	*Sisymbrium irio Linn. **	0	0	0	40	40	30	0	0	0	0.8	0.8	0.6	0	0	0	2	2	2
7	*Chenopodium murale Linn.*	0	20	0	60	50	50	0	0.3	0	0.9	0.5	0.5	0	1.5	0	2	1.4	1
8	Astragalus candolleanus Royle	30	20	10	20	20	20	0.4	0	0.2	0.6	0.7	0.5	1.3	1	2	3	2.5	2.5
9	*Chenopodium album* Linn.	20	20	20	70	60	50	0.5	0.4	0.4	1	0.8	0.7	2.5	2	2	1	1.3	1.4
10	*Artemisia absinthium* Linn.	20	20	0	70	60	20	0.2	0.3	0	1.1	1	0.6	1	1.5	0	2	1.7	3
11	*Bistorta amplexicaulis (D.* Don) Greene	20	10	0	40	40	20	0.3	0.2	0	0.7	0.6	0.3	1.5	2	0	2	1.5	1.5
12	*Atemisia parviflora* Wight	20	0	0	30	30	30	0.5	0	0	0.7	0.7	0.7	2.5	0	0	2	2.3	2.3
13	*Thalictrum foliosum* Dc.	10	0	0	40	40	10	0.2	0	0	0.9	0.8	0.3	2	0	0	2	2	3
14	*Aster flaccidus* Bunge.	0	20	0	30	30	30	0	0.3	0	0.7	0.5	0.5	0	1.5	0	2	1.7	1.7
15	*Rheum emodi* Wall.	20	0	0	40	30	30	0.4	0	0	0.8	0.7	0.4	2	0	0	2	2.3	1.3
16	*Lepchinnella microcarpa* (Boiss.) Riedl.	10	20	10	40	40	40	0.3	0.3	0.1	0.6	0.8	0.6	3	1.5	1	2	2	1.5
17	*Geum elatum* Wall.	30	10	10	30	50	10	0.5	0.2	0.2	0.9	0.9	0.2	1.7	2	2	3	1.8	2
18	*Oxytropis cachemiriana* Cambess*	0	0	0	40	20	20	0	0	0	0.8	1	0.5	0	0	0	2	5	2.5
19	*Rumex acetosa* Linn.	10	20	0	60	30	30	0.3	0.3	0	1.1	0.8	0.6	3	1.5	0	2	2.7	2
20	*Arnebia benthamii* (Wall. ex G.Don.) I.M. Jonston.	20	10	0	60	60	30	0.4	0.2	0	1.2	0.7	0.4	2	2	0	2	1.2	1.3
21	*Hypericum perforatum* Linn.	10	20	0	30	50	50	0.1	0.2	0	0.8	0.8	0.7	1	1	0	3	1.6	1.4
22	*Origanum vulgare* Linn*	0	0	0	70	40	30	0	0	0	0.9	0.7	0.4	0	0	0	1	1.75	1.3
23	*Thymus serpyllum* Linn.	20	20	20	60	50	40	0.4	0.4	0.4	1	0.9	0.6	2	2	0.4	2	1.8	1.5

24	*Marrubium vulgare* Linn.	30	30	20	60	40	30	0.5	0.4	0.3	0.9	0.7	0.5	1.7	1.3	0.3	2	1.75	1.7
25	*Plantago lanceolata* Linn.	20	10	10	60	30	30	0.4	0.1	0.1	1	0.8	0.4	2	1	0.1	2	2.7	1.3
26	Polygonum aviculare D.Don.	30	20	20	40	40	40	0.5	0.2	0.3	0.9	0.9	0.8	1.7	1	3	2	2.25	2
27	*Nepeta eriostachya* Benth.	20	0	10	70	20	20	0.3	0	0.1	1	0.7	0.6	1.5	0	0.1	1	3.5	3
28	*Nepeta clarkei* Hk.f.	20	10	30	70	10	10	0.2	0.1	0.5	0.9	0.6	0.6	1	1	0.5	1	6	6
29	*Taraxacum officinale* Wigg.	30	10	10	50	40	10	0.6	0.2	0.3	1	0.7	0.3	2	2	0.3	2	1.75	3
30	*Clinopodium vulgare* Linn.	0	20	20	40	30	30	0	0.3	0.4	0.9	0.8	0.8	0	1.5	0.4	2	2.7	2.7
31	*Lychnis coronaria* Lamk.	0	20	0	30	20	20	0	0.3	0	0.8	0.7	0.7	0	1.5	0	3	3.5	3.5
32	*Lychnis apetala* Linn.	0	10	10	70	50	30	0	0.2	0.1	1.1	0.9	0.6	0	2	0.1	2	1.8	2
33	*Stachys floccosa* Benth. *	0	0	0	20	30	30	0	0	0	0.7	0.6	0.6	0	0	0	4	2	2
34	*Verbascum thapsus* Linn.	0	10	20	40	20	20	0	0.4	0.2	0.8	0.5	0.5	0	4	0.2	2	2.5	2.5
35	*Morina longifolia* Wall.	0	30	30	40	10	10	0	0.4	0.5	0.9	0.4	0.4	0	1.3	0.5	2	4	4
36	*Erigeron Canadensis* Linn.	0	30	0	40	40	40	0	0.5	0	0.9	0.7	0.6	0	1.7	0	2	1.75	1.5
37	*Malva neglecta* Wallr.	0	10	0	30	20	20	0	0.2	0	0.8	0.5	0.5	0	2	0	3	2.5	2.5

