TOURISM AND ITS IMPACTS ON ALPINE MEADOW OF CHOPTA , UTTARAKHAND

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By

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2021

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Submitted to;
CCF. Forest Research Wing,
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Introduction

The Chopta region, located in Chamoli district of Western Himalaya, is famous not only in Uttarakhand for its beautiful , colorful flowers , trees, meadows, ancient civilization built temples, lakes, and snow clad mountains, but also throughout the world. It is high up to about 3600m from sea level as here mountains are covered with snow for long time. The snow clad mountains and the Burans species blossom in mid-April make the view seem to be no less than heaven, large dense forest and the high mountain of the snow covered Himalayas attract a large number of tourists. Increasing number of tourists from India and abroad have been affecting the climate and biodiversity. Tourism has become one of the fastest growing industries over the last decades in the world. Moreover , grassland is the largest terrestrial ecosystem and provides both the material basis for animal husbandry production and homes for many ethnic minorities. Grassland is a complex of natural, social and culture landscapes, therefore, grassland tourism is acting as a key development role in many regions. However , the effects of the rapid development of grassland tourism has an obvious double – edged effect on grassland ecosystems . The pressure from population increase, cultivated land expansion and landscape fragmentation result in the consequence that animal husbandry is incapable of supporting improvements in living standards of herders. Moreover, tourism can increase the income of pastoral households, especially during the peak tourism time. In return , tourism revenue is an essential incentive for local residents to protect the ecology and landscape diversity. The impact of grassland tourism disturbance is

directly reflected upon local vegetation and soil (Ling Feng et. all 2019). The blooming grassland tourism and imperfect management measures have a significant impact on regional grassland biodiversity and ecological environment. The grassland vegetation in tourist spots has been destroyed by frequent trampling and crushing . These effects have resulted in widespread vegetation loss and soil degradation, such as a reduction of plant species diversity and vegetation cover, and deterioration in soil structure and soil nutrients. Of particular importance is the fact that tourism disturbance has a large influence on soil physical and chemical properties , such as increased soil bulk density, decreased soil water content and electrical conductivity (Ling Feng et. all 2019). The aim of this study was to analyze, the impact of tourism in alpine meadows of Chopta .The results will contribute to provide a reference for tourism development, and environmental protection in alpine meadows.

Material and Methods

Study Area

The present study was conducted in Chopta meadows which comes under district Chamoli Garhwal in Uttarakhand state of India It is located between 30° 29'31.17" N latitude an 79° 12'14.66" E longitude and covers and altitudinal range between 3000m asl and 3800 m asl. Primary data were collected from local people of Chopta, through conducting the field surveys. Apart from the personal observation, and discussion have been made with local residents, forest department and help some available literature.

