

**ECOTOURISM DEVELOPMENT USING GEOSPATIAL TECHNIQUES IN  
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**ABSTRACT:** In the last few decades, “Ecotourism” has emerged as a much talked about topic that is frequently linked to the term “sustainable development”. Ecotourism may be defined as voluntary travels to intact natural areas in order to enjoy the natural attractions as well as to get familiar with the culture of local communities. Geospatial Technologies with their unique capabilities to monitor, collect and analyse geographically referenced information have emerged as a key enablers in environmental conservation and in minimising the ecological impact of development projects. Geospatial Technology that mainly include Remote Sensing and Geographical Information System (GIS) can be used in tourism as a decision supporting tool for sustainable tourism planning, impact assessment, visitor flow management, and tourism site selection etc. Evaluating the ecotourism potentials of each area would lead to a wider participation of local people in natural resource conservation activities. This research proposed for community development and involvement of local people as a part of hospitality services in ecotourism industries in this region because they can assist tourists according to their experience as guides in the forest. Moreover, they can be employed in the service industries operating or accompanying jungle trips and wilderness trails and assisting in transport operation. Finally this study proposed an outline for ecotourism planning in Sattal Camp and nearby areas where GIS assist in the planning and development process. As decision –making in tourism development and planning is becoming increasingly complex because of the interrelationship with various phenomenon including local people, stakeholders, local culture and natural environment. The case study employed of Sattal Camp, Surya Village, Bhimtal, and Nainital. Uttarakhand, was the first of its kind in Kumaon region, initiated on disused garden close to the lake, leased from the irrigation department. The idea was simply to provide an adventure and nature based alternative to the burgeon, resort tourism in the lake region. Camp provides a lot of fun and action, one can enjoy Kayaking, fishing and swimming in crystal clear lakes, rock climbing and tracks through dense jungle as well as wildlife viewing, natural history lectures, photography and local food. During the stay at camp, it was also observed that only palm and oak trees found abundantly (as they need less water for its growth). The primary data has been generated regarding social and cultural activity, infrastructure availability and also some information on geographical conditions of the study area using qualitative methods, which included focused interview, information discussions, onsite observation and questionnaire. This type of primary database information can be utilized in Remote Sensing and GIS environment by linking spatial and non spatial data and generation of thematic maps out of this spatially joined and referenced data. Then, further this data use for tourism planning and development process by assisting decision and policy makers. Besides decision – making, Geospatial technique can also help local people through various training programmes and effective communication that

in turn enhance their self esteem and confidence and also facilitate timely communication. Meanwhile, the importance of local people's active involvement at different levels of ecotourism development in ensuring ecotourism's success, in the long term, was also revealed.

**KEYWORDS:** *Ecotourism, GIS, Decision Making*

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## 1. INTRODUCTION

Tourism is the world's fastest growing industry and in recent years, has come to play an increasingly dominant role in the economies of developing countries After World War II, the tourism industry was seen primarily as a means of economic development since then a number of economic benefits have been attributed to tourism related industries. Tourism nurtures a great potential to generate substantial foreign exchange earnings and being a labour-intensifying industry it can provide numerous employments opportunities Tourism can be developed almost anywhere and areas or countries in short supply of trade Commodities Tourism development commonly has been advocated as an alternative to traditional natural resource-based economic development, such as timber production, agriculture and mining

### 1.1 Background

After World War II, development became the focus of many newly independent countries (Mc Michael, 1996). Many development projects emerged, aimed towards promotion of the comparison of scientific knowledge, industrialization, and the increase in productivity and trade these projects have contribute to the rapid development of some economies and advanced technology, which consequently smoothed the way for The emergency of a number of new industries, among which the tourism industry is an important one (Smith & Eadington, 1994) sadly, global tourism practices have left their mark on many once pristine environments, Traditional cultures, and local communities, leaving a trail of environment and social devastation in their wake. If tourism is to continue as an economically viable global industry, it will have to become both ecologically and socially responsible In other words, tourism needs to become sustainable. Rather than simply preserving the environment for the benefit of future generations, **sustainable tourism** cares for communities, traditional cultures, and local livelihoods The term was most famously and officially used in The 'Brundtland Report' by the world commission on Development and Environment in 1987, and has gained wide attention and acceptance since then (keyser, 2002)

### 1.2 Sustainable Development in the Context of Tourism

When considering the concepts of sustainable development in the context of tourism, new issues, views and challenges are exposed. This is because tourism continues to develop as a significant economic and social activity although it utilizes environmental resources. It has significant environmental, economic, social, and cultural impacts which can either be positive or negative, or both. Thus, tourism development has become one of the central challenges within the sustainable development topic. For example, there is discussion that the incorporation of sustainable development into tourism has had its focus primarily upon the ecological sustainability of tourism itself rather than the potential contribution of tourism to long term sustainable development It is argued that *sustainable tourism* is not concerned with protecting the resource base for the sake of environmental sustainability, but rather it is protecting its product so that tourism development may be maintained. Ideally, the concerns of sustainable tourism development should overlap with that at sustainable development, but it seems that sustainable tourism development is developing its own tourism-centric 'agenda' to the extent that the development of tourism does not necessarily conform to all the general concerns and requirements of sustainable development some of which were mentioned earlier.