(U) Upper zone (2640–2670 masl), (M) Middle zone (2520–2640 masl), (L) Lower zone (2400–2520 masl)
(–) Absent, (*) Species not found in anthropogenic area.

In autumn low frequency (10%) was recorded in *Chenopodium album* Linn, *Clinopodium vulgare* Linn and *Morina longifolia* Wall in upper zone, *Chenopodium album* Linn, *Clinopodium vulgare* Linn, *Verbascum thapsus* Linn and *Morina longifolia* Wall in middle zone *Chenopodium album* Linn, *Verbascum thapsus* Linn and *Morina longifolia* Wall. *In lower zone* low frequency of the above-mentioned taxa is attributed to low moisture content and low nutrient status of deforested soil high frequency (40%) was recorded in *Fragaria nubicola* Lindl. In both the upper and middle zone (30%) in *Nepeta clarkei* Hk.f. and *Morina longifolia* Wall. Studies have shown that protected areas can significantly increase species richness, plant density, and total vegetation cover when effectively managed (Muller *et al*., 2012) (Table 2).

In the lower zone during summer and during autumn high frequency (30%) was recorded in *Artemisia scoparia* Waldst. & Kit, *Atemesia parviflora* Wight, *Lepchinnella microcarpa* (Boiss.) Riedl, *Taraxacum officinale* Wigg, *Lychnis coronaria* Lamk, *Lychnis apetala* Linn and *Verbascum thapsus* Linn and in lower zone high frequency (30%) was shown in

Artemisia scoparia Waldst. & Kit, *Atemesia parviflora* Wight, *Taraxacum officinale* Wigg and *Lychnis coronaria* Lamk. The high frequency of the taxa could be due to an increase in light intensity in anthropogenic areas. No impact was recorded on *Fragaria nubicola* Lindl in both upper and middle and *Morina longifolia* Wall (Table 2). In lower zone of Faquir Gojri in summer and *Artemisia scoparia* Waldst. & Kit, *Atemesia parviflora* Wight, *Lepchinnella microcarpa* (Boiss.) Riedl, *Taraxacum officinale* Wigg, *Lychnis coronaria* Lamk, *Lychnis apetala* Linn *and Verbascum thapsus* Linn. However, a complete absence of *Viola odorata* Linn* *Oxytropis cachemiriana* Cambess. **Origanum vulgare* Linn. **Stachys floccosa* Benth. **And Sisymbrium irio* Linn* *in summer and Sisymbrium irio* Linn*, *Rumex acetosa* Linn* *Oxytropis cachemiriana* Cambess. *And *Stachys floccosa* Benth. * During autumn reflects the highest impact of Anthropogenic. Activities on these taxa, the conversion of forest land for agriculture and livestock farming have led to the decline of many plant species that are crucial for maintaining ecosystem stability (Giam, 2017). (Table 2).