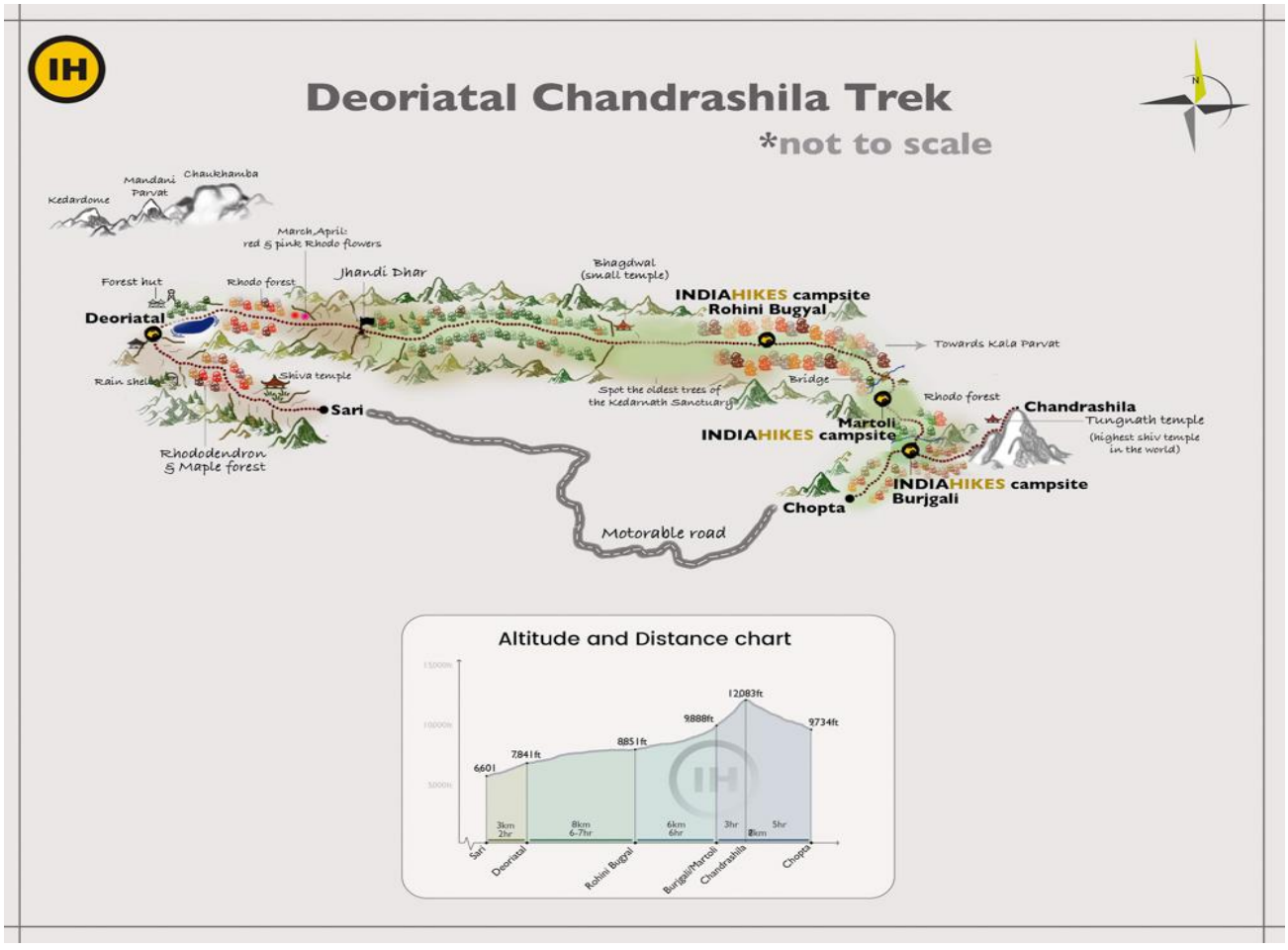
Vegetation and Climate

Chopta to Tungnath : The basin between Chopta and Tungnath temple has forest hill with rich alpine meadows, oak forest, Rhododendron groove and also farm field. At a lower altitude (1500 to 2500m.) broad leaved forest dominated by *Quercus leucotrichophora* are found. Medium altitude (2500 – 2800m.)broad leaved forest dominated by *Quercus semecarpifolia* and High altitude (2900 – 3200m.) mixed forests dominated by species like *Rhododendron arboreum, R. campanulatum* with a few scattered *Abies pindrow* and *Taxus baccata* trees. At higher altitude (3400 -3800m.)grasslands dominated by herbaceous species of *Potentilla, Corydalis,Taraxacum,Trachydium, Geranium, Anemone, Primula* and dotted pockets of shrubs of *Rhododendron anthopogon* and *R. lepidotum* are common.The landscape of the area consists of edges and uncovered rocks with area of plane alpine pasture. The soil is loam and sandy loam, light grey to brown in colour and sandy with large debris at a higher elevation. The climate of this zone is cold, with extreme irradiance and low partial gas pressure. Heavy frost, snowstorm, and hailstorms prevail throughout the year except for few months.

The climate of the study area is typical moist temperate type, which receives moderate to high snowfall from December to February. Meteorological details (1998-2007) of the study Mean annual maximum temperature was recorded as 16.41 ± 3.60 °C, whereas mean annual minimum temperature as 6.14 ± 1.98 °C. Mean annual rainfall was recorded as 2044.47 ± 476.01 mm. Mean Relative humidity round the year ranged from 15 % to 86 %. Geologically, the rocks in the study sites are complex mixture of mainly sedimentary, low grade metamorphosed with sequence capped by crystalline nappe. (Source : Sumeet Gairola at. all 2010).

Study area: tourist attraction profile

The study area lies on the link road connecting the two major pilgrim centres of the state, Kedarnath and Badrinath, which is being visited by lakhs of tourists every year from May to October. Being a part of Panch Kedar trekking route of the state, the area has been popular among trekkers since long time.



