



Application of remote sensing and geographical information system for tourism planning and impact assessment of Nainital town, Uttarakhand

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Abstract

The beautiful and scenic natural surroundings of Nainital town is currently experiencing a bi-phase impact of increasing tourist activities. On one hand it has provide an impetus to employment and income generation and means of livelihood, on the other it has affected adversely the physiocultural surroundings and overall environment of the town in many ways. This presentation is an effort to elaborate these after effects which is well supported by adequate and relevant data-base and statistical figures of tourist inflow, number and increasing size of other facilities like hotels, travel agencies etc. it is quite clear from the analysis that there is an consistent rise in tourist traffic followed by a rise in number of other agencies and faculties which are providing them better services. Moreover emphasis is separately laid on various aspects of socio-economic and culture impact of ever-rising tourist pressure in the town.

Key words: comprehensive information, infrastructural facilities, augmenting.

Introduction

Tourism industry is rapidly becoming a leading service industry worldwide. Public and private sectors efforts are already under way through inter sector approach to develop and maintain tourism industry as a major source of revenue for the local people. However, with the available data about the possible employment opportunities and number of domestic and foreign tourist arrivals, it is evident that the Indian in general and Uttarakhand state in particular have not been fully explored and marketed in potential tourism markets. The root cause of failure is the obsolete planning and promotion procedures being followed for the development of tourism attractions both at the interregional intraregional levels. With the changing scenario in tourist's preferences about the nature of tourist attractions, tourism planners and promoters need to be updated about accurate and comprehensive information about the available amenities, activities, facilities, qualities of attractions besides providing them information of destination use patter, average length of stay, visitors views, weather conditions, local people attitude, and many other significant information.

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However while evaluation the tourism development stage of Uttarakhand state it is revealed that a majority of tourist attractions of the state have so far achieved Annoying and Apathy stages of Tourism product life cycle. In other words the tourist attractions of the state can be placed as mid centric quality tourist attractions. Such quality of tourist attractions always remains in high demand and are opted by such nature of tourist traffic who frequently visit a destination with family members and groups. Such tourist attractions are poorly preferred by backpackers and outdoor recreationists. In view of this the state needs to make rich documentation both of tangible and intangible assets of each tourist attraction and start to identify the most preferred destination and meeting points. The state is highlighting a couple of sites for the promotion of ecotourism, adventure tourism, and wellness tourism since the very beginning. On account of this a majority of trekkers are merely aware only with Bhuyandiyar Valley of Flowers whereas the state enjoys the presence of more than 27 valleys of flowers which are full of flowers and herbs and unfortunately least number of tourist are noticed in such sites. Similar is the condition of natural lake, trek route, hot spring, spiritual centre, temple, ashram, spa, glacier, cave,



tribal village and hill station. Had the state applied remote sensing and GIS methodology in the projection and interpretation of such unexpected tourists attractions there would have been different picture of the industry in this mountainous state and local people would have been created a large number of individuals getting their tour booked both from frontier and developed tourism markets.

Tourism in Kumaon Himalayas

Himalaya, since times immemorial has been the source of inspiration for sages, nature lovers, explorers and mountaineers. The majestic grandeur of these ranges has always attracted people and therefore, from the tourist point of view, this region presents an endless scope for development. Some of the basic components which enhance the potential of Himalaya for tourism include natural beauty of landscape, pleasant climate, flora and fauna, rivers and lakes and a peaceful and pollution free environment. Kumaon Himalaya, the eastern segment of Western Himalaya also proves to be one of the most attractive areas for tourism, mainly

because of two factors. Firstly, due to the great climatic contrast between this hilly region and the adjacent North Indian Plains and, secondly, because of the wide variety of picturesque settings and spots found all over the region. In Kumaon although the growth of tourism is comparatively a recent development, but the foundations may be traced back to the British period, when places like Nainital, Ranikhet were developed as summer resorts. (Singh and Dhondiyal, 1988) Nainital was discovered in 1941 by a British P. Barron, who happened to spot this glistening lake surrounded by lush green hills and virgin natural beauty during one of his hunting expeditions. (Atkinson 1973). Taken in by the beauty of the nature Barron announced his discovery to the world and opened the gate for the inflow of Britishers. Very soon the place became an exclusively British lake resort and later the summer capital of Northwestern Provinces was also shifted to Nainital that assigned this newly developed town a great importance. Nainital lies at 29°24' North latitudes and 79° 28' East longitudes in the Lesser Himalayan zone of Kumaon (Fig.1)



