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# Environmental Impacts of Tourism- A Case Study of Jammu and Kashmir

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**Abstract:** *Tourism industry is one of the largest and fastest growing sectors in the world economy. Tourism now has become most popular global leisure activity. Jammu and Kashmir also known as "Paradise on Earth" possess its rich cultural heritage, world famous pilgrimage destinations, rich flora and fauna, wild animal's sanctuaries, snow clad mountains, and scenic sports etc. which attract tourists from all over the world. The growth of tourism in J&K has been improved astonishingly. The development of tourism industry may promote economic growth both directly and indirectly, first by stimulating the growth of other sectors and secondly by increasing domestic incomes and effective demand. On the one hand tourism industry has a tremendous capacity to generate employment opportunities, earning foreign exchange and develop the overall region but on the other it costs a huge in the form of environmental destructions. This paper is an attempt to study the impacts of tourism on the environment of J&K. It has been observed that the increasing pressure of tourism has caused the problems of over constructions of hotels, deforestation, air pollution, solid waste, water pollution etc. Indiscriminate throwing of municipal solid waste into rivers is common practice in these tourist destinations, as result river water is continuously getting polluted. The present study mainly focused on the prosperity that tourism has brought to the region and the unplanned tourism development which brought negative feedback to the environment. The study also gives some major recommendations for future development of tourism and some suggestions to overcome the problems in the way to achieve this goal. This paper also offers some valuable recommendations to reduce the negative environmental impact due to the development of tourism and also opens some new and interesting avenues for future research. Furthermore, the study will help researchers to enhance knowledge, will help planners in the process of planning and also be useful to incorporate the findings required in future by scholars.*

**Keywords:** *Tourism, development, adverse impacts, Environment, Economy, pollution,*

## I. INTRODUCTION

Tourism industry is one of the largest and fastest growing sectors in the world economy. Globally tourism is considered to be an important tool for the socio-economic development of the economy. It is clear from the tourism statistics that international tourist arrival has increased from 25 million globally in 1950 to 278 million in 1980, 674 million in 2000, and 1,235 million in 2016. Likewise, international tourism receipts earned by destinations worldwide have surged from US\$ 2 billion in 1950 to US\$ 104 billion in 1980, US\$ 495 billion in 2000, and US\$ 1,220 billion in 2016 (as per the UNWTO Report 2016). Tourism is a fastest growing market and is showing tremendous growth in the current scenario of the India economy. "The year 2016 witnessed a growth of 10.7% in Foreign Tourist Arrivals (FTAs) in India. FTAs during 2016 were 88.9 lakh (provisional) as compared to the FTAs of 80.3 lakh during 2015. The Foreign Exchange Earnings (FEEs) from tourism in rupee terms during 2016 were Rs.1,55,650 crore (provisional) with a growth of 15.1%"(MoT Govt. of India Annual report 2016-17). Jammu and Kashmir also known as "Paradise on Earth" blessed with its rich flora and fauna, wild animal's sanctuaries, snow clad mountains, rich cultural heritage and world famous pilgrimage destinations etc., is one of the most popular and fastest growing tourist destinations in India. The growth of tourism in Jammu and Kashmir has been improved astonishingly and stimulated the growth of whole service industry viz., transport, retail outlets, hospitality and other small-scale sector.

Tourism, which accounted for 7% of state's GDP in 2014 according to Government figures, has great potential to stimulate the local economy by providing significant economic multiplier effects and for generating employment both direct and indirect even for the people lacking specialized skills e.g., tourist Guides, Travel Agents, Ponywallas, Jobs in Hotels and Houseboats etc. So Tourist

inflow is a major source of development, but (there is another side) also the major cause of environmental destructions. If the level of visitor use exceeds the ability of environment to cope with, it causes a serious threat to the environment. In this sense “tourism is a goose that not only lays a golden egg, but also fouls its own nest” (Hawkins, 1982, p. 3). So tourism not only contributes to environmental degradation, but at the same time affected by it as well. “The tourism industry highly relies on its natural resources and has significant environmental, cultural, social and economic impacts, mostly in an adverse manner” (Mow forth & Munt, 2003). Therefore, tourism is a double-edged activity as on the side contributes positively to the socio-economic achievements, on the other side its fast, unmanaged and uncontrolled growth is proving to be the major cause of degradation of the environment. As this uncontrolled mass tourism puts enormous pressure on the area and leads to impacts such as increasing pollution (Air, Water, Land etc), soil erosion, discharge into the rivers and streams, loss of natural habitat, deforestation, pressure on endangered species, puts strain on water resources and also force the local population to compete for using critical resources.

## II. LITERATURE REVIEW

Batra & Kaur (1996) in their study highlighted the increasing conflicts between tourism and the environment and observed that increasing number of tourists arrival at a destination leads to overcrowding which further leads to supply of polluted water and causes damage to the surroundings. Vegetation of a place suffers from constant trampling and crushing by feet, Fumes emitted from the exhaust pipes of automobiles also cause wanton destruction to the fragile environment of the place.

Batta (2000) in his study has analyzed that owing to the needs of developing nations to generate incomes, such nations are inclined to tourism-related environmental destructions. The challenge therefore is to accomplish the harmony between rapidly growing demands of tourism and environmental conservation (p.77).

Motiram (2003) in his study emphasized that no doubt tourism development has demonstrated positive relationship with generation of employment earning foreign exchange, alleviation of poverty etc but the haphazard development of mass tourism has resulted in spoiling the fragile environment of mountain resorts, landscapes, parks, sanctuaries, archaeological sites and natural habitats etc in many parts of the destination area (p. 129).

Korstanje & George (2012) in their study highlighted that the tourism industry is one of the major contributors to global warming. The researchers revealed that tourism industry draws heavily on nature and on natural resources and so it does have a responsibility to ensure that these resources are preserved by means of sustainable consumption initiatives. Their study also focused on the need to adopt necessary effective measures in order to deter global warming.

O (2016) in his paper made an attempt to evaluate negative impacts of tourism on environment. The study concluded that the impact of tourism is double sided. On the one side it is a source of international understanding peace and friendship, on the other hand it is a cause of environmental destruction, a physical attack on people’s privacy, dignity and authenticity and a destroyer of local culture.