Source of Map. renokadventures.com Fig 1

Table :1 Tourist attraction profile

Name of the place	Nature of attraction	Average no. of visitor per year	% of overnight staying visitors	Accommodation units	Eateries	Bank	Post office
Chopta/ Dogalbhita	Religious, Nature based trekking	40,000	35 %	12 lodges One PWD guest house. One tent colony	Six eateries Seven tea stalls	---	---

Source : Shiv Kumar Gupta 2014, https://www.researchgate.net/publication/275590266

Table :2 **TOURIST INFLUX AT CHOPTA (2018 – 19)**

S.No.	MONTHS	STUDENTS UPTO 18 YEARS OF AGE	STUDENTS ABOVE 18 YEARS OF AGE	ADULTS	FORIEGNERS	TOTAL	REVENEU COLLECTED (Rs)
1	APRIL	0	0	163	0	163	9900
2	MAY	0	165	347	18	530	36000
3	JUNE	0	39	23	0	62	3300
4	JULY	0	0	0	0	0	0
5	AUGUST	0	0	0	0	0	0
6	SEPTEMBER	0	0	0	4	4	2400
7	OCTOBER	0	0	0	0	8	4800
8	NOVEMBER	0	123	587	11	721	103875
9	DECEMBER	0	311	985	16	1312	180675
10	JANUARY	10	1205	1150	2	2367	264605
11	FEBRUARY	0	24	4	0	28	2400
12	MARCH	0	0	0	0	0	0
	TOTAL	**10**	**1867**	**3259**	**51**	**5195**	**607955**

SOURCE: UKHIMATH RANGE , KEDARNATH WILDLIFE DIVISION GOPESHWAR

Table :3 **TOURIST INFLUX AT CHOPTA (2019 – 20)**

S.No.	MONTHS	STUDENTS UPTO 18 YEARS OF AGE	STUDENTS ABOVE 18 YEARS OF AGE	ADULTS	FORIEGNERS	TOTAL	REVENEU COLLECTED
1	APRIL	41	420	666	9	1136	138358.00
2	MAY	20	319	307	15	661	79735.00
3	JUNE	0	0	0	2	2	1200.00
4	JULY	0	0	0	0	0	0.00
5	AUGUST	0	0	0	0	0	0.00
6	SEPTEMBER	0	0	0	4	4	2400.00
7	OCTOBER	0	0	0	31	31	18600.00
8	NOVEMBER	0	149	355	26	530	80025.00
9	DECEMBER	46	389	459	12	906	106983.00
10	JANUARY	4	53	35	0	92	9377.00
11	FEBRUARY	0	0	0	0	0	0.0
12	MARCH	0	0	0	0	0	0.0
	TOTAL	**111**	**1330**	**1822**	**99**	**3362**	**436678.0**

SOURCE: UKHIMATH RANGE , KEDARNATH WILDLIFE DIVISION GOPESHWAR

Table :4 **TOURIST INFLUX AT CHOPTA (2020 -21)**

S.No.	MONTHS	STUDENTS UPTO 18 YEARS OF AGE	STUDENTS ABOVE 18 YEARS OF AGE	ADULTS	FORIEGNERS	TOTAL	REVENEU COLLECTED
1	APRIL				0	0	0
2	MAY				0	0	0
3	JUNE				0	0	0
4	JULY				0	0	0
5	AUGUST				0	0	0
6	SEPTEMBER				0	0	0
7	OCTOBER				0	0	0
8	NOVEMBER				0	0	0
9	DECEMBER				0	1324	0
10	JANUARY				0	2492	0
11	FEBRUARY				0	482	0
12	MARCH				0	1158	0
	TOTAL				**0**	**5459**	**0.00**

SOURCE: UKHIMATH RANGE , KEDARNATH WILDLIFE DIVISION GOPESHWAR

Table :5 **TOURIST INFLUX AT TUNGNATH DHAM (2019)**

S.No.	MONTHS	LOCAL VISITOR			OTHER STATES VISITOR			FORIEGNERS			TOTAL
		CHILDREN	FEMAL	MALE	CHILDREN	FEMAL	MALE	CHILDREN	FEMAL	MALE	
1	MAY	321	373	447	782	1308	1920	0	4	0	5155
2	JUNE	923	1269	1504	1893	2613	3687	0	1	1	11891
3	JULY	344	693	1043	397	796	2429	0	1	0	5703
4	AUGUST	426	1169	1795	49	318	1079	0	4	3	4843
5	SEPTEMBER	168	476	879	70	1323	3258	0	5	3	6182
6	OCTOBER	105	404	862	534	2565	5679	0	10	20	10179
7	NOVEMBER	21	64	151	89	294	883	0	8	8	1518
8	**TOTAL**	**2308**	**4448**	**6681**	**3814**	**9217**	**18935**	**0.0**	**33**	**35**	**45471**

