Chapter 31
Tourism and Tribal Economy: Application of GIS Technology on Sundarbans Region

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31.1 Introduction

Tourism is an industry with one of the strongest effects on economy, because it helps in developing other sectors through multiplier effect. It is a composite of activities, facilities, services, and industries that deliver a travel experience, that is, transportation, accommodation, eating and drinking establishments, entertainment, recreation, historical and cultural experiences, destination attractions, shopping, and other services available to travel away from home. In other words, tourism is defined as the sum of phenomenon and relationships arising from the interaction of the tourist and host communities in the process of attracting and hosting this tourist (Fadahunsi, 2011). This definition shows that tourism is interactive in nature. Geography essentially plays a pivotal role in tourism because of the geographical base. It offers a fascinating environment for geographers and GIS experts to analyze the different components of tourism in spatial context. Today's world is profoundly affected by Information Communication Technology (ICT) revolution, which has enabled information and knowledge circulation at unprecedented speed, changing all aspects of life, and economic, political, and sociocultural mosaic of the world. In this information era, it is the ability of a country to use information and communication technology effectively and efficiently that increasingly determines the relevance and competitiveness of a country in the global economy. But in my study area, there was absence of technological information for tourist guidance. No work has been done about the GIS-based tourism application and tribal economy relating to tourism in Indian Sundarbans.

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Geographical Information System is an integral part of the information system and forms a chain of operation from a survey, collection to storage, analysis, and output of spatial information for supporting decision making (Dockkey, 2002). Sustainable tourism is rightly known as a catalyst for the overall development of the developing part of the world. On account of this, it has attracted the interest of the government, communities, and researchers. These entire stakeholders have reached consensus that tourism needs to be developed in a planned way and Geographical Information System can assist as a decision support system for planning strategies. GIS has diverse applications for a wide range of activities such as environmental planning, property management, infrastructure setting, and emergency event planning, automobile navigation system, urban studies, and market analysis and business demographics (Chen, 2007). Recently, GIS application in tourism sector has rapidly increased: as, for example, park management, facility monitoring, visual resource assessment, and tourist area identification, etc.

31.2   Tourist Potential of the Sundarbans Area

Sundarbans is located in the southern part of West Bengal and Bangladesh. This is known as Sundarbans Biosphere Reserve (SBR) and Sundarbans Tiger Reserve (STR) formed in 1973 under the Project Tiger of Ministry of Environment and Forest. It forms a significant part of the Indian Sundarbans and is one of the original nine tiger reserves in India. Not only that there are various opportunities of economic development like honey collection, fishing, etc. The natural beauty of Sundarbans and scenic beauty attracts people from all over the world. Undoubtedly it is the most attractive scenic spot. As it is a bioreserve forest, there are different kinds of plant and animal species over here. Tiger is the main attractive and ferocious animal and also the national animal. Dears, pigs, and crocodiles are the other animals inhabiting together. Neti Dhopani, Dobanki, Bannie Camp, Khalsi Khali, Haldibari, Pakhiralay, and Sajnakhali, Sudhanyakhali, are important spots to visit in the Sundarbans Tiger Reserve (STR). There are also markets, ATMs, hospital facilities, etc., although it is a remote area from Kolkata, almost 84 km away. As it is a famous tourist spot, the tribal people are recently depending on the tourism sector for sustainable livelihood instead of the primary sector economy. The Department of Information and Cultural Affairs of West Bengal (2015) has launched a scheme (Folk Artist) for the tribal people. They have made groups, and each folk artist group should have a minimum of 11 members and a maximum of up to 15 members. The male and female ratio of these groups is 2:3. In these groups, each member should be a tribal. They are performing their dance at any other governmental program also. They are earning remuneration per month of Rs 3500/- per member for their performance. The Adibasi Kalyan Folk Group (AKFG) is one of the examples of such a folk group. In this regard, women work participation rate is greater than men. These dance groups also promote the tourism in the Sundarbans Region. They are

also now earning the money from public tourism sector. It is a great example of economic inclusion of Munda tribe of the Sundarbans Region.