## III. OBJECTIVES OF THE STUDY

- A. To analyse recent trends in tourist arrival in Jammu and Kashmir.
- B. To analyse the environmental impacts of tourism.

## IV. RESEARCH METHODOLOGY

The research is descriptive and analytical in nature. The study has been conducted mainly on the basis of literature survey and secondary information. The secondary was collected from various organizations viz., United Nations World Tourism Organisation, World Travel and Tourism Council, Ministry of Tourism-GOI, Jammu and Kashmir Tourism Development Corporation and Directorate of Tourism (Jammu/Kashmir), books, journals, newspapers, economic survey of Jammu and Kashmir, and other online sources. Various theses, article and online resource have been referred and downloaded from ugc@inflabnet and open access journals and magazines.

### A. Findings and Discussion

- 1) *Tourists inflow to Jammu and Kashmir*: Jammu and Kashmir is considered as the powerful magnet for tourists, as it cater to the needs of every type of tourist. Further, it has world famous pilgrimage sites e.g. Shri Mata Vaishno Devi Ji and Amarnath Ji Shrine which attracts a large number of pilgrims every year.

The increase in tourist arrivals in J&K is considered as blessing, as this increases the revenue and employment opportunities etc for local population. The table-1 given below is depicting the year wise tourist arrivals (domestic as well as foreign) in J&K from the year 1988 to 2015.

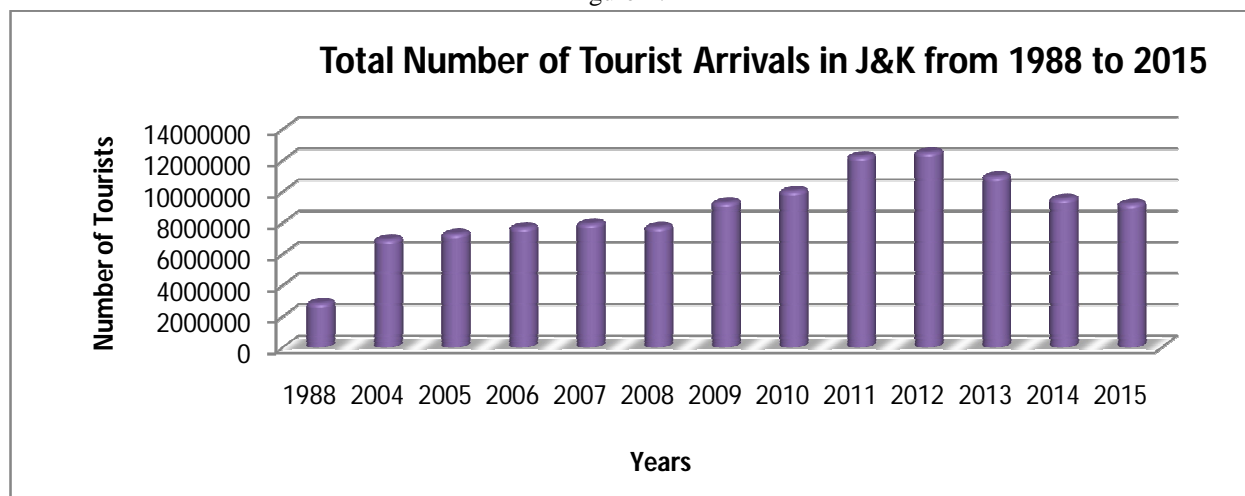
Table-1.1: Number of Tourist arrival in J&K from 1988 to 2015

Year	Number of Tourist arrival in J&K from 1988 to 2015					
	Kashmir Valley			Jammu	Ladakh	Total State
	Amarnathji	Domestic /Foreign	Total	Mata Vaishno Devi Ji	Domestic/ Foreign	
1988	96055	722035	818090	1992595	24864	2835549
2004	400000	377000	777000	6100000	35000	6912000
2005	388000	605382	993382	6251998	38446	7283826
2006	265000	432888	697888	6950573	43900	7692361
2007	213565	441840	655405	7222318	50579	7928302
2008	498075	572100	1070175	6576000	72000	7718175
2009	373419	601250	974669	8235064	78573	9288306
2010	458046	736448	1194494	8749000	76055	10019549
2011	634000	1314432	1948432	10115232	179204	12242868
2012	621000	1308765	1929765	10394000	178750	12502515
2013	353969	1171130	1525099	9287871	137650	10950620
2014	372909	1167618	1540527	7803193	181301	9525021
2015	352771	927815	1280586	7776604	146501	9203691

Source: Economic Survey 2009-10, 2015-16

Table-1.1 shows the trends of tourist arrival in J&K for the year 2008 to 2015. The results indicates that there is a significant increase in the number of tourist up to 2012, which reflects the increasing demand for tourism related activities. The classification of tourist arrivals reveals that during the last couple of years maximum tourists liked to visit J&K. It is clear from the Table-1 that there is a significant increase in the number of tourist arrivals throughout the year from 1988 to 2012. The number of tourist arrivals which was just 2835549 in 1988 increased to 6912000 in the year 2004 and further increased to 12502515 in 2012. Furthermore, the table-1.1 highlights that there is tremendous increase in tourist arrivals from the year 1988 to 2012. But as tourism is also highly sensitive to the issues of law and order, table-1 clearly depicts that after 2012 there is continuously decreasing trends in tourist arrivals and this decrease is because of the political disturbances in the state which is well known issue globally. Due to these political disturbances there is hue and cry and unrest in all over the state and the state is also suffering huge losses. As shown in the Economic Survey of 2016 report tabled by the Finance Minister in the Jammu and Kashmir Assembly, just for a small period of time starting from July 8 to November 30, 2016 the loss was estimated at more than Rs. 16000 crore. But it is evident from the past history of the state that this decrease in tourist arrivals is temporary in nature.