SOURCE: UKHIMATH RANGE , KEDARNATH WILDLIFE DIVISION GOPESHWAR

Table :6 **TOURIST INFLUX AT TUNGNATH DHAM (2020)**

S.No.	MONTHS	LOCAL VISITOR			OTHER STATES VISITOR			FORIEGNERS			TOTAL
		CHILDREN	FEMAL	MALE	CHILDREN	FEMAL	MALE	CHILDREN	FEMAL	MALE	
1	MAY	0	0	15	0	0	0	0	0	0	15
2	JUNE	0	43	83	0	0	0	0	0	0	126
3	JULY	84	511	1261	22	53	385	0	0	0	2316
4	AUGUST	146	611	1056	2	65	475	0	0	0	2355
5	SEPTEMBER	63	236	581	6	254	960	0	0	0	2090
6	OCTOBER	33	197	425	113	804	1911	0	2	2	3487
7	NOVEMBER	11	35	74	9	78	225	0	0	0	432
8	**TOTAL**	**337**	**1633**	**3495**	**152**	**1254**	**3956**	**0.0**	**2.0**	**2.0**	**10821**

SOURCE: UKHIMATH RANGE , KEDARNATH WILDLIFE DIVISION GOPESHWAR

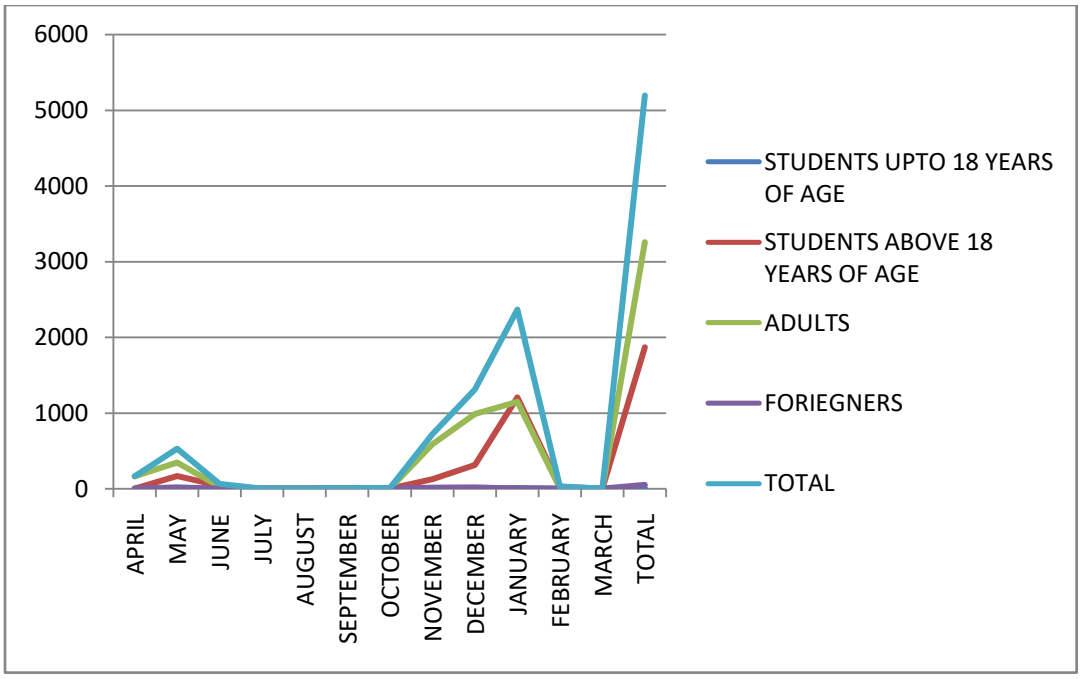


Fig 2 : Graphical representation of data Table 2

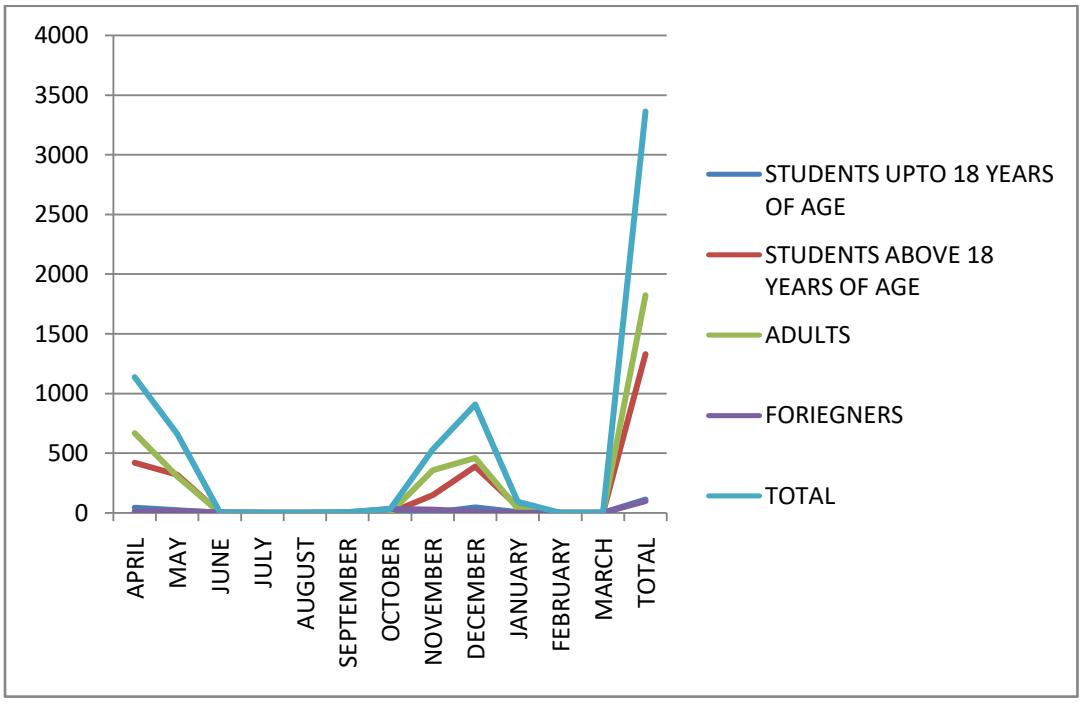
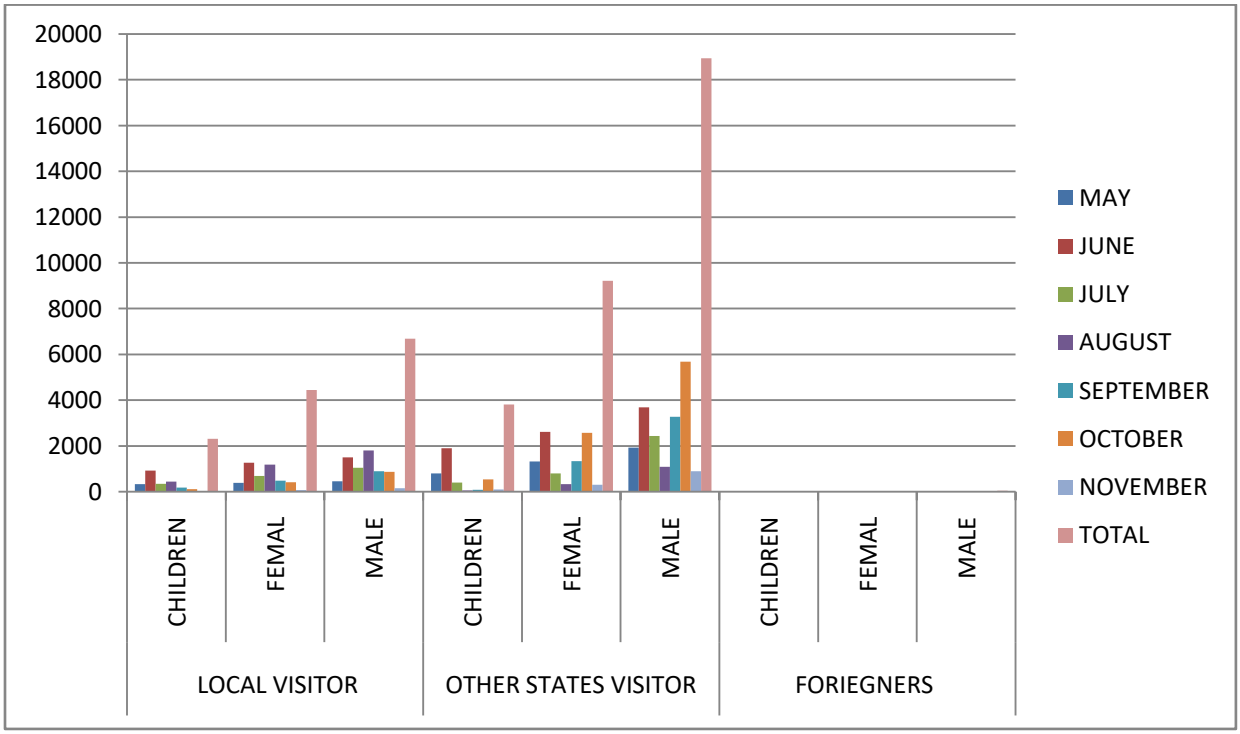