Figure 1: Nainital Town- Location Map



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The town has grown around a fresh water lake, which is one of the biggest in this region. The settlement of the town extends across the slopes over an area of 14.32 sq.km. Due to its location in outer hills, it is easily accessible from the plains and has a good transport connection from many big towns of North Indian Plains including the capital of the country. It can be reached within just 12 hours of journey from places situated in U.P., Delhi, Haryana, North Rajasthan and Punjab. It lies at a distance of 34 km. from the nearest railway terminus, Kathgodam and thus can be reached hardly in an hour.

Tourism in Nainital: Tourism which is a well developed trade in the West has recently also gained ground in India and other developing countries in the East. (Burkert and Medlik, 1988) Mountains have always proved a favorite environment for such and exercise because these combine in one, a number of factors for want of which a tourist usually moves out. More so, in area of sub-tropical and tropical climate, mountains, prove to be the most suitable and attractive areas to escape the summer heat, Kumaon, being potential for the growth and development of tourism. In Nainital also, during recent year, there has been a

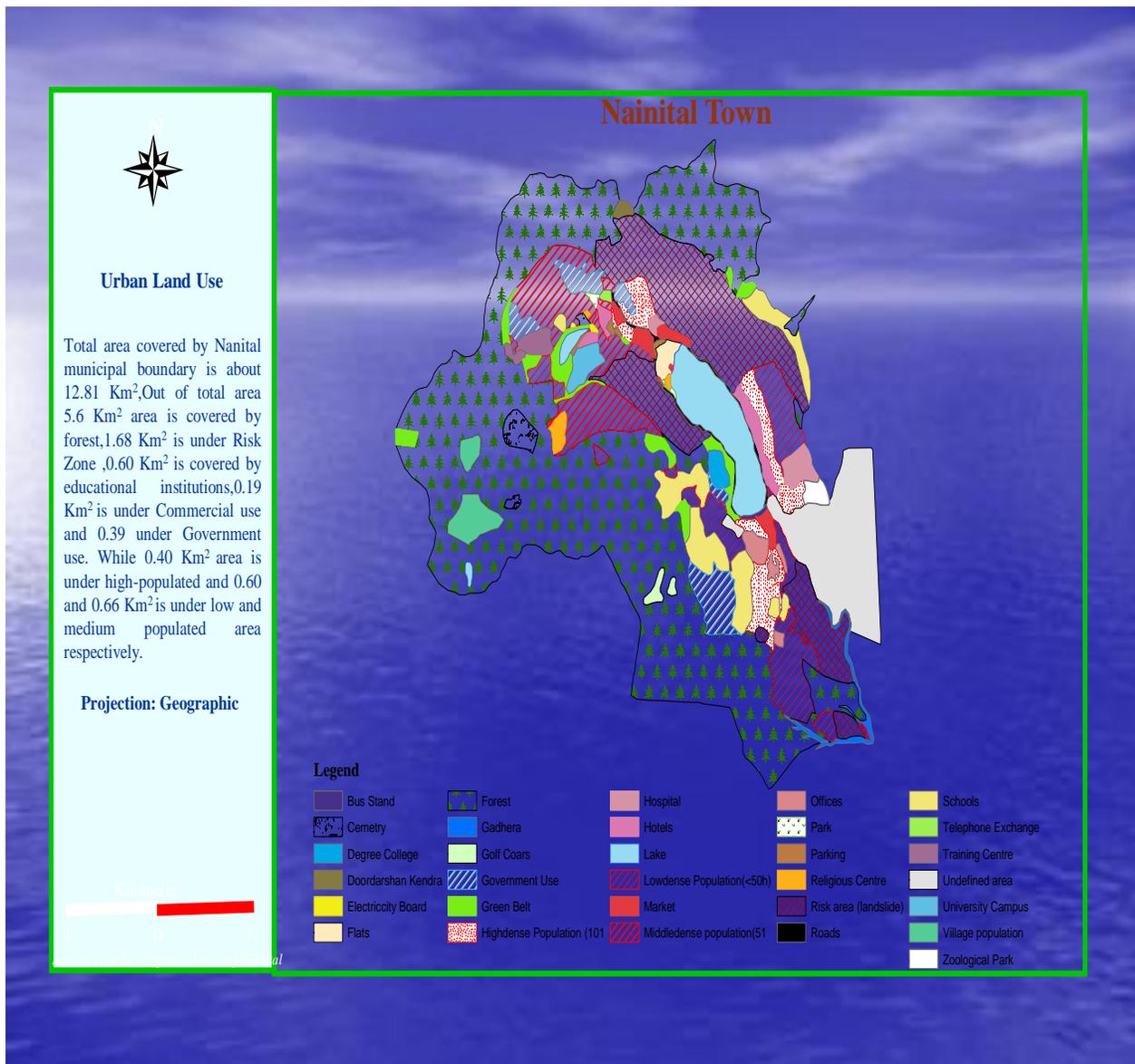


Fig 2: Nainital Town- Urban Land Use



rapid expansion of tourist industry which has given impetus to the economy of the place often in the form of employment generation, creation of various kinds of infrastructural facilities and provision of services to the tourist.

The Historical Perspective: Nainital is assuredly the most attractive and well maintained of all the lake towns or holiday resorts of Kumaon. Nainital, due to its being the summer capital of the North-Western Provinces during British period developed as a tourist town long before Independence. In 1847 only twenty six casual visitors came to the place between March and August, and sixty one spent the next summer season in Nainital (Smarika, 1982). Likewise, during the first half of the 19th century, only a limited number of tourists visited every year. But after 1860 this town was declared as Summer Capital of U.P, the North-western Provinces of Agra-Avadh (Clay, 1927). This necessitated a systematic development of township and provision of various amenities and services like roads, parks, offices, schools, shops, hotels etc. The construction of the 34 Km. motorable road between Kathgodam and Nainital in 1951 provided further impetus to the development of the town. There were only three big hotels in Nainital in 1872 viz. Standard Hotel, Royal Hotel, and the biggest Victoria Hotel (Nainital Guide map, 1872). The number of Hotels increased to nine in 1938 (Nainital Guide map, 1938). The Amateur Dramatic Club came into existence in 1889 for cultural activities of tourists. Besides these, recreational centres and other facilities developed during the same period including the Boat House Club, the Rink Skating Hall, Golf Course, Swiss Hotel and Grand Hotel etc (Clay, 1927).

The post-independence period has been associated with many fundamental and interesting changes in tourist trends in the town. While many of the changes are associated with corresponding changes in the national tourist scene, some of the changes were the result of technological advancement, political decisions and the government planning.

Expansion in Post-Independence Era: The first decade following Independence witnesses a slow but steady increase in the number of tourists. As, much emphasis was laid on developing tourism as a commercial sector, the infrastructural facilities

were provide by both, State and Central Governments (Bhatia, 1983). This helped the town to develop as a popular tourist place of North India. The data available from Municipal records itself speaks that about 1,06,000 tourists visited Nainital in the year 1958. In 1960 the U.P. Government established 'Regional Tourist Bureau' at Nainital and Almora with a view to promote tourism in the hill areas (Adhikari, 1990). Indo-Pak wars of 1965 and 1971 also provided a boost to tourism in Nainital since a larger number of tourists avoided visiting Kashmir and other border districts because of the disturbances. The steady inflow of tourists between 1964 and 74 is clear from the table below:

Table 1: Tourist Inflow in Early 60's and 70's

Year	No. of Tourists	% increase
1964	2,75,000	-
1966	3,35,000	21.81
1968	3,47,673	3.78
1970	3,62,580	4.28
1972	4,13,120	13.96
1974	4,78,365	15.79