Figure-1.2



Source: Economic Survey 2009-10, 2015-16



With the help of figure-1.2 given above we can see that there is a consistent increase in tourist arrivals from the year 1988 to 2012. With the help of this graph we can easily understand that tourism industry is growing rapidly in the state. Being a diverse industry, tourism has a potential to boost and support other economic activities as well through the creation of income and demand for the goods and services of other related sectors. “It is estimated that almost 50-60% of total population of J&K is directly and/or indirectly engaged in tourism related activities. Tourism contributes about 15% to State Gross Domestic Product” (Mir, 2014). It can be seen from the Table-1.3 that tourism has contributed to an increase in the

Table-1.3: Revenue earned from tourism in Jammu and Kashmir

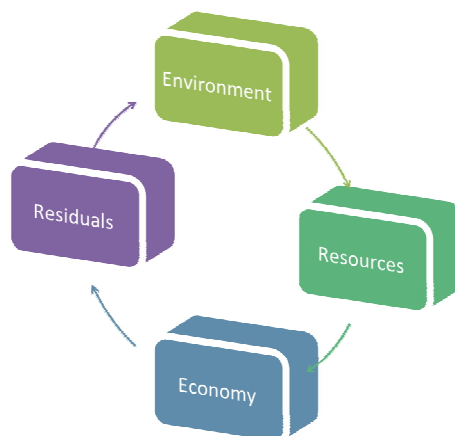
S. No	Name of the department / Organization	Revenue earned during year 2004 to 2008 (Rs. in lakhs)				
		2004-05	2005-06	2006-07	2007-08	2008-09
01	Director Tourism Kashmir/ Jammu (DGT)	11.46	14.83	35.25	62.06	54.00
02	SKICC	46.00	49.34	52.00	64.00	71.20
03	Gulmarg Dev. Authority.	19.70	21.86	32.46	48.50	51.17
04	Pahalgam Dev. Authority	5.12	9.16	9.95	19.00	12.73
05	Sonamarg Dev. Authority	0.00	13.78	36.35	32.50	45.00
06	Patnitop Dev. Authority	11.00	10.15	15.62	79.00	20.00
07	Royal Spring Golf Course	57.26	35.09	34.73	50.06	45.66
08	Cable Car Corporation	289.00	754.41	676.00	798.81	839.14
09	J&K TDC.	1642.41	1796.44	1765.39	1763.00	1963.00
	Total	2081.95	2705.06	2657.75	2916.93	3101.90

Source: Economic Survey 2009-10

earning opportunities of the residents of J&K who are involved directly or indirectly in tourism. When the tourists and those who work in this industry either workers or businessmen, come to the area they consume a significant amount of local produce and in response spend their money for these goods and services, which has enabled the local population to produce and operate agro-based and other industries e.g. handicraft, handloom etc

But for accommodating more and more tourism activities excessive use of the environment may cause decimation of the ecosystem. Padilla(2015) argued that “tourism development was intended towards the creation of jobs and increase the income, ultimately improving the life condition of the population. However, the perspective of overall development was at the high cost of natural resources and it clearly brought negative ecological and social consequences”(p. 291). So this ascending trend of tourist arrivals (Table-1.1) and construction of more tourism facilities are generating heavy pressure on the natural environment of the region because it is out of the carrying capacity of the area.

Figure-1.4: The Materials Balance Model



Source: Briassoulis, 1992, p. 14

As fig. depicting that the use of environmental resources by the economy must be in balance. “The model postulates mainly that the economic system interacts with the environment in two principal ways: first, the economy uses environmental resources as inputs to production and consumption of the economic goods and services and, second, it disposes residuals (usually, harm products) to environmental media. According to the first law of thermodynamics, all material and energy inputs to the economic system must equal the material and energy outputs of this system”(Briassoulis, 1992, p. 14). This is equally applicable in case of tourism industry as well.

### B. Environmental Impacts of Tourism

The natural environment, on which Tourism mainly depends, is an important economic asset. The relation between tourism and environment is very complex and both are interrelated and interdependent to each other. Tourism involves various activities which can have positive as well as negative effects on the environment of the concerned area. Tourism has a potential to benefit the environment by directly or indirectly contributing to the environmental conservation and protection. This can be achieved either by financing for the protection and increasing the economic importance of the natural area or by raising the awareness of environmental values among tourists and the local population. Government and local bodies collect money directly or indirectly from both, consumer as well as consumer of tourism related services in the form of User fees, taxes on sales or rentals of recreation equipments, license fees etc. And these funds can be used for further protection, conservation, maintenance and sustainable development these natural resources. But being a double edged sword the unchecked and unregulated rapid growth of tourism also leads to environmental decimation and degradation of local resources. As the number of tourists in J&K has increased manifold (Table) the mounting pressure on environment is leading to destruction of natural environment and fragile ecology of the state. “As long as the tourist traffic was within the carrying capacity of the mountains, no sign of adverse ecological effects were tangible. However, now with a sea-change in the situation, the mountain environment has been adversely affected by tourist activities and it is already showing signs of virtual collapse”(Sharma 1989, p. 20). Because of unmanaged tourism, mass tourists are been allowed to visit the eco-sensitive destinations of the state which is causing serious threats to the natural environment and ecology of the area. “Load on natural resources, pollution, waste generation and damage to ecosystem are the main environmental impacts of tourism” (O, 2016). Growing number of tourists and rapidly developing tourism and accommodation activities are posing potential threats to the natural areas and leading to impacts such as: generation of wastes, increased pollutions (Air, Water, Sound etc), deforestation, soil erosion, discharges into the lakes and rivers, loss of natural habitat, pressure on endangered species, tremendous increase in Consumption levels and misuse of local resources which are already scarce and much more and causing immense environmental and ecological destructions.

### C. Problems

1) *Environmental Degradation:* The main attractions of Jammu and Kashmir are its nature, culture and its world famous pilgrimage centers. Therefore, J&K is one of the leading tourist destinations in India and the number of tourist arrivals here is increasing over the period of time. Which has led to number of environmental problems and issues, For example, industries and ignorance have polluted various lakes, rivers and other water resources, encroachment and logging have destroyed forest. Shri Amaranth ji shrine and Gulmarag are the best examples of how uncontrolled and unmanaged development of tourism has decimated the natural resources and environment.