31.3   Use of GIS Application on Tourism Planning

Geographical or spatial data refers to the location on the Earth's surface usually expressed as a grid coordinates or in degrees of latitude and longitude. Most institutions or organizations make use of implicit geographical references as place names, address, and postcode and road number, etc.; implicit spatial references can usually be geocoded into explicit spatial references. Advanced technology, particularly software and hardware, has resulted in the development of system that provides a range of searching, querying, presentation, and analytical function. Travel preferences are often hidden and are not explicitly known when users start to plan their trips, particularly if visiting an unfamiliar place. According to Van and Wessel (1994), there has always been a direct relationship between tourism and cartography. Tourism is concerned with the traveling between close and distance places and maps are the important tools to identify the specific location; therefore, it is more concerned with maps and thematic information than other industries. Maps of the travel route and general information about the area to visit are used in selecting the destination, planning travel, accommodation, etc. Therefore, tourist information system should contain large amounts of detailed up-to-date information about the destination (Brown & Weber, 2012).

The decision to adopt tourism as an agent of development has been largely based on the expectation that tourism can increase foreign exchange earnings, create employment, attract foreign investment, and positively contribute to local economies and national balance of payment (Dye & Shaw, 2006). The success of any tourism business in any destination is determined by tourism planning, tourism development, and research and tourism marketing. Some of the key features of GIS that could be benefiting tourism planning include their ability to manipulate data and spatial attributes (Jovanovic & Njegus, 2008) and provide necessary value-added information (Bahaire & White, 1999). The ease is in allocating resources between what are often conflicting demands (Williams et al., 1996), their adaptability requirements, needs, and data changes over time (Beedasy & Whyatt, 1999), and their ability to identify pattern and spatial relationship (McAdam, 1999). Although the number of GIS applications in tourism and recreation management and planning is increasing, there are still many more potential opportunities (Porter & Tarrant, 2001), but tourism resource inventory is one of the very first and basic applications, and such inventories may be further used for resource management resource allocation and land use planning decisions (Williams et al., 1996). Tourism marketing is another fascinating area wherein geo-demographics and lifestyle analysis can be performed by a GIS, which actually have a significant contribution in the needs of post-modernism tourism marketing (Elliott-White & Finn, 1998). Therefore, managers, entrepreneurs, and other stakeholders responsible for tourism marketing could

benefit from GIS in order to locate and analyze the characteristics of potential customers. The synthesizing of environmental, social, and economic parameters in GIS format is easily possible because GIS is an integrating technology capable of working along with other technologies, such as remote sensing, global positioning system, etc., which could further facilitate more tools for sustainable tourism planning and marketing. Furthermore, service-oriented architecture can be applied to remanage the GIS resources and provide a dynamic and reliable service system that could meet the information and service requirements of different users over the Internet instantly (Emhmed & Chellapan, 2012). The Internet development contributed to the growing importance of GIS in various areas, opening new perspectives for people who need to use spatial data (Yang et al., 2004), when making decisions, planning and analyzing the effect of changes, looking for pattern, etc. We may look at maps, tables, charts, lists, graphs, reports, and sometimes it is rather difficult or nearly impossible to pull all these sources of information together and make sense out of them. Hence lays the benefits of GIS and its application.

GIS has the capability to handle several kinds of information that can be related to location or area. Therefore, GIS gives integrated tourism information. The database created in GIS format will answer the following frequently asked question in a user-friendly manner:

- Where is the tourist spot located?
- What is the shortest route direction?
- What is geographical environment?
- What is the best time to visit?
- What are the types of accommodation available?
- Where is the location of ATM services and tourist products available to purchase?

31.3.1   Research question formulation

Basically the tribal people usually use to depend on primary activities in the Sundarbans Region like fishing, wood collecting, etc. But now Sundarbans Tourism is developing; therefore, they are focusing their economy on tourism sectors like hotel business, hotel cooking, Jhumur dance, etc. In this regard, two definite research problems arise:

1. What is the extent of tribal involvement in the tourism sector for their economy?
2. What is the state of development of the GIS-enabled inventory for existing tourist infrastructures of the Sundarbans Region?

To look into these questions, multiple methods of researching have been adopted.