Fig 3 : Graphical representation of data Table 3



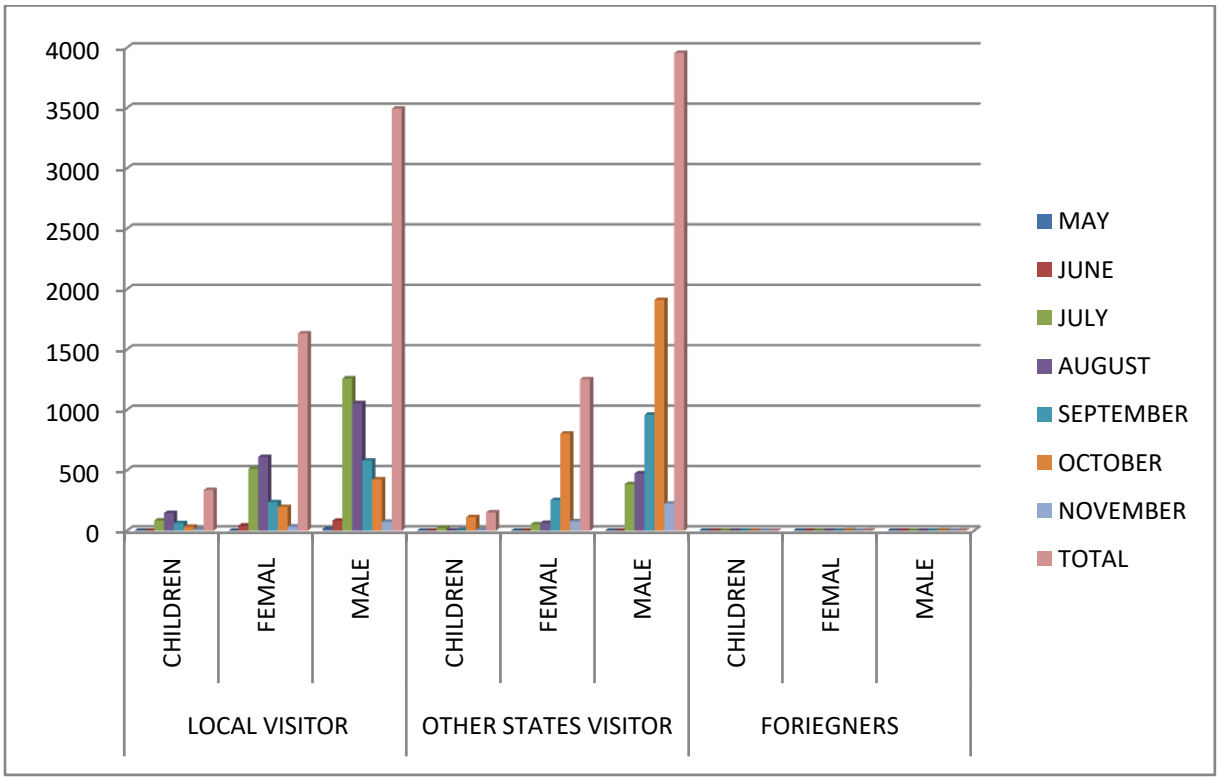


Fig 4 &5 : Graphical representation of data Table 4 & 5 respectively

Following observations have observed during field survey

The main cause of tourists influence in the meadows of Chopta is that the meadows are closer to the road which connects the two main Hindu Pilgrimage site Badrinath and Kedarnath.