### 1.3 How it has been applied already

The attempt to incorporate sustainable development concepts into tourism was - and still is - a result of the growing environmental awareness and cultural sensitivity the sustainable development debate has brought about, and the increased public education of the vulnerability of natural resources. This has caused

increasing dissatisfaction with the previous tourism products, and so development of a new type of tourism has evolved –alternative tourism (Butler 1992) Alternative tourism is usually taken to mean alternative forms of tourism (other than mass tourism) which place emphasis on greater contact and understanding between hosts and guests as well as between tourists and the environment (Butler 1992).Of all of the alternative forms of tourism (Adventure, Nature-based, Wildlife, Ecotourism), it is often believed that Ecotourism is the most sustainable. Indeed, ecotourism has been said to “represent and encompass a set of principles, policy prescriptions, and management methods which chart a path for tourism development such that a destination area’s environmental resource (including natural, built, and cultural features) base is protected for future development”

Through this research a site-specific framework is developed to examine the sustainability of ecotourism projects. And here lies the significance of geospatial techniques especially Geographical Information System(GIS) distinctive ability to generate new information from the existing datasets and thus offering added value added information, can lead to the identification of sustainability indicators which otherwise would not be possible to be defined and measured. This is even more important since talking Sustainable development indicators for which combined information is necessitated while applicable data are not often available.

GIS is now recognized widely as a valuable tool for managing, analyzing, and displaying a large data pertinent to many local and regional planning activities. At the same time, its use in environmental planning is rapidly increasing. Tourism is an activity highly depended on environmental resources. It is also a phenomenon, which in the event of a lack of planning and management is likely to erode its environmental base, hence, the strength of tourism planning and decision making can be enhanced be GIS applications, which provide a toolbox of techniques and technologies of wide applicability to the achievement of sustainable tourism development. The following tables illustrate the functional capabilities and the tremendous potential of GIS. Rhind (1990) categorized GIS applications in a structured approach according to the generic questions which GIS are frequently used to investigate. Bahaire and Elliot- White (1999) related these categories to the basic applications in tourism, as well as, to GIS functions.

**Table 1: Capabilities of a GIS**

Functional capabilities of a GIS	GIS Basic Questions	Tourism Applications
1. Data entry, storage and manipulation	1. Location	1. Tourism Resources Inventories
2. Map production	2. Condition	2. Identify most suitable locations for development
3. Database integration and management	3. Trend	3. Measure tourism impacts
4. Data queries and searches	4. Routing	4. Visitor management/flows
5. Spatial analysis	5. Pattern	5. Analyze relationships associated with resource use
6. Spatial modeling	6. Modelling	6. Assess potential impacts of tourism development
7. Decision Support		

Source: Bahair and Elliot-White 1999, p. 159

**Table 2:** Common tourism-related issues and GIS applications

<b>Problem</b>	<b>GIS Application</b>
Benchmark/database	Systematic inventory of tourism resources
Environmental management	Facilitating monitoring of specific indicators
Conflicts	Mapping recreational conflicts: recreation-wildlife; user conflict
Tourism behavior	Wilderness perceptions
Carrying capacity	Identify suitable locations for tourism/recreation development
Prediction	Simulating and modeling spatial outcomes of proposed tourism development
Data integration	Integrating socio-economic and environmental datasets within a given spatial unit
Development control and direction	Decision support systems

Source: Adapted from Butler 1993, p. 33 (cited in Bahaire and Elliott-White (1999), p.162).

It becomes clear that tourism and recreation management and planning have a lot to benefit from using such Technology some of the key features of GIS that could benefit tourism planning include:

- a. Their ability to manipulate data and spatial attributes
- b. Provide necessary value added information
- c. The ease in allocating resources between what are often conflicting demands
- d. Their adaptability in requirements needs and data changes over time
- e. Their ability to identify patterns or relationships based on particular criteria and support in this way decision making.