31.4   Materials and Methods

The base map of Gosaba Block of Sundarbans Region and Sundarbans Tiger Reserve was generated from Google Earth and District Census Handbook (2011), and *Esri's Arc-GIS 10.1* version was used to support the existing ground-level situation and also for developing the drainage system and subsequently various thematic layers were generated, that is, existing land use, road network, water bodies, hotel or resort, ATM facilities, etc. Intensively field investigations have been done regarding the relationship between tourism and tribal economy selecting four tribal villages (Hamilton Abad, Kamakhyapur, Chotta Molla Khali, Kumirmari) of Gosaba Block because these villages are situated near the Sundarbans Region and also most of the tribal people are concentrated in this block and Kultali Block (2.5%). Focus Group Discussion (FGD) has also been done on different Jhumur dance group like Loko Sanskriti Sampraday and others.

31.5   Results and Discussion

31.5.1   Tribal Economy and Tourism

Economy is one of the major subsystems of any societal system. Comprehension of the structure and dynamics of the economic system is a prerequisite for social work practice in tribal India as most of the challenges to tribal welfare are embedded in them. Moreover, tribal economies in India are at different stages ranging from food gathering to industrial labor types. Thus, economy can be understood as an institutional arrangement that facilitates acquisition, production, and distribution of material means of survival for individual and community life. Tribes develop their economies through a wide range of activities, including agriculture, mining, and tourism. Nowadays tribal nations in the Sundarbans Region pursue their economic development by performing the Jhumur dance for tourists. Tribal economy is embedded in and revolves around the Sundarbans. Not only tribal economy, but also culture and social organizations are interwoven with the forest. Tribals depend on forest for fulfilling their basic needs earlier. Now with increasing situation of the tourism industry, they partly depend on forest for their development of economic infrastructure. The Adibasi Kalyan Folk Group (AKFG) is one of the examples of a folk group led by Ratan Sardar (Card No-S24-1527). As male and female participants in a group are 2:3 accordingly so that women work participation rate is now increasing in the Sundarbans Region. These dance groups also promote the tourism in the Sundarbans Region. They are also now earning money from the public tourism sector. It is a big example of economic inclusion of Munda tribe of the Sundarbans Region. There were seen several Jhumur dance groups, namely Sundarbans Adibasi Lokosankriti Sampraday (Card No-S24-1526) led by Bithika Sardar (Hamiltan Abad), Tusu Mata Sampraday (Card No- S24-1528) by Bablu Sardar

Table 31.1 Relationship seasonal involvements of tribal people in their economy

Chi-square value	DF	P-value
94.180	1	0.000

(Kamakshapur), Sonali sampraday (Card No-S24-1532) by Sarswati Sardar (Chotta Molla Khali), Radhakrishna Sardar (Card No-S24-1523) by Shila Sardar (Kumirmari), Shidhu kanhu Sampraday (Card No-S24-1525) by Nripen Sardar (Kantamari), and Bandana Sampraday (Card No-S24-1535) by Bandana Sardar (Shyamnagar).

FGD revealed that each member of the group is getting remuneration Rs 3500/- per month from the government and earn Rs. 1200/- per performance before a tourist party in any tourist lodge or resort or guest house during the peak season (September–March). Each group performs three or four times every day in the peak season. In this way, every member earned almost Rs 5000/- per month. Earlier they earned money from fishing, honey collection, wood collection, etc. The amount earned is also less and is also risky because it would have to be collected from deep forest. According to Santosh Sardar, a resident of Hamiltan Abad, 20% of total population of the village (i.e., 2817 according to 2011 Census) is engaged in fishing and honey collection in the Sundarbans Tiger Reserve (STR). The present Lahiripur Gram Panchayat Pradhan (Prakriti Ghorami) indicated that the economic benefits of tourism are largely more in Hamiltan Abad and its surroundings. They left this job and are now engaged in different hotels and restaurants for cooking and other works and earn Rs 3500/- per month. There are many hotels (more than 50) and resorts that have been constructed, and different works have opened up for the local people. So, if tourists are not allowed in the Sundarbans Region, not only the tribal but other people also will not be able to earn livelihood. They will be compelled to depend on primary sector, which is very risky. Therefore, tourism definitely plays a vital role to develop their economy. Nowadays tourists are allowed to visit there except for three months during the rainy season, specifically June, July, and August. The tourist season starts from September every year. So, tourism definitely promotes tribal economy of the Sundarbans Region.