Source: Municipal Board Record, Nainital

In order to provide better amenities and guidance to tourists and for the extension of tourist activities and to look after some of the affairs more closely, the Tourism Directorate was established in 1972. A separate Hill Development Board and Kumaon Mandal Vikas Nigam came into being in 1975 and 1976 respectively for micro level development, especially, of tourism. This provided a further impetus to tourism development in the areas since a fairly large number of government officials and personnel were posted and suitable schemes were worked out for promotion of tourist activities (Sah *et al.*, 1990)

The Present Day Scene: After the formation of Uttarakhand as a new state, the state has witnessed a sharp increase in tourist inflow across the year. The state government has taken a lot of serious initiatives to promote tourism of almost all kinds in the state. In the state planning commission it has been proposed that the state should be promoted as an important tourist destination owing to various development and tourism promotion activities, the



pressure of tourism related activities in Nainital is increasing day by day. Not only the Government but also non-government and various private organizations have played an important role in augmenting the tourist inflow in the town. The railway and road connections and the traveling facilities catered by the travel agencies have also provided great impetus to the tourist activities. The statistics, of past and present reveal the fact that there is a continuous increase in the tourist inflow. The decade of 80's and first half of 90's recorded a massive increase not only in the number of tourists but also in the respective number of hotels and travel agencies. While there were only 30 Hotels and less than 10 Travel Agencies in late 70's, their number increased to 112 and 20 (Registered and non-registered which worked on seasonal basis) respectively in 90's. As per the official records of

Table 2: Tourist Arrival in Nainital In 80's, 90's and 2000 onwards

Year	No. of Tourist	% increase
1980	479770	-
1982	485302	1.15
1984	584999	20.54
1986	491671	15.95
1988	559772	13.85
1990	577276	3.12
1992	589917	2.18
1994	610618	5.65
1998	737012	6.16
2000	812098	5.18
2002	919237	5.21
2004	1023760	10.2
2006	1112380	7.9
2008	1289875	13.7
2010	1421380	9.26
2012	1532600	7.2
2014	1542349	0.63
2016	1638654	5.8

Source: Municipal Board Record, Nainital; Tourist Information Bureau, Nainital, and Personal Survey.

Municipal office of Nainital, there are more than 245 hotels and about 85 registered and unregistered travel agencies, big and small working on yearlong and seasonal basis. The total number of tourists who visited the town during the time span of 1980 to 1996 was approximately 40 lakhs. The exceptional rise in the number of tourists may be attributed to disturbed law and order conditions in Jammu and Kashmir and parts of Himachal Pradesh that diverted a large proportion of tourists of these areas. The analysis of data for tourist inflow in the year 1980 to 1996 shows (Table-2) an abrupt increase in 1984 and the trend continues till 1988, when 13.85 percent increase was recorded. The instable law and order conditions in Jammu and Kashmir and parts of Himachal Pradesh diverted a large number of people to Nainital in this period. But the overall increase on comparing the 16 year data is clearly related to its increasing popularity and recognition as a tourist resort in the Himalaya.

The seasonal variation in tourist inflow reveals some interesting trends. While the months, May, June in summer, and September, October during the Autumn continue to attract the tourists, all other months witness a moderately high but regular inflow of tourists in the town. Although the tourist inflow has been quite regular throughout the year as there is no such concept of tourist season prevailing. Post 2010 there has been a continuous increase in tourist inflow as there is a new rise of neo-rich section of society with high ambitions and inflated lifestyle and vacations and traveling form a part of it. Although the period of 2013-14 saw a fall in numbers because of natural disasters in the higher Himalayan regions during peak of the season.

Impact of Tourism on the Town:

The impact of tourism on the environment is in many ways and it is more seen on the fragile natural environment in the hilly areas (Singh, 1989). The hilly terrain in the Kumaon region is more prone to the natural imbalances and an ever increasing tourist pressure is continuously adding more to the problem. It is very often suggested, not to hold such activities on a very large scale which are affecting the landscape as well as the environment in a significant way (Sinha and Pal, 1989). The natural and socio-economic