Low density (0.1 m^{-2}) was recorded in *Hypericum perforatum* Linn in the upper zone. In the middle zone, low density in Faquir Gojri in summer (0.1 m^{-2}) was shown in *Plantago lanceolata* Linn and *Nepeta clarkei* Hk.f. and in the lower zone (0.1 m^{-2}) was shown in *Geranium pamiricum* Linn, *Lepchinnella microcarpa* (Boiss.) Riedl, *Plantago lanceolata* Linn, *Nepeta eriostachya* Benth and *Lychnis apetala* Linn. In autumn, low density (0.2 m^{-2}) was recorded in *Astragalus candolleanus* Royle, *Nepeta clarkei* Hk.f. *Clinopodium vulgare* Linn and *Morina longifolia* Wall (0.1 m^{-2}) was recorded in *Verbascum thapsus* Lin in middle zone of deforested area in autumn in lower zone (0.1m^{-2}) density is shown in *Verbascum thapsus* Linn. During the season of autumn Low density of taxa could be attributed to uncongenial climatic

Table 2: Impact of anthropogenic activities on herbaceous taxa of Faquir Gojar in autumn.

S. No	*Parameter*	*Frequency (%)*						*Density (m2)*						*Abundance*					
	Habitat	*Anthropogenic area*			*Forest area*			*Anthropogenic area*			*Forest area*			*Anthropogenic area*			*Forest area*		
	Zone	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*
	SPECIES																		
1	*Artemisia scoparia* Waldst. & Kit.	30	30	30	40	30	20	0.3	0.3	0.3	0.4	0.3	0.3	1	1	1	1	1	1.5
2	*Euphrasia officinalis* Linn.	20	20	0	30	30	10	0.3	0.3	0	0.3	0.3	0.2	1.5	1.5	0	1	1	2
3	*Sisymbrium irio* Linn.*	0	0	0	20	10	20	0	0	0	0.3	0.1	0.4	0	0	0	1.5	1	2
4	*Astragalus candolleanus* Royle	20	20	20	20	30	30	0.2	0.2	0.2	0.3	0.3	0.5	1	1	1	1.5	1.7	1.7
5	*Chenopodium album* Linn.	10	10	10	30	20	20	0.3	0.3	0.3	0.3	0.2	0.3	3	3	3	1	1.5	1.5
6	*Atemesia parviflora* Wight	30	30	30	30	20	10	0.4	0.4	0.4	0.3	0.2	0.2	1.3	1.3	1.3	1	2	2
7	*Lepchinnella microcarpa* (Boiss.) Riedl.	30	0	0	20	20	20	0.5	0	0	0.3	0.2	0.2	1.7	0	0	1.5	1.5	1
8	*Oxytropis cachemiriana* Cambess*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	*Rumex acetosa* Linn.*	0	0	0	20	20	30	0	0	0	0.3	0.2	0.3	0	0	0	1.5	1.5	1
10	*Thymus serpyllum* Linn.	20	20	20	10	20	20	0.4	0.4	0.4	0.3	0.2	0.3	2	2	2	3	2	1.5
11	*Polygonum aviculare* D.Don	20	20	20	20	20	10	0.3	0.3	0.3	0.2	0.2	0.1	1.5	1.5	1.5	1	1.5	1
12	*Nepeta eriostachya* Benth.	20	20	0	10	20	10	0.3	0.3	0	0.1	0.2	0.1	1.5	1.5	0	1	1	1
13	*Nepeta clarkei* Hk.f.	20	20	20	20	20	20	0.2	0.2	0.2	0.2	0.2	0.3	1	1	1	1	1	1
14	*Taraxacum officinale* Wigg.	30	30	30	40	30	20	0.4	0.4	0.4	0.5	0.3	0.2	1.3	1.3	1.3	1.25	1.7	1
15	*Clinopodium vulgare* Linn.	10	10	0	20	30	20	0.2	0.2	0	0.3	0.3	0.3	2	2	0	1.5	1	1.5
16	*Lychnis coronaria* Lamk.	30	30	30	10	30	20	0.3	0.3	0.3	0.1	0.3	0.2	1	1	1	1	1	1
17	*Lychnis apetala* Linn.	30	0	0	20	20	20	0.5	0	0	0.3	0.2	0.3	1.7	0	0	1.5	1.5	1.5
18	*Stachys floccosa* Benth*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
19	*Verbascum thapsus* Linn.	30	10	10	10	20	20	0.3	0.1	0.1	0.1	0.2	0.3	1	1	1	1	1	1.5
20	*Morina longifolia* Wall.	10	10	10	20	10	20	0.2	0.2	0.2	0.3	0.1	0.3	2	2	2	1	2	1.5
21	*Erigeron Canadensis* Linn.	20	20	0	20	20	10	0.3	0.3	0	0.3	0.2	0.1	1.5	1.5	0	1	1.5	1