#### ***1.4 Advantages of the Use of GIS in Sustainable Tourism***

Determining the ideal tourism modelling for a prospective tourism region involves a complicated set of criteria. Even though tourism development is a distinctly geographical activity with serious implications for destination areas, few researchers have applied GIS to tourism planning and management practices. The following are a number of opportunities for GIS applications in tourism planning (Farsari and Prastacos, 2004):

1. Visitor flow management: This involves the use of GIS to identify principal tourist activity spaces within a destination and the flows among destinations. Authorities may implement strategic plans for superior infrastructure (e.g., building public transportation systems linking various tourist activity spaces).
2. Facility inventory and resource use: This involves the use of GIS in connection with the issue of environmental justice (namely the fact that tourism may not benefit all segments of society equally). It also involves developing an inventory of resources in order to identify conflicting but also complementary land uses and activities, available infrastructure, and natural resources.
3. Assessing impacts of tourism development: GIS can be used to demonstrate tourism impacts on various industrial sectors in a time-series and spatial format (Chen, 2006). Within this category, analysts can use all or

several of the previous categories by employing the “what-if” tool of GIS. This tool allows the development of scenarios for predicting what the effect of a change in a certain variable(s) will be in the destination. The categories listed above are not mutually exclusive and it is more than likely that any application of GIS in a tourism scenario will involve a contribution of more than one of these. Unfortunately, as Farsari and Prastacos (2004) reported, most applications of GIS in tourism relate to identifying suitable areas for developing tourism activities in the future (land suitability analysis) while the use of GIS in already developed (mature) tourist destinations has been avoided. They suggested that there are a number of ways in which GIS can benefit the study of tourism and implementation of sustainable practices in destination areas.

## 2. OBJECTIVES

The main objective of the study is to prepare an inventory and categorization of the Sustainable practices involved in the camp as the tourism activities started in camp is in initial stage that may have deep rooted impacts on environment both physical and social. Along with this study is exploratory in nature and try to help organizers and decision makers to enhance the capacity of ecotourism at the destination area to generate more benefits for both the local village and the villagers through the adoption of geospatial techniques in management, planning and implementation of sustainable concepts in the camp.

## 3. STUDY AREA

Sattal Camp, Surya Village is situated on top of a hill overlooking the lake and surrounded by the forest. Since there are seven lakes in the area, it is named as Sattal. This area comes under kumaon region of Uttarakhand. This state carved out from Uttar Pradesh and made a new state in November 2000. It lies between 28<sup>o</sup>43' and 31<sup>o</sup>28' north latitude and 77<sup>o</sup>32' and 81<sup>o</sup>00' east longitudes. It is often called the lands of Gods (DevBhoomi) because of its holy places and abundant shrines. The whole state has outstanding natural beauty. Most of the northern parts of the state are part of Great Himalayas. Surya Village is in two parts- Lower and Upper. Camp is situated in Upper Part. This area comes under Vikas Khand Bhimtal in District Nainital- which is set in a valley and lies in 29N80'E Coordinates. The place is a popular hill station; owing to its natural beauty.

Sattal Camp run by Wild rift began operations in 1993. Sattal Camp was the first of its kind in Kumaon, on disused garden close to the lake, leased from the irrigation Department. The idea was simply to provide an adventure and nature based alternative to the burgeoning resort tourism in the lake region. In 2008, the Camp had to shift its base to Surya Village. Because irrigation Department took back their land which has political reasons. Apart from abundance of the natural beauty, the Camp provides a lot of fun and action. One can enjoy Kayaking, fishing and swimming in crystal clear lakes, rock climbing and treks through dense jungles past hidden villages and waterfalls. Camp fires, games and barbeques complete the outdoor experience. Sattal is situated at a moderate height of 1350mts which makes it an ideal all season camp.

## 4. RESEARCH METHODOLOGY

### 4.1 Data Collection;

Data was collected using primary source. The main instrument for collecting primary data was the structured questionnaire on schedule for managers and staff that include both close and open ended questions. The questionnaire was designed to collect information of practices that are followed in the camp and also other sustainable practices/steps taken by the camp organizers. The one **focussed interview** was conducted with key respondents, Mr. Vinod and Mr. Sanjay- who organize or manage the camp for the collection of the data. Both were around 25 years old and graduate pass. Along with this, they did some certificate courses from Tourism Department, Nainital and National Mounteering Institute, Uttarakashi. An observational study also done through interacting with the camp people and villagers

**4.2 Data Analysis:**

Data collected through schedule for camp managers and staff questionnaire was mainly qualitative in nature. Before detailed analysis, questionnaire was thoroughly examined.

**4.3 Tools & Techniques:****QUESTIONNAIRE**

Date of Interview : .....

Name of the respondent/s;.....

Educational Status:.....

Schedule for camp managers and staff:.....