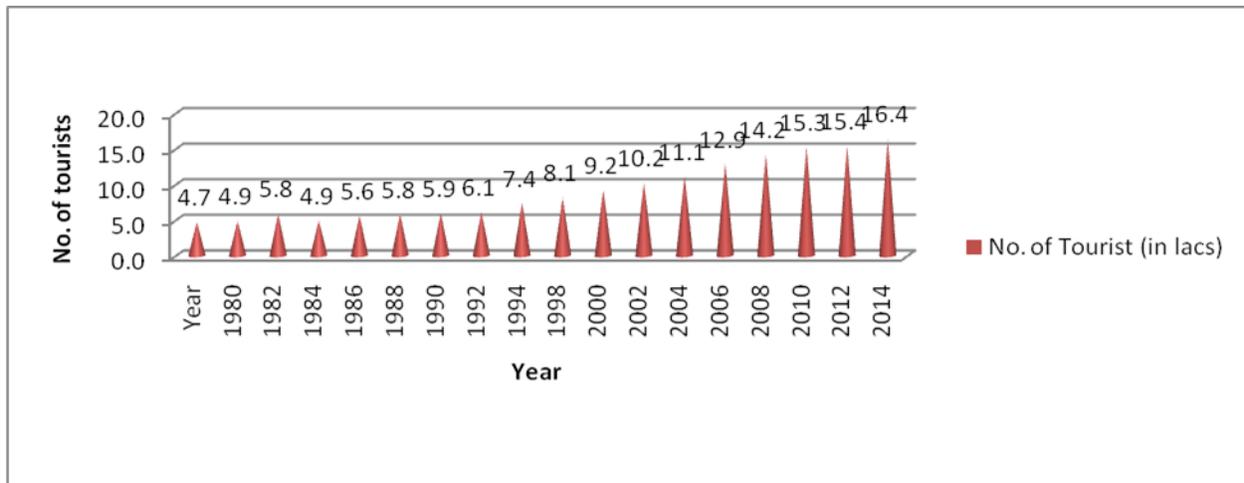


Figure 3: Tourist Inflow in Nainital Town

environment of Nainital town and its surroundings are continuously being affected and considerably on the negative sides of it. The tourist inflow, on one hand brings changes to the physiography and landscape of the town owing to various construction activities at various levels, and on the other hand it imposes an extra burden on the socio-economic life of the town. Although it provides a sound money inflow and also generates employment and means of livelihood in the town, many after-effects, of course negative, can be seen, and in many ways. These negative ramifications are manifested as:

- Adverse effect on the fragile landscape by different construction activities:** Several Hotels, Rest Houses, residential complexes, shops and recreation centres etc. are being developed inside the town and in the surrounding areas to accommodate the pouring-in public. These constructions adversely affect the landscape because deep diggings, leveling of land etc. are harmful to the surface stability of the hills. To provide better movement and transportation, inter and intra-town, roads and linkages are developed. This very often, has led to land slips, especially along the roadsides.
- Enormous pressure of vehicular traffic on a considerably smaller road length leading to road and side slumps:** The problem is frequently witnessed, mostly during the tourist seasons. Moreover the carbon mono-oxide, carbon di-oxide, smoke and noise emerging out of the vehicles
- Excess pressure on civic amenities and municipal services:** Owing to the smaller area, these services are much less and are far short to meet the local demands. The situation worsens when public pressure increases.
- Rapid increase in pollution level of Naini Lake:** While used as a recreational site, the Lake also accumulates a large number of used wrappers, pieces of paper, polythene packets, bottles etc. The other disposages at a raised level also contribute to the pollution problem.
- Endangered status of public health pertaining to the ill practices of tourists:** Number of public lavatories and toilets, municipals water taps etc. are much, less in number to meet the raised demands of people. Moreover sanitation situation, disposal of waste, water, garbage and other refuses deteriorates at an alarming rate.
- Overall rise in price levels increasing the overall cost of living in the town:** Inflow of moneybags from different business pockets of country and abroad is capable to buying the things at higher costs and this results in general tendency of price hike. This is a negative effect of tourism affecting the local population.
- Increase in hawkers and pavement business:** Most of these hawkers and petty businessmen, either from local town or from neighbouring areas, add to the congestion in the busy market

areas like Flats and the Mall-Road. The garbage, waste or the refuses emerging from these shops pollute the areas as well. Moreover faulty business practices, tax-evasion and frequent disputes are other problems created by them. The frequency of these happenings increases in the tourist seasons.