Such problems can also be seen at other tourist spots such as Dal Lake, Patnitop-Sanasar, Bhaderwah valley (which is one of the emerging tourist destinations), Katra (Base camp of Mata Vaishno Devi Ji Shrine) etc. Tourists often litter the places with leftover food and polythene without thinking about its adverse impact on the environment.

The Dal lake has lost its nature due to the uncontrolled tourist pressure and is now covered with weeds, animal carcasses, and sewage. Due to the growing demand of tourism industry unplanned construction of hotels, restaurants, lodges and Houseboats in the nearby area is also increasing rapidly. The sewage water of these hotels and houseboats flows into lakes and rivers, causing serious threats to their marine ecosystem.

### D. Solid Wastes And Littering

This is another acute problem found at all the tourist destinations of J&K where tourism related activities are very high. The unmanaged disposal has become a serious threat to the natural environment of rivers, streams, lakes, flora and fauna etc of the area. Thousands of ton waste is produced by the tourists and

Littering of garbage at Vaishno Devi Katra



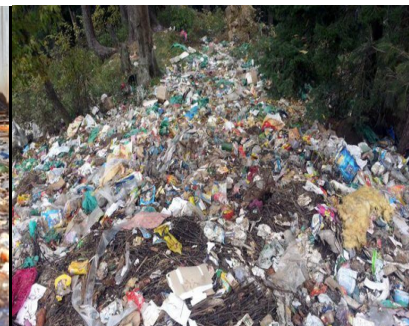
Source: Early Times (Newspaper), December 7, 2017

Garbage Floating in Dal Lake



Source: Kashmir News Observer, June 28, 2017

Littering of garbage at Gulmarg



Source: Kashmir Glory ([kashmirglory.com](http://kashmirglory.com)), July 29, 2017

other agents providing tourism related service e.g. hotels, restaurants, shops, etc at Vaishno Devi ji, Dal Lake, Amarnath Ji, Gulmarg and other small and major tourist spots. Pilgrims, trekking tourists and other visitors to these destinations and naturally preserved centuries and lakes produce huge amount of waste which is very harmful to for their natural health of these areas. Littering of garbage and other waste by the tourists is a very serious matter which is causing environmental decimation.

#### E. Sewage

Tourism development often leads to increased construction of hotels etc this causes a drastic increase in sewage which is the primary agent of degradation of water resources and natural flora and fauna. Urbanization is also an important issue that has threatened the natural environment of J&K. Furthermore, development of tourism industry attracts people for the availability of job and other business related opportunities resulting temporary and permanent settlement of huge population which is also a main reason for rapid urbanization of these areas. All such activities increase the pressure on the local resources and causing number of serious problems including sewage pollution.

This untreated sewage runoff pollutes rivers, streams, and lakes surrounding these tourist destinations and causes serious damage to their natural ecosystem and coral reefs because it contains lots of nutrients which stimulates the growth of algae, which covers the filter-feeding corals and hindering their survival.

#### F. Air Pollution

Air pollution is also a serious cause of concern as many studies have found a very strong link between air pollution and human health, as pollution give birth to many diseases such as asthma, chronic obstructive pulmonary disease, lungs cancer and other respiratory problems (dyspnea, cough, respiratory tract infections and irritations). According to the report by The Lancet Commission on pollution and health, there were 6.5 million premature pollution related deaths globally in 2015 and India has ranked No. 1 with 2.51 million deaths. So every year millions of people are dying prematurely because of pollution. A major source of air pollution in the context of tourism in J&K is associated with Transportation system. As the number of Tourist arrival is increasing rapidly, the air and road transport is also increasing significantly over the year. This increase in transportation has given rise in the release of carbon dioxide (CO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and emission of other greenhouse gases, as a result the area has faced the problems like acid rain which has directly affected the natural ecosystem, landscape, human health, vegetation of the area and agro-based industry as well. Agro-industry produce especially apple and saffron has affected adversely since past couple of decades. The Continuous Ambient Air Quality Monitoring Stations (CAAQMS) installed recently at different locations in Jammu and Srinagar cities by State Pollution Control Board (SPCB) has revealed that the pollution level in the city has reached a highly alarming level.

#### G. Pollution and Mismanagement of Water Resources

Water pollution is another serious problem caused by the tourism in J&K. The rapid tourism growth in J&K has put an immense pressure on water resources at the expense of the needs of the local community.

In case of Dal Lake the construction and establishment of large number of hotels, restaurants, lodges, Houseboats Houses, etc has not been accompanied wastewater management or water conservation strategies. As a result, sewage from hundreds of hotels and home on shore empty into the lake causing serious damage to its fauna and flora. Floating vegetable gardens, some of Kashmir's



biggest vegetable-producing areas and also a centre of attraction for large number of tourists, are also major polluters. At all the tourist destinations of the state, tourism demands for freshwater and other local resources which are already scarce are very high, especially during the peak season causing overuse of the freshwater and these resources which is greater than the average daily demand of a local resident. As a result, there have been increasing pressure on these resources and these resources are depleting at very fast rate.

#### H. Deforestation

Plants are the basis of life on this heavenly planet Earth and all living organisms, including human being cannot imagine surviving without them. Forests play a vital role in environmental maintenance and damage to the forest may degrade an entire ecosystem. Forests, on the one hand serve as source of oxygen, wood, food, abode of wildlife, at the same time absorbs pollutants including CO<sub>2</sub>. The rapid growth of tourism is one of the main reasons behind uncontrolled destructions of forests, because the growing demand of tourism has led to increasing need for building material viz. construction of hotels, restaurants, lodges, houseboats, houses and for other agricultural activities. Increase in tourist arrival has led to increase in the demand for local resources by manifolds and this rise in demand also pushes local communities to harvest more trees in order to increase agricultural areas. Another important reason of

Deforestation at North Kashmir    Deforestation due to construction of roads    Illegal deforestation at Bhandarwah (Doda)



Source: Early Times (Newspaper) June 10, 2017

Source; Greater Kashmir, December 19, 2015

deforestation is that the price of land near the tourist destinations has increased at a great rate as a result of increasing demand of these lands for various business purposes and other tourism related activities which leads to illegal encroachment, logging and cutting down of forest areas. According to the estimates of forest department in 2010, within past couple of decades approximately 14000 hectares of forest land has been encroached upon by the people in the state including 9496 hectares in Jammu region and 4877 hectares in Kashmir valley. As per the forest policy of India approximately 33% and 60% of the total area of plain and Himalayan regions respectively must be under forest but unfortunately there is only less than 22% of forest area in India and as for as J&K is concerned the state does not have more than 20% of forest area. But still the growing competition for the usage of forest resources is causing decimation of these precious natural resources at a very large scale. At the same time deforestation is giving birth to serious problems such as soil erosion, loss of biodiversity, climate change and also effecting negatively to overall water cycle and environment of the region.