This chi-square result (Table 31.1) proves that the involvement of tribal people is basically season wise, because p-value is 0.000. As the p-value is 0, the null hypothesis is true; and if the p-value is 1, the null hypothesis is false. But it is true that all season tourists visited the Sundarbans. Therefore, tribal economy more or less depends on the Sundarbans Region.

31.6   Distribution Pattern of Amenities

Spatial pattern is the manner of arrangement of events in space or simply how spatial features are distributed. A spatial pattern can be described as regular, random, or clustered, which is the product of certain processes at a particular time and space
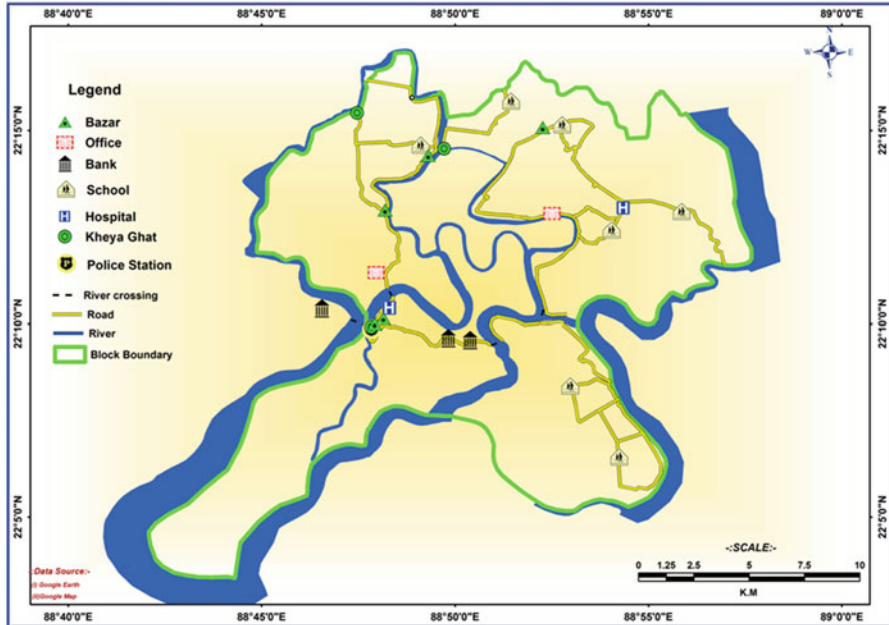
Fig. 31.1 Amenities map of Gosaba. (Source: Map drawn by the first author)

(Li & Zhang, 2007). Visualization is the process of creating and viewing graphical images of data with the aim of increasing human understanding (Hearnshaw & Unwin, 1994). It is based on the premise that humans are able to reason and learn more effectively in a visual setting than when using textual and numerical data (Tufte, 1999). Specific location and accommodation is the basic needs for the pace of tourism industry of any destination. At present, there are 65 hotels or resorts including government and private comprising 6985 rooms and with 13,980 bed capacity. The map (Fig. 31.1) shows that tourists can easily select any hotel on basic location, category, facilities, type of food, tariff, and can finalize the accommodation process through email and phone, which is available for tourist party in lean or peak season. The month of September is the starting season and continues up to March. But there is a huge pressure of flow of tourists during the peak season; room availability then may be short of supply. In this situation, room rent escalates, ranging from Rs 600–1200 per room.

31.6.1 Identification of Preferred Accommodation

Identification of accommodation is the basic need for the tourist party. If there was no availability of accommodation in any specific tourist destination, no tourist will be there as per their choice. Always every visitor prefers guest houses that are in

Fig. 31.2 Buffer map of Sundarbans. (Source: Map drawn by first author)

close proximity to the visiting place or spot. Sundarbans being a tourist place, the accommodation is concentrated in a particular area, that is, it is located near the Sajnekhali Sanctuary, so all are lured to seek accommodation in that place. As the Sundarbans is natural beauty and unique geographical location in the world, people try to visit at least one time as per their capability. In a map, one place is located in the peripheral area and the rest of the visiting places are in core area (Fig. 31.2). The buffer map has been created with 1330 km^2 of core area and with 1255 km^2 of periphery area out of 2585 sq km of Indian Sundarbans Tiger Reserve (STR).