8. The mob from the fashion centres of the country contributes much in changing the thoughts and life styles of simple and kind hearted local people. Their erotic dress-ups and their general code of conduct in the town and at various picnic spots affect the minds and hearts of local young masses. Irritating scenes of eve-teasing, unpleasant loud noises etc. adds negatively to the raw sentiments of the public, especially of the younger ones. The club-culture, alcoholism, uncivic-nudity etc. have contributed to the overall socio-spheric environmental pollutions.

Planning for Tourism development using GIS and remote Sensing Technology:

Tourism land use planning requires more spatial data collection and processing of all major tourist locations and their interrelations should be defined and analyzed for quality tourism promotion. For this purpose remote sensing and GIS can describe and identify background tourism elements geometrically, thematically and topologically. GIS can deal with both object data related to tourist places as well as field data related to the altitude and location of tourist attractions. Infusion of technology with the help of both government and private sectors to serve the tourism and associated development in following manner:

1. Identification of tourism potential

Tourism has emerged as a much diversified sector as there are various types of tourism practiced in different parts of world and in Uttarakhand due to natural set-up, age old tradition and culture. New tourist potential sites should be identified across the state with respect to religious tourism, eco-tourism including wildlife tourism, sports tourism including water sports, adventure tourism, medical tourism including Ayurvedic treatment, educational tourism and neighborhood tourism for recreation of local population.

2. Development of tourist clusters

Development of tourist clusters in and around popular tourism destination with prime focus on decongestion and alternate recreation.

It is a well known fact that existing popular touristic locations are overcrowded during peak touristic seasons, and sometimes this is unavoidable. Therefore, to minimize the pressure on the main sites, attempt should be made to develop nearby locations with equal or even better natural beauty. One such example is the development of small town of Chail near Simla in Himachal Pradesh. However, these are not utilized due to lack of identification of such sites and development at these sites.

3. Development of touristic infrastructure

One of the key requirements of touristic infrastructure development is development of alternate roads and hotel infrastructure. It has been observed that Uttarakhand is investing heavily on some specific roads/routes where as some attention should be given on development of alternate roads that could provide safe passage during disaster and blockade. Development of alternate roads with key infrastructure should be one of the topmost priorities for the state.

4. Tourist infrastructure and asset mapping

Tourist infrastructure and asset mapping (heritage sites, camping sites, parking capacity, hotel capacity etc.) using high resolution satellite images will aid in popularizing tourist sites and planning for development of the same. Some of the assets and physical facility are added every year, hence, there should be attempt to map these features accurately and update with all attribute information for tourists. Attempts should be made for online and mobile access for easy dissemination.

5. Protection of heritage sites

Heritage sites need to be protected from natural and man-made disasters; hence, attempt should be made on 3-D imaging using high resolution terrestrial laser scanning such that in the event of destruction and relocation, the same structure can be reconstructed with high accuracy. 3-D database, visualization will also have many collateral advantages in tourism promotion.



6. Short –term weather forecast to aid tourism

This is very critical for managing touristic inflow during extreme climatic events. Short-term weather forecast based on space – meteorology to forewarn about the high intensity rainfall, cloud burst, snow fall, cold and heat wave would discourage people in a proactive manner and will aid administration to take appropriate measures to control the flow of tourists.

Collection of real time weather data and dissemination of the same is undertaken by private hotel owners in Scandinavian countries that aid in popularizing their hotel destination with help of now casting of weather information. The same can be undertaken by government as well as private agencies.

7. Natural hazard zonation and early warning

It is very critical to know the areas in advance that are prone to natural disasters so that precautions can be taken well in advance. Hazard zonation maps for landslide, earthquake, flash flood, glacier lake outburst flood (GLOF), and avalanche could be prepared using high resolution satellite images and modeling techniques in GIS so that micro planning and remedial measures can be prepared in advance to minimize its impact well in advance. Early warning system with respect to landslides, flash floods, etc. could be developed such that tourist can be warned in advance. Mainstreaming risk reduction in tourism development planning is a key area for intervention as per the Prime Minister's 10 –point agenda on DRR. This should be given due attention while developing tourism infrastructure.