(U) Upper zone (2640–2670 masl), (M) Middle zone (2520–2640 masl), (L) Lower zone (2400–2520 masl)
(–) Absent, (*) Species not found in anthropogenic area.

and edaphic attributes caused by Anthropogenic Activities. In summer high density (1.2 m^{-2}) was recorded in *Fragaria nubicola* Lindl in upper zone (0.8) in *Fragaria nubicola* Lindl. In middle and (0.5 m^{-2}) in *Nepeta clarkei* Hk.f. *and Morina longifolia* Wall in the lower zone of the anthropogenic area. In autumn, high density (0.5 m^{-2}) was recorded in *Lepchinnella microcarpa* (Boiss)Riedl and *Lychnis apetala* Linn in upper zone, (0.4 m^{-2}) in *Atemesia parviflora* Wight, *Thymus serpyllum* Linn *and Taraxacum officinale* Wigg (Table 2). Climate change further exacerbates these effects, as rising temperatures and changing precipitation patterns alter the habitats suitable for many plant species (Gebeyehu & Hirpo, 2019).

In the middle zone of the anthropogenic area in autumn in the lower zone, high density (0.4 m^{-2}) is shown in *Atemesia* *parviflora* Wight, *Thymus serpyllum* Linn *and Taraxacum officinale* Wigg. High density could be attributed to an increase in light intensity leading high temperature under anthropogenic conditions. *Euphrasia officinalis* Linn, *Viola odorata* Linn*, *Sisymbrium irio* Linn. * *Geranium pamiricum* Linn, *Chenopodium murale* Linn, *Aster flaccidus* Bunge, *Clinopodium vulgare* Linn, *Lychnis coronaria* Lamk, *Lychnis apetala* Linn, *Stachys floccosa* Benth *Verbascum thapsus* Linn, *Morina longifolia* Wall, *Erigeron Canadensis* Linn *and Malva neglecta* Wallr were absent in upper zone of deforested area in summer. *Viola odorata* Linn. * *Sisymbrium irio* Linn*, *Atemesia parviflora* Wight, *Thalictrum foliosum* Dc, *Rheum emodi* Wall and *Nepeta eriostachya* Benth were absent (Table 2).

In middle zone *Viola odorata* Linn. * *Sisymbrium irio* Linn*, *Chenopodium murale* Linn, *Artemisia absinthium* Linn, *Bistorta amplexicaulis* (D. Don) Greene, *Atemesia parviflora* Wight, *Thalictrum foliosum* Dc, *Aster flaccidus* Bunge, *Rheum emodi* Wall, *Oxytropis cachemiriana* Cambess, *Rumex acetosa* Linn, *Arnebia benthamii* (Wall. ex G.Don.) I.M. Jonston, *Hypericum perforatum* Linn, *Lychnis coronaria* Lamk, *Stachys floccosa* Benth, *Erigeron Canadensis* Linn, *Malva neglecta* Wallr were absent in lower zone of Anthropogenic area in summer. In autumn *Sisymbrium irio* Linn. * And *Rumex acetosa* Linn. *Were absent in upper zone in Anthropogenic area in Faquir Gojri *Sisymbrium irio* Linn* *Lepchinnella microcarpa* (Boiss.) Riedl, *Rumex acetosa* Linn.and *Lychnis apetala* Linn.were absent. In moddle zone and *Euphrasia officinalis* Linn. *Sisymbrium irio* Linn*, *Lepchinnella microcarpa* (Boiss.) Riedl, *Oxytropis cachemiriana* Cambess, *Rumex acetosa* Linn, *Nepeta eriostachya* Benth, *Clinopodium vulgare* Linn, *Lychnis apetala* Linn and *Erigeron Canadensis* Linn were absent in lower zone in autumn in Anthropogenic area. Absence of above-mentioned species in upper middle and lower zone could be due to decrease in moisture content towards lower zone of study area (Table 2).

Low abundance (1) was recorded in *Artemisia absinthium* Linn. *Hypericum perforatum* Linn. *Nepeta clarkei* Hk.f. in upper zone, *Astragalus candolleanus* Royle, *Hypericum perforatum* Linn, *Origanum vulgare* Linn, *Plantago lanceolata* Linn, *Polygonum aviculare* D.Don, *Nepeta clarkei* Hk.f. in middle zone and in *Artemisia scoparia* Waldst. & Kit, *Geranium pamiricum* Linn, *Lepchinnella microcarpa* (Boiss.) Riedl in lower zone of Anthropogenic area in summer. In autumn, low abundance (1) was recorded in *Artemisia scoparia* Waldst. & Kit, *Astragalus candolleanus* Royle, *Nepeta clarkei* Hk.f. *Lychnis coronaria* Lamkand *Verbascum thapsus* Linn (Table 2).