31.6.2 Visualization of Tourist Place and Heritage Bacon Bungalow

Bacon Bungalow is popularized as Hamilton Bungalow, which is at present an important part of the Sundarbans Tourist place. On 20th December, 1873 Mr. Tilmen Henkel, magistrate of Jessore, wrote to Governer General Hastings for considering whether the jungle portion of the Sundarbans could be given on lease. For that cleansing the jungle started. Befor 1877, there was no fixed law as such for revenue collection and from this very year a proper revenue collection system was started, although unused land was kept out of revenue jurisdiction. Mr. Gomes, the then commissioner of Sundarbans was directed by the Board of Revenue to chalk out

a draft of law, which later came to be known as Large Capitals Rules in 1879 (Pargiter, 1934). According to that law Sir Daniel Hamilton (1903) was clearing the jungle with the help of tribal people for settling up the new settlement due to establishing a Zamindar system and business. In 1932, Kavi Guru Rabindra Nath Tagore was invited and came to this bungalow and stayed there from 30 to 31 December. That is why this is the important part of the Sundarbans for visitors as a historical place of Gosaba Block in Indian Sundarbans Region (ISR). Neti Dhopani is another mythological place. In mythological view, once upon a time Neta Maa, a Dhopa, used to wash cloths of Gods of Heaven at this place. Now this place is known as "Neti Dhopani." Sudhannya Khali, Sajnakhali, Bannie Camp, Bhagabatpur Crocodile Project, Dobanki, and KhalsiKhali (Fig. 31.2) are also some important visiting places in the STR.

31.6.3   Identification of Route Direction Kolkata to STR

A traveler has limited spatial knowledge about the specific tourist destination and map, and can perform an essential function in the question of spatial information about the travel destination. Web-based G.I.S Route Finder System not only models and processes the real road network to digital format but also provides user with different route finder options to proper management of travel time, safety, reliability, passenger convenience, and mitigating traffic congestion (Singh & Singh, 2012). The map shows a tourist how to reach Gosaba and Kultali Block for visiting STR. There was only one way to visit ISR, and traveling to different places was only through boats because all routes were by water to reach the tourist place. The distance can be easily measured; as the map shows, the distances between Kolkata to Gosaba and Kultali are 85km and 72km (Fig. 31.3), respectively, as two blocks are the gateway of Sundarbans in the southern part of Sundarbans.