#### I. Land Degradation

Rapid increase in construction of tourism and recreational facilities in J&K has increased pressure on the important land resources e.g. forests, wetland and wildlife, fertile soil, minerals resources, scenic landscapes etc. Development in terms of facilities such as accommodations, hotels and restaurants, and other recreational activities involve mining of sand, soil (for making bricks etc) and other crucial mineral resources and also leads to soil erosion and extensive paving. In addition, construction of roads, airport, railways, golf course, etc can lead to degradation of land, loss of wild life and wetland and deterioration of scenic beauty. Increase in the number of hotels, restaurants and other facilities often leads to increased sewage and other wastes which has polluted rivers,



lakes, and other water bodies and degraded land surrounding these tourist destinations. Another serious issue related to tourism development is the sprawling developments at these tourist destinations e.g. construction of tourism supporting infrastructure and facilities, due to the lack of land-use planning and building regulations which also give rise to acute land degradation problems.

#### *J. Land Transformation And Encroachments*

Another burning issue concerning tourism development is change of land use and illegal encroachments. This increasing demand for tourism services and pressure on the local resources has led to the transformation of land which has destroyed ecological habitats. This alteration has also tended to permanent environmental damages. These rapidly increasing encroachments have threatened to extinct migratory routes and breeding grounds. Furthermore, many orchards, farms and agricultural lands near these destinations has changed into hotels, restaurants, resorts, golf courses, and other tourism facilities. These evaluations of land usage transformation in J&K have decreased the forest and natural coverage. In short, the rapid tourism development has resulted an increase in the rate land transformation and encroachments for more development in tourism industry which are more intense.

#### *K. Local Resources*

Mass tourism results in increase in the population in J&K which has created pressure on the local resources e.g. land, food, water, energy, recreational amenities and other raw materials which are already scarce in supply. To fill this widened gap of demand and supply the extraction of these resources is increasing which has adverse impact on these resources and thus depleting the precious natural and environmental resource base of the area.

As tourism industry is growing rapidly, the availability of job and other life supporting activities attracts high number of population gathering in these tourist destinations which causes deterioration of air and water quality, undesirable land use changes and encroachment, generation of waste and other type of pollutions all of which contribute to the destruction of local resources.

#### *L. Degradation and Loss of Ecosystem*

Unrestricted development of tourism facilities such as accommodation, recreation etc involves mining of sand and other minerals, deforestation, extensive paving etc which may result to the destruction of ecosystem. In addition, construction of roads, railways and airports causes degradation of land and loss of wildlife habitats and deterioration of scenery. Furthermore, massive presence of visitors and their activities such as anchoring, horse riding and trampling etc can cause physical impacts which lead to extinction of multiple species of the fauna, soil erosion, loss of vegetation and organic matters, decrease in air and water permeability etc. As a result, alteration of ecosystems by tourist's leisure activities can lead to the degradation of natural habitat and give rise to other serious problems related to the environment of the area.

#### *M. Change in Climate*

Environment and Climate condition are the most important factors for tourism. Climate change now-a-days is one of the most burning issue which tourism is facing globally because tourism is a climate sensitive sector. The United Nations Framework Convention on Climate Change (UNFCCC) defined it as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (1992, Article 1). Although, the impact of tourism on global climate change is considerable but still tourism development involve activities such as movement of people, creation of facilities e.g. accommodation, recreation etc, which are closely associated to climate change. Only the movement of people from their home to other destinations accounts about 50% of traffic (air, railways and road) which is the main contributor of global emission of carbon dioxide (CO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and other greenhouse gases. Thus, tourism is a significant contributor to the increasing concentration of greenhouse gases in the atmosphere. "Impacts of climate change include increases in global air and ocean temperatures, decreasing snow and ice cover, global sea-level rise, coral bleaching, water shortages and/or supply restrictions, changing rainfall patterns, greater dry season severity and higher summer temperatures, as well as increased frequency and severity of storms, cyclones, floods, fires, and droughts. Up to a third of the world's flora and fauna species could be lost due to climate change. Future changes in temperatures and other important features of climate will manifest themselves differently across the regions of the world" (Ruhanen, 2015).

Unplanned and unprecedented growth of tourism in J&K has caused negative impacts on local environment. Mass tourism beyond carrying capacity of the area has put great pressure on existing resources and infrastructure such as increased pollution load, weather related risks, drinking water, accommodation facilities, forest and land resources etc. According to IMD (Indian Meteorological Department, ministry of earth sciences, Govt. of India), there is increase in an average temperature in J&K. Kashmir valley has

shown rise of 1.45°C and Jammu region has shown a rise of 2.32°C over last two decades. Maximum temperature has increased by 0.5°C per year in Kashmir valley and 0.08°C in Jammu region. As a result the snow fall has reduced over the year. Furthermore, unrestricted construction and maintenance of tourism and recreational facilities involve clearance of vegetation and forests, extensive use of refrigerators, air conditioners etc which are responsible for the emission of ozone depleting substances (ODSs) such as CFCs (chlorofluorocarbon) further causing the depletion of protective ozone layer as a whole. Recent estimates shows that transport sector including airways, railways and roads generates the largest proportion, with 75% of all emissions and the accommodation sector accounts for approximately 20% of emission from tourism. (UNWTO et al., 2008)

#### *N. Some Major Consequences of Climate Change in j&k:*

Jammu and Kashmir is facing significant impacts of severe climate change. Climate change seriously affecting human health, livelihood, natural ecosystem, flora fauna and scenic beauty of the study area. These impacts of climate change range from increase in extreme weather events, severe draughts and flooding to high temperatures causing public health problems, agricultural shifts, resource degradation etc.