8. Tourist Management System (TMS)

Tourist management system including traffic flow, hotel room availability, parking lot availability, camping sites, emergency health care centre and on –line information on number of people at specific sites vis-à-vis carrying capacities would forewarn people and avoid congestion during peak season.

9. Mela Management System (MMS)

Kumbh and Ardhkumbh mela require very highly dedicated online management system in and around entire Haridwar and Rishikesh region with real time information on crowd at strategic locations, facilities, transportation and power management,

which could be implemented in a GIS enabled real time information system.

10. Preparation of touristic brochures and maps

In view of the development of new touristic sites, there will be greater demand on preparation of accurate and authentic touristic information in terms of maps showing details of main route, alternate route, en-route facilities including availability of hotels and emergency health centres, camping sites etc. These can be prepared very efficiently by using satellite images and 3-D graphics based on simulated terrain models and thematic information.

Conclusions

The increasing pressure of tourists in the town has led to some very serious impacts- mainly through progressively rising construction activities on the slopes and increasing demands for other infrastructural facilities which has destabilized the slopes and the landscape is getting robbed off its natural beauty day by day. The increased pressure on the limited civic facilities create enormous problems during tourist seasons like water scarcity, choked sewer lines and drains, and overall in sanitary conditions leading to pollution of lake water. So that the town may develop in a natural way, it is necessary to resort to a planned model of development- including the development of satellite towns or centres like Mukteshwar, Bihimtal, Bhowali, Sat Tal and Naukutchial to divert the excess tourist traffic from Nainital. Regulatory measures are necessary within the town itself to create a healthy environment and better services to the tourists which, to a large extent, are lacking at the moment. It is true that the town at present is experiencing a pressure beyond its carrying capacity and therefore, it is much more necessary to plan the future development mainly to cope with the increased tourist traffic so that the situation may not give way to an ecological disaster.

References

- Adhikari, P.S., 1990: Himalayan Tourism Industry; Geographical and Cultural Aspects, New Delhi, :40 .
- Atkinson, E.T., 1973: The Himalayan Gazetteer, Vol. III, Part II, Cosmo Publication, New Delhi, :623 .



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- Bagri, S.C. and Tiwari Sunil., 2017: *Application of Remote Sensing & Geographic Information System in Tourism Planning*, USAC Publication, India, :12-13.
- Bhatia, A.K., 1983 : *Tourism Development : Principles and Practices*, Sterling Publications, New Delhi, :298 .
- Burkart, A.J. and Medlik, S., 1988 : *Tourism- Past, Present and Future*, E.L.B.S. Hainemann Professional, London, :24 .
- Champaty Ray, P.K and Bisht M P ., 2017, Space and Allied geospatial technology for tourism development... USAC Publication, India, :19-22.
- Clay, J.M., 1927 : *Nainital A Historical and Descriptive Account*, Superintendent Government Press, United Provinces, Allahabd, :1-78 .
- Location Map and Land use illustration, courtesy, Prof P.C.Tiwari, Professor, Department of Geography, Kumaon University, Nainital
- Nainital Guide Map, 1872: Survey of India, Calcutta.
- Nainital Guide Map, 1938 : Survey of India, Dehradun.
- Sah, N.K., Bhatt, S.D. and Pande, R.K., 1990 : *Himalayan Environment Resources and Development*, :419 – 420.
- Singh, A.P. and Dhondiyal, G.P., 1988 : *Tourism in Kumaon : Prospects and Problems*; Kumaon Land and People, Ed., K.S. Valdiya, Gyanoday Prakashan, Nainital, :325-340.
- Sinha, A.K. and pal, D., 1989 : *Ecological Problems in the High Altitude Lake of Nainital Area : Problems and Suggestions*; Studies in Himalayan Ecology, Ed., T.V. Singh and Jagdish Kaur, printhouse India, Lucknow, :52 .
- Smarika, 1982 : Kumaon Mandal Vikas Nigam, :3 .