In upper zone, *Artemisia scoparia* Waldst. & Kit. *Astragalus candolleanus* Royle *Nepeta clarkei* Hk.f. *Lychnis coronaria* Lamk and *Verbascum thapsus* Linn in the middle zone, *Artemisia scoparia* Waldst. & Kit, *Astragalus candolleanus* Royle, *Nepeta clarkei* Hk.f. *Lychnis coronaria* Lamk and *Verbascum thapsus* Linn. In the lower zone of the anthropogenic area in autumn. The low abundance of these species could be attributed to low moisture content and low nutrient status of soil. High abundance (3) was

Table 3: Impact of anthropogenic activities on the composition of herbaceous taxa of Faquir Gojar.

S. No.	*Site*	*Faquir Gojar*			
	Habitat	*Anthropogenic area*	*Forest area*		
	Family	*Genera*	*Species*	*Genera*	*Species*
1	Asteraceae	3	4	4	6
2	Rosaceae	0	0	2	2
3	scrophulariacea	2	2	2	2
4	Violaceae	0	0	1	1
5	Geraniaceae	0	0	1	1
6	Brassicaceae	1	1	1	1
7	chenopodiaceae	0	0	1	2
8	Polygonaceae	2	5	4	4
9	Ranunculaceae	0	0	1	1
10	Boraginaceae	1	1	2	2
11	Fabaceae	1	1	1	1
12	Hypericaceae	0	0	1	1
13	Lamiaceae	4	5	6	7
14	Plantaginaceae	0	0	1	1
15	Caryophyllaceae	1	2	1	1
16	caprifoliaceae	1	1	1	1
17	malvaceae	0	0	1	1
18	Papilionaceae	1	1	1	1
19	Ameranthaceae	1	2	0	0
Total	19	18	22	32	36

recorded in *Fragaria nubicola* Lindl and *Lepchinnella microcarpa* (Boiss.) Riedl in upper zone, (4) in *Verbascum thapsus* Linn.in the middle zone (3) *Polygonum aviculare* D. Don in a lower zone in Anthropogenic area in summer of Faquir Gojri. In autumn, High abundance (3) in *Chenopodium album* Linn in the upper middle and lower zone of the anthropogenic area. High abundance value of these species could be due to high light intensity in anthropogenic area. (Table 2).

In order to know the difference between herbaceous taxa in Anthropogenic and forest area, species composition was worked out during a one-year study (Table 3). Data indicates the presence of 22 species pertaining to 18 genera and 11 families in the anthropogenic area of Faquir Gojar in order to know the difference between herbaceous taxa in Anthropogenic and forest area species composition was worked out during one-year study (Table 3). Data indicates presence of 36 species pertaining to 32 genera and 18 families in Anthropogenic area of Faquir Gojar, reflecting complete absence of two species pertaining to two genera and two families in Anthropogenic area in summer (Violaceae and Brassicaceae) and two species two genera and two families in autumn in anthropogenic area (Brassicaceae and Polygonaceae) could be attributed to decrease in moisture content and increase in light intensity in Anthropogenic area.

The low abundance, density and high support may be due to the low moisture and nutrient status of the forest soil. Higher frequency, density, and abundance of taxa can be associated with increased light intensity in forests. The absence of shade-loving species is associated with decreased humidity and increased light intensity in anthropogenic areas.

Conclusion

The present study, "Impact of deforestation on herbaceous taxa of Faquir Gojri of Dhara Catchment," was undertaken with the main objective to understand the impact of deforestation on phytodiversity and nutrient status of soil. The findings of the study summarize the effects such as the Impact on the frequency of species from time to time, the Impact on an abundance of species, and the Impact on density, which was recorded in the study period. The species composition of Faquir Gojri revealed that there were only 22 species present in the deforested area against 36 species recorded in the forest area, reflecting the absence of 2 species in the deforested area. We recommend the act of protecting species in the area and forest department requires a combination of conservation strategies, policy implementation, and public awareness.

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Authors' Contributions

Gousia Majeed has planned and prepared the manuscript and Syed Aasif Hussain Andrabi conducted the experiment and made the analytical analysis of the data. All the authors read and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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