As stated in United Nations Sustainable Development Goals;

- 1) From 1880 to 2012, average global temperature increased by 0.85°C. To put into perspective, for each 1 degree of temperature increases, grain yields decline by about 5%. Maize, wheat and other major crops have experienced the global leve of 40 megatonnes per year between 1981 and 2002 due to a warmer climate.
- 2) Oceans have warmed, the amount of snow and ice have diminished and sea level has risen. From 1901 to 2010, the global average sea level rose by 19cm as oceans expanded due to warming and ice melted. The Arctic's sea ice extent has shrunk in every successive decade since 1979, with 1.07 million km<sup>2</sup> of ice loss every decade.
- 3) Given current concentrations and on-going emissions of greenhouse gases, it is likely that by the end of this century, the increase in global temperature will exceed 1.5°C compared to 1850 to 1900 for all but scenario. The world's oceans will warm and ice melt will continue. Average sea level rise is predicted as 24-30cm persist for many centuries even if emissions are stopped.
- 4) Global emissions of carbon dioxide (CO<sub>2</sub>) have increased by almost 50 per cent since 1990.
- 5) Emission grew more quickly between 2000 and 2010 than in each of the three previous decades.
- 6) It is still possible, using a wide array of technological measures and changes in behavior, to limit the increase in global mea temperature to two degrees Celsius above pre-industrial levels.
- 7) Major institutional and technological change will give a better than even chance that global warming will not exceed this threshold.

#### *O. Snowfall Imbalance And Glaciers*

The impact of climate change in J&K is very much clear, as there has been rise in temperature, sudden rains and almost no snow in winters. As per International Panel on Climate Change (IPCC), glacial meltdown is projected to increase flooding, snow avalanche fall from established slopes, diminish water supplies to rivers as glaciers recede.

In recent estimates by United Nations Environment Program (UNEP) and International Centre for Integrated Mountain Development (ICIMOD), the temperature in Himalayan region has risen by 1°C since 1970, as a result the snow fall has reduced over the year and this has also caused meltdown of snow and glaciers at rate of 15m per year even in winter. The studies conducted by the National Institute of Hydrology, Roorkee for last three decades reveals that in Ladakh, Zanskar and Greater Himalayan ranges o f J&K the glacier volume has changed ranging between 3.6% and 97% with the majority of glaciers showing a degradation of 17% -25% .

The 23km long Drang-Drung glacier in the Zanskar valley is highly affected by these climate changes. The Nubra valley of J&K has 114 small- sized glaciers varying between less than 5km and 10km in length. The variable decline in the glacial area of the Siachin glacier has been observed with the area reducing from 994.99 km<sup>2</sup> in 1969 to 932.90 km<sup>2</sup> in 1989. However, small change in the area (932.90 km<sup>2</sup> to 930 km<sup>2</sup>) has been noticed during the following decades (1989-2001). The increase in temperature and reduce in snowfall results in melting and shrinking of overall glacier mass.

Pilgrims camp Amarnathji Yatra

Pilgrims camp Amarnathji Yatra  
on the way to Amarnathji

Shrinking Glacier at Ladakh (J&K) Pilgrims



Source: Greater Kashmir Nov 16 2017

Source: Times Of India Aug 3, 2012  
[www.kashmirilife.net](http://www.kashmirilife.net)

Source: <http://www.researchgate.net> Source:

The dwindling glaciers apart from being responsible for increasing water deficit in the plains are imprinting a negative influence on the tourist industry as well, as a number of tourists being attracted to the state aspire for adventure and other types of nature based tourism.

*P. Floods and Draughts*

Due to drastic climate change in J&K severe draughts, sparse rainfall, and a heavy downpour is a common phenomena, and during past few years the high rate of cloudbursts occurred leading to flash flood and mud slides etc. From past some decades J&K has experienced the worst floods and devastations due to unprecedented and intense rainfalls. A CSE (centre for science and environment) analysis showed that the floods were a manifestation of an extreme weather event linked to climate change. The study of data between 1950 and 2000 showed that the incidence of heavy and very heavy rainfall had increased and moderate rainfall decreased. September 2014 flood of J&K is the best suited example for this issue. It was claimed that over three hundred people lost their lives and destroyed everything that came its way such as residential houses, schools, colleges, hospitals, paddy fields, orchards, government establishments and businesses etc. Tourism industry also suffered a great loss. It has rendered thousands of people homeless and jobless.

Aerial view of Srinagar submerged in flood water.



Picture Source: The Hindu (newspaper) New Delhi, September 10, 2014

Source: Daily Excelsior, September 09, 2014

Furthermore, because of this climate change J&K had already suffered badly due to draught situations occurred during 2001 to 2004, 2009, 2011 etc which has caused huge loss to the state's economy.



#### *Q. Agricultural shifts And Food Insecurity*

The impacts of climate change particularly for the Himalayan state of J&K are not favorable as climate patterns have altered and evidence reveal trends of marked seasonal fluctuations, extreme weather events, forest and agricultural shifts, water stress, disease outbreaks and food insecurity etc. All these problems have caused a serious threat to the agricultural production of the state. Over the last few years considerable fluctuations have been observed in seasonal and weather patterns with prolonged heat dry spells, less and intense winter, fluctuating rain and snow precipitations which has caused huge decline in agricultural production, change in crop selection and increase in the altitudinal range of cultivated land e.g. the Apple belt in the region is shifting upwards because of decreasing chilling hours and increasing temperature from November to March. Due to this rapid change in climate it has been found that from last few years instead of sprouting normally in mid April apple trees start sprouting 2-3 weeks early and about 70% of trees begun to open their buds in mid March which aftermath become very cold due to rainy season in April and causes the huge damage to apple blossoms. Uncertain changes in temperature and precipitation also causes the problems such as pests, insects and other diseases.