1 - INCREASED CONGESTION : Large number of tourists are attracted to popular sites, Chopta is

one among them. Tourist shops and accommodations facilities also develop near tourist areas, vehicular and pedestrian traffic also get increased consequently increasing biotic pressure on alpine meadows.

2 - POLLUTION AND LITTERING : Plastic packets, bottles, bag of chips used by the tourists are left over there in a huge quantity, polluting alpine ecosystem.

3 - DESTRUCTION OF HABITATS : The increasing number of tourists are eliminating natural habitat and wildlife . The careless tourists trample the plants . The animal are running away from their native place by the noise of the tourists.

4 – INCREASED CARBON FOOT PRINT : Increases carbon foot print in to the atmosphere from buses, cars used by the tourist and burning of fuelwood for preparing food for the tourists.

Demand of fuelwood is also increasing which adversely affecting nearby forests particularly Quercus and Rhododendron species.

5 – HEAVY GRAZING AND TRAMPLING : As there are many villages near by , people used to graze their livestock in these alpine meadows for few months per year, heavy trempling takes place. During tourist season mules and ponies are used by locals to carry tourist , by their hooves soil erosion and land degradation occurs.

6 - UNMANAGED TOURISM : During the field visit it has seen many tourist left their disposable in alpine meadows and numerous tourists pluck flowers of alpine meadows . A huge number of tourists visit alpine meadows in a single day which ultimatly creats heavy biotic pressure on alpine ecosystem. There is no control over the numbers of tourists visiting per day and there is no management of garbage removal.

Effect of tourism on Plant community Characteristics: During last two years we have observed that some species are common near the track route e.g. *Goodyera fusca, Ponerachis chusua , Jurinea dolomiaea ,Nardostachis jatamasi* etc . A transect line or route is observed during the study by encounter method. These species encountered frequently in first year as compared to the next year, it shows that these species are decreasing in numbers due to biotic pressure . Nardostachis jatamasi is used in devotional rituals, people used to collect this species. Jurinea dolomiaea roots are used for making incense sticks and dhoop, a critically endangered plant found in a good number in slopes near Tungnath. These species are most vulnerable to be trampled by tourists. However it is too early to come to a conclusion, further data collection is required for 2 -3 years.