31.7   Future Plan for Sundarbans Tourism

Distances from Sealdah to Kultali and Sealdah to Gosaba on Sate High way 1 are 72 km and 85 km, respectively. No railway exists from Jaynagar to Kultali and Canning to Gosaba. But Sealdah to Canning and Sealdah to Jaynagar railway connectivity already exists. Tourists have to journey either via canning or Jaynagar. It is time consuming and expensive also to reach Sundarbans through both routes. If the extension of railway line from Canning to Gosaba and Jaynagar to Kultali Block is made available, then many tourists can reach easily this destination cheaply and comfortably (Fig. 31.4). Extension of railway will be beneficial to tourists in respect of traveling expense, and at the same time local tribal people will be benefited for hotel business and others tourism-related occupations. Therefore, this extension will not only develop the tourism sector of Sundarbans but also upgrade the livelihood
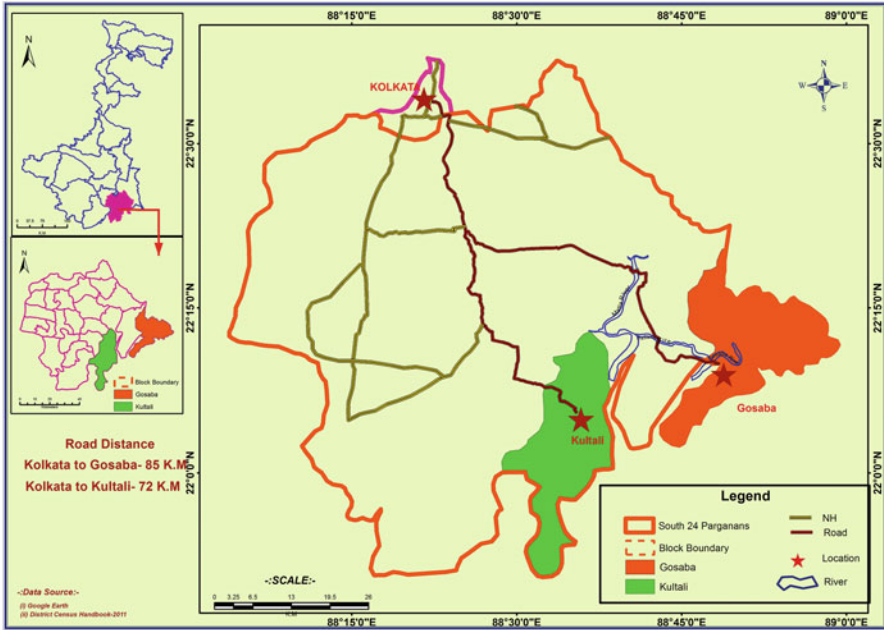
Fig. 31.3 Road connectivity map of Kolkata to Gosaba and Kultali. (Source: Map drawn by the first author)
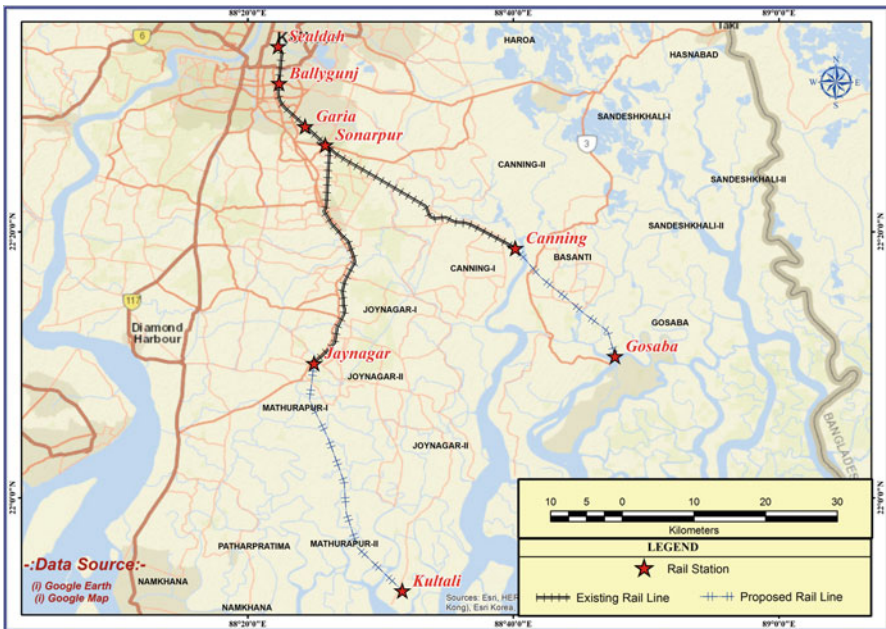

Fig. 31.4 Future plan for train route direction. (Source: Map suggested by the first author)

and socioeconomic condition of the local stakeholder. As this is the only route to enter the Sundarbans, it would be very much effective for the development of Sundarbans Tourism.
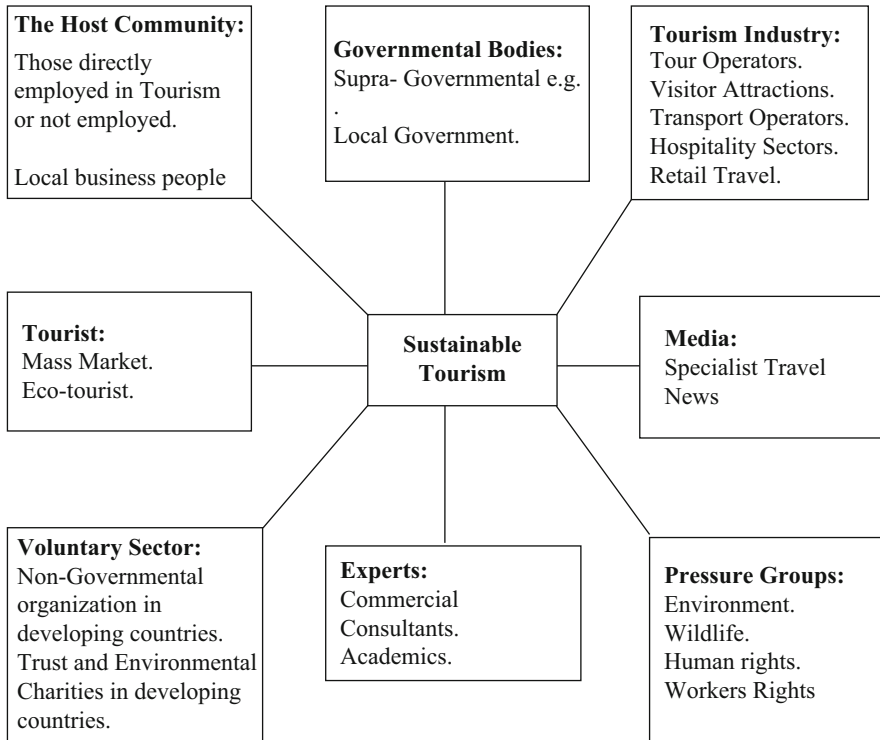
31.8   Sustainable Tourism in Sundarbans

One of the major essentials of Sundarbans Tourism (ST) Development and management is active participation of all relevant stakeholders in the tourism development and management process (UNEP and UNWTO, 2005; UNWTO, 2013). With a similar view, other scholars (Gunn, 1994; Ioannides, 1995; Robson & Robson, 1996; Briassoulis, 2002; Byrd, 2007) claim that the success and proper implementation of ST in a destination notably depend on the support from and involvement of stakeholders. A stakeholder (Freeman, 1984, p. 46) is "any group or individual who can affect or is affected by the achievement of the organizations objectives."

There are many stakeholders in the field of ST; however, it is not entirely predetermined and mostly depends on the nature and context of a tourism destination. Figure 31.5 demonstrates the key stakeholders in sustainable tourism of ST, a typical tourism destination source (Swarbrooke, 2001).

The development and/or maintenance of specific sites, infrastructures, and routes in the designated areas of Sundarbans will offer quality ecotourism and recreation experience. In order to take advantage of the increasing tourist flow, the Ecotourism Department of Forest will seek public/private partnerships consistent with the guidelines and principles established by the Government of West Bengal to improve the ecotourism services and facilities. The first necessary step in this regard is to impart communications and hospitality skills to residents and especially to tour operators. This would include training them on similar initiatives that have been successful. In the Sundarbans, people will also need financial assistance so that they can develop environmentally sustainable home stays and restaurants that would meet international standards of comfort and hygiene. For preventing any damage to the ecosystem, the guards in the forest departments of India are to be trained so that they can help tourists touring the area. Boatmen taking the tourist around belong to the economically vulnerable section in Sundarbans. In such a way, it will be possible to maintain the sustainable tourism in the Sundarbans Region.

31.9   Major Findings

- Electricity supply is often interrupted and mobile phones sometimes do not work properly.
- The boats currently used for cruises do not comply with government-mandated regulations and standards in terms of safety and hygiene.

The Host Community: Those directly employed in Tourism or not employed. Local business people	Governmental Bodies: Supra- Governmental e.g. . Local Government.	Tourism Industry: Tour Operators. Visitor Attractions. Transport Operators. Hospitality Sectors. Retail Travel.
Tourist: Mass Market. Eco-tourist.	**Sustainable Tourism**	Media: Specialist Travel News
Voluntary Sector: Non-Governmental organization in developing countries. Trust and Environmental Charities in developing countries.	Experts: Commercial Consultants. Academics.	Pressure Groups: Environment. Wildlife. Human rights. Workers Rights

Source: (Swarbrooke, 2001) the key Stakeholders in Sustainable Tourism.

Fig. 31.5 The key stakeholders of sustainable tourism. (Source: Swarbrooke, 2001)

- There are hardly any hotels that would be acceptable to most international tourists.
- Though the number of eating places for tourists is limited, appropriate hygiene standard is always maintained.
- Lack of communication skills is also the cause of worsening situation of tourism sector in the Sundarbans.
- Local tribal people are earning money from tourist party through performing the Jhumur dance.
- Tourism promotes tribal economy of the Sundarbans Region.
- GIS-based tourist information system is increasing in the Sundarbans Region.

31.10   Conclusion

GIS-based ways and methods of analyzing spatial