Similarly, other crops such as walnuts, peach, pears, wheat, rice, maize etc are also showing decreasing trends in the production. In J&K especially in Jammu region most of the agricultural land is un-irrigated and mostly depends upon seasonal rains for cultivation, but in last some couple of years this region is facing the problem of climate change in the form of draughts, floods and snow storms causing dismal production of food grains and other vegetables due to this farmers of many areas of J&K are adopting horticulture and business activities. Whereas, on the one hand with this unseasonal rain fall the region has suffered badly due to draught situations occurred during 2001 to 2004, 2009, 2011 etc, on the other hand this has also suffered a huge due to severe floods as occurred recently in September 2014, all this has triggered bloody wars fighting over the access to basic necessities such as food grain. As stated by FCI Govt. of India, due to the failure in agricultural productivity the dependence of J&K on import of food grains has registered a regular increasing trend, rising from 503 thousand metric Tonnes to 887.6 thousand metric Tonnes i.e. about 76% during last 10 years.

#### *R. Health Problems*

The uncontrolled growth of tourism related activities are closely linked to climate change and environmental destructions which is very dangerous for human health, as the quality of life does not only refer to the quality of goods and services, but also to the quality of the environment. Over the last couple of decades, tourism and accommodation related activities such as constructions, transportations (Air, Water and land) etc have released sufficient quantities of CO<sub>2</sub> and other greenhouse gases to affect the global climate by trapping additional heat in the atmosphere. As a result in last 130 years, the average global temperature has increased by 0.85°C. Climate change is a significant threat to the health of all the living creatures including humans. These impacts of climate change range from increase in extreme weather events, severe draughts and flooding to high temperatures causing health problems such as Asthma, Respiratory Allergies, Cancer, cardiovascular disease and stroke, effects of heat, food borne diseases and nutrition, mental health and stress related disorders, waterborne diseases etc. According to some estimates there were 6.5 million premature pollution related deaths globally in 2015 and India has ranked No. 1 with 2.51 million deaths. In addition to these problems discussed above there are other many serious problems which the region is experiencing from last few years such as Warmer winters or More winters with little snow, Heat waves, Storms, Avalanches, etc which is causing immeasurable loss in the form of human health, livelihood, natural ecosystem, flora fauna and scenic beauty of the study area.

#### *S. Suggestions*

So the above discussion proves that the unmanaged and uncontrolled growth of tourism is very harmful for the natural environment of the state. To avoid its negative impacts, tourism need to be planned, managed and undertaken in a way that is environmentally sustainable, socially beneficial and economically viable.

#### *T. Environmental Management*

1) First of all the ministry of planning and human resources an environment should be responsible for policies, rules and regulations in relation to the environment of these areas. In this context there should be a sound and careful Environmental Management and planning for the controlled development of tourism as well as recreational and accommodation facilities such as construction of hotels, restaurants, houseboats, parks, roads etc which may have potential impacts on the environment of the area. This can help in avoiding the deterioration of the fragile ecology of the state.

- 2) The environment and ecosystem of lakes, rivers and other water bodies should be managed efficiently in order to minimize the environmental effects on the coral reef, natural fauna and flora and all other threatened habitats.
- 3) Tourism industry should be enforced to adopt eco-friendly practices keeping in view the environmental resource of the area towards the protection and promotion of environment in the long-run. This could be achieved by putting an increased focus on eco-tourism which is more reliable and can help in preserving the wildlife and environment of the area.
- 4) Sources as well as the types and the amount of pollutants in these areas must be identified and efficient measures should be taken to reduce them.
- 5) Promotion of environmental activities should be there in order to encourage the active involvement of local people who are directly or indirectly involved in tourism related activities, in making decisions which affect their land and living.
- 6) Government should help in Formation and promotion of special services and investment schemes for the protection of environment.

#### *U. Increased Environmental Education and Awareness Programs*

This can be done by educating tourists about impacts of their activities on the environment of the tourist destination and making them aware about how they can keep it as low as possible. There is an equal need of educating the local population on why protecting the environment around them is essential to maintain tourism and assure they continue to benefit from it. As the awareness and knowledge of environment and climate change is generally lacking in the hosting community of J&K. For policy makers and destination managers, the study highlights the need for stakeholders to play a more active role in making the local residents aware about the importance of a environmental protection. Through collaboration with Meteorological Office the authorities should also organize awareness camps for the local people, which can help them to keep an eye on the tourism and recreational activities at these tourist destinations.

#### *V. Management of Waste*

- 1) The key solution for waste pollution lies in proper management of these wastes, for this proper care should be taken to avoid generation of waste by tourists, local people, hotels, houseboats, shopkeepers etc.
- 2) More and more dustbins especially 'Recycling Bins' should be installed at every nook and corner of these tourist spots and more conservancy staff should be assigned for collection services. Proper segregation system of waste should be made and on that basis waste should be treated properly. Centre with technologies that use collected waste materials must be established and steps should be taken for its recycling. Government should provide subsidy for the products generated from recycled materials this will encourage socio-economic changes.
- 3) Wastes that may have harmful effects on the environment e.g. hospital waste, should only be disposed within the area designated by the government.
- 4) Principles such as "polluter pays" should be applied and penalty should be imposed on those who litter or dump waste in places other than those which are meant for it.
- 5) Land fill areas should be identified by keeping in view the environmental conditions of the area.
- 6) A system of measuring and monitoring the hotel progress regarding energy, water use and waste management on a regular basis should be there.
- 7) A database on wastes should be made easily available this could provide information to possible users of wastes and other researchers and government organizations.
- 8) Slogans like "reduce, Reuse and Recycle" should be made popular.
- 9) Furthermore, seminars, conferences, road shows, discussions etc on problems waste disposal should be organized.
- 10) Complete ban on the use of polythene and plastic which adversely harm the ecology.
- 11) Introduction of battery powered vehicles in these Destinations.