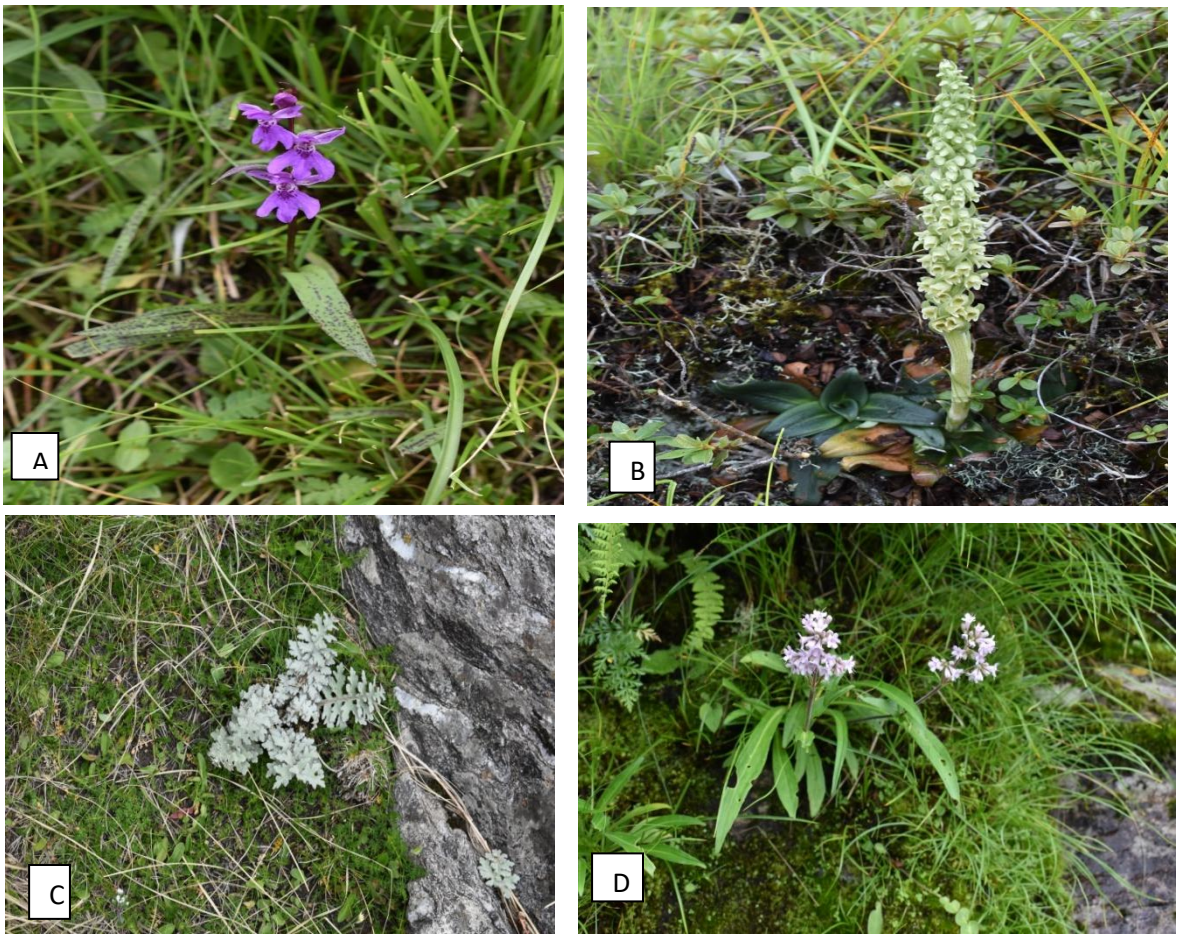


Figure 6 A, *Ponerachis chusua* , B, *Goodyera fusca*, C, *Jurinea dolomiaeaan* and D , *Nardostachis jatamasi*

Discussion

Uncontrolled conventional tourism poses potential threats to many natural areas around the world. It can put enormous pressure on an area and lead to impact such as soil erosion, increased pollution, natural habitat loss, etc. Data suggests that in year 2019 (Table 3 &5) a population of 48833 in a season visited Tungnath and Chopta , which gives an average of 134 person per day in a year travelled these particular areas. Peak tourism seasons (Fig 2&3) in these areas coincide with the reproduction cycle and fruiting time of majority of herbaceous plants growing in alpine areas. Trampling at flowering and fruiting time may disturbs the natural regeneration cycle which in turn reduces the diversity of alpine ecosystem.

Depletion of natural resources

Tourism development can put pressure on natural resources when it increases consumption in one as where resources are already scarce.

Depletion of Local Resources

Tourism can create great pressure on local resources like energy flood and other raw materials that may already be in short supply. Greater extraction and transport of these resources exacerbates the physical impact associated with their exploitation.

Land Degradation

Direct Impact on natural resources both renewable and nonrenewable just like Important land resources include minerals, fossil fuel, fertile soil forests wetland and wildlife. Increased construction of tourism and recreational facilities has increased the pressure on these resources and on scenic landscape. Forest after suffer negative impacts of tourism in the form of deforestation.

Solid Waste and Littering

Tourist activities and appealing natural attraction, waste disposal is a serious problem and improper disposal can be a major spoiler of the natural environment. Construction of hotels, recreation and other facilities often increases the solid waste damaging the flora and fauna.

Conclusions

The most direct impact of tourism on alpine meadows are frequent trampling and crushing. Trampling has an obvious negative effect on species diversity, decrease in alpine meadows communities. Our study showed that tourism has increased on alpine meadows ,it creates biotic pressure on alpine ecosystem, reduce soil fertility , degrade soil texture , thus adversely affecting the whole plant – soil system , which ultimately affecting the native flora and fauna . Therefore, this problem should influence decision makers in balancing the relationship between management and economic benefits of alpine meadows . Our study suggest that , controlling the number of tourists at peak tourism time should be factored into achieving a win – win outcome to maintain alpine ecosystem and enhance the livelihood of locals basesd on tourism in a sustainable manner.

Reference

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