1. Kitchen / Cooking
  1. Source of raw material / ingredients use in cooking
  2. How much you spend (% of total earning)
 

<input type="checkbox"/> Transport	<input type="checkbox"/> Buying
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  3. Cooking medium / Appliances
 

<input type="checkbox"/> Gas	<input type="checkbox"/> Chula	Other <input type="checkbox"/>
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  4. Waste disposal method
 

Kitchen Pit \_\_\_\_\_

Other \_\_\_\_\_
2. Lighting sources
  1. Kitchen  Lamps      Tube Lights       Halogen
  - Camp Area  Lamps      Tube Lights       Halogen
  2. Powered By
 

<input type="checkbox"/> Electricity	<input type="checkbox"/> Kerosene	<input type="checkbox"/> Battery
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  3. Back Up Inverter       Generator
  4. Monthly expenditure (% of camp earning)
3. Accommodation
  1.  Tents       Huts       Toilets
  2. Type  Permanent  Temporary  Semi Permanent
  3. Material used in construction
    1.      ii      iii
  4. Procured from
  5. If plastic, then how dispose, after turn off
  6. Cost as % of camp Earning
4. Mode of Transportation
  1. Around Camp
 

<input type="checkbox"/> Bikes	<input type="checkbox"/> Trucks	<input type="checkbox"/> Cars	<input type="checkbox"/> Buses	<input type="checkbox"/> Jeeps
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  2. From camp to village
 

<input type="checkbox"/> Bikes	<input type="checkbox"/> Trucks	<input type="checkbox"/> Cars	<input type="checkbox"/> Buses	<input type="checkbox"/> Jeeps
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  3. Main source of fuel
 

<input type="checkbox"/> Petrol	<input type="checkbox"/> Diesel	Other <input type="checkbox"/>
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5. Entertainment
 

<input type="checkbox"/> TV	<input type="checkbox"/> Music Players	Bonfire	<input type="checkbox"/> Others (specify)	<input type="checkbox"/>
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6. Mention other sustainable practices:

**TABLE 3: Categorisation of Practices**

Cooking/Kitchen			Water Usage	Lighting Source	Accommodation	Mode of Transportation	Entertainment	Other
Raw material for cooking	Cooking Medium	Waste	i. For cooking, fresh water is use-collected directly from source	Kerosene lamps	Semi –permanent Safari Tents Bathrooms/Toilets- made up of wood and covered with plastic roofs	Jeeps Bikes	Bon fire Kayaking Swimming Rock Climbing Jungle Walks Village Visit	Planting of Trees
In Rainy season locally available. Otherwise from Market in Bhowali	Gas Chula	Collected in plastic bags and then send to Bhowali in Government operated waste disposal system	ii. For other domestic purpose, water is stored in Syntax tanks					

Source: Primary survey

## 5. ANALYSIS AND RESULTS

**TABLE 4: Analysis of Practices to check Sustainability**

Partial Sustainable a.) Save fuel wood b).Risk involved while use c).Not Cost effective	Not Sustainable Cost of transporting waste and use of plastic bags that in itself not sustainable because of its disposal problem due to long persistent on the land or soil.	i.)Sustainable in the sense of job opportunities. Villagers are hired to collect water as daily wages. ii.)Not Sustainable – Cost both on buying tanks and filling these thanks	Not sustainable Dangerous in use and chances that tents can catch fire easily if not properly handle.	i)Sustainable ii) partial Sustainable Use of wood can create tussle between wood users because of its scarcity. # Expenditure incurred on plastic sheet and its disposal problem	Not sustainable : i) Cost incurred on fuel – Diesel / Petrol ii) Pollution : Due to burning of fossil fuel, Noise Pollution due to: Vehicular Movements and horns	Not Sustainable i) Burning of wood generates light that might affects the animal movements ii) Wood scarcity
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Source: Primary survey

### 6. RESULTS & CONCLUSION

After collecting primary data through focussed interview and questionnaire found good result that reflects Sattal camp is the perfect place of ecotourism.





**6.1 Research Conclusion:** Through the analysis of mentioned practices, it can be conclude that camp is partially sustainable. As kerosene is use in lamps i.e. not safe and also costly. In menu, non- veg is included that is also not sustainable. But the Camp is the good source of earning for youth which they are utilizing for the improvement and progress of the village as well as for themselves (that they use for their studies and to bare other expenses). Not only young generation, had villagers also showed interests in the camp through their opinions?

**6.2 Final Conclusion:** The Sattal Camp is a role model for other ecotourism based projects not only in that region but in whole India. The camp was among the first to operate with the concept of Sustainability (mentioned above). In other words camp can be considered the perfect example of the application of principles of Sustainability in terms of tourism i.e. involvement of local people and minimal use of local resources. The growth and management of the camp in this competing industry demands proper planning and management that requires spatial data and collection and processing, as all locations and their interrelations should be defined and analysed within a spatial content. For this purpose, geospatial techniques can describe and identify tourism infrastructure elements geometrically, thematically and topologically.

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