#### *W. Problem of Sewage And Other Liquid Wastes*

Sewage and waste water of tourism, recreational facilities and other accommodations should be collected through well managed waste water treatment systems based on some specific standards. Drainage system should also be improved to control the pollution and destruction of the ecosystem of rivers, Lakes and other water bodies. Drainage water purification system should be improved and steps should be taken to avoid the mixing of drainage water to the rivers and lakes. The use of septic tanks and construction of bio-toilets in tourism facilities and accommodations should be enforced. Strict laws should also be enforced and license of the

owners of hotels, restaurants, houseboats, and other related service providers should be canceled and if they fail to perform on the basis of rule and regulations of government.

*X. Problem of Deforestation*

- 1) All the development and constructions of tourism facilities should be monitored by authorities to prevent the adverse effects on the green gold of the state.
- 2) We must avoid deforestation and rehabilitation of degraded forests should be done on war footing.
- 3) Native trees and shrubs should be conserved and protected from the processes of constriction of roads, resorts and buildings and other tourism and recreational facilities.
- 4) Efforts should be made for massive afforestation in river catchments for climate Oriented Eco-restoration and nursery should be developed for climate adaptable species.
- 5) All the upcoming projects, having an impact on the green gold of the area should be carried out in a sustainable way without damaging the fragile ecology of the state.
- 6) In-situ Conservation of RET species, wild edible and medicinal plants.
- 7) The management of soil Erosion should be done by enhancing forest regeneration, for this plantation of native plant species can prove to be very effective.

*Y. Problem of Air Pollution and Climate Change*

In order to curb the rising air pollution and climate change in the area, measuring and monitoring of overall tourism and accommodation activities which are responsible for the emission of carbon dioxide (CO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and other greenhouse gases and efficient measures should be taken to reduce them.

Intelligent transport system should be established and promotion of renewable energy use such as battery operated transport system, battery driven motor boats, use of alternative fuel instead of liquid fuels etc should be done at war footing. All the vehicles should be checked for emission level to control the air pollution through liquid fuels burning. Public transportation should be promoted in order to curb the increasing traffic burden this will also prove helpful in reducing the overall emission of harmful gases e.g. CO<sub>2</sub>, which are the main contributor to the destruction of climate. Maximize the usage of solar power gadgets, CNG, cooking gas etc and reduction in the use of fuel wood, heating-system energy consumption and emissions should be encouraged.

*Z. Some Other Important Worth Noting Points*

- 1) There should be a well managed system of collection of fees such as park entrance fees, users fees, income taxes, taxes on rental of recreation equipment, license fees for various tourism and recreational activities at all the tourist destinations and the revenue and similar sources generated from these fees should be allocated specifically to pay for the protection and management of environmentally sensitive areas and other natural resources.
- 2) Reduction in the number of tourists in some areas by putting limitation to the number of tourist allowed to visit the area per year, so that tourism does not cause a damage to the natural environment.
- 3) There should be a better distribution of tourist activities throughout the region to curb the pressure of tourists during the peak seasons.
- 4) There is also a need to establish more such institutions like 'Institute of Hotel Management (IHM), Srinagar, to provide proper knowledge and training to the local people so that they may effectively participate in tourism related activities and may help in handling tourist inflow.
- 5) Frequently, cleanliness programs should be launched at all the tourist destinations.
- 6) Promotion of energy conservation including assessment and implementation of rain water harvesting, artificial recharging of ground water and the use of energy star appliances should be done all over the state.
- 7) To curb the unplanned and unauthorised growth of buildings at these tourist destinations, all tourism related constructions should have to be properly managed by making the relevant rules more stringent.
- 8) For the over exploited destinations like Vaishno Devi (Katra), Patnitop, Dal lake, Gulmarg etc the main focus of tourism policy should be management rather than promotion.
- 9) Attention should be given while implementing new technologies for the production and construction of tourism related activities and the choice of technology should be contemplated from the viewpoint of technology's significance for the environmental protection.



- 10) A comprehensive rejuvenation plan should be formulated and effectively implemented for Dal Lake, Mansar Lake, Pangong Lake and all other major water bodies in the state.
- 11) Development and maintenance of online portal on weather and climate change and the data should be made easily accessible for researchers and for other users.
- 12) There should be a well planned cropping system and there is also a need to develop good varieties of crops like drought tolerant crops and water saving crops.
- 13) Monitoring river flows and mapping of flood and drought zones should be done.
- 14) A “Guidebook” should be published showing an efficient and well planned roadmap to harness the natural beauty of all the tourist destinations and indicating the ways to maintain the clean image of these destinations. It should describe various fines and penalties implemented by the authorities for damaging the fragile ecology of the state.
- 15) Harness the renewable energy potential of the state by developing various power generation projects of solar, wind and hydroelectricity.
- 16) Environmental education should be made a compulsory part of the curriculum in primary, secondary and higher education.
- 17) Organize seminar, workshop, conferences, road shows and eco-friendly activities for environmental awareness. There is also a need for strengthening research infrastructure for conducting research and studies on the impact of climate change on human health.

### III. CONCLUSION

The state of Jammu and Kashmir popularly known as the “paradise on earth” is one among the most unique destinations of travel lovers. The state occupy the status of most favored destination for all type of tourists and attracts large number of tourist every year, which has ultimately led to a boom in the tourism industry and made significant contribution to the State’s economy by generating revenue, leading to employment opportunities as well as infrastructural and socio-economic development. However, as is evident from the present study the impact of tourism is double edged and the study has shown the possible impacts of its unchecked and unregulated growth on environment. The study has navigated and discussed that how this fast uncontrolled tourism growth causes environmental decimation, ecological disturbances, degradation of local resources and other serious problems. The study has also revealed that there is a direct relationship between nature and tourism and efforts should be made for sustainable development of eco-tourism in order to preserve the nature for the benefit of present and future generation. Finally, the discussion concludes with some valuable recommendations to assist the local government, policy makers, researchers, ecologists, environmentalists and different interest groups (practitioners, academics, official, businessmen, tourists, and local community members) in order to protect the natural environment and maintain the tourist attractiveness of the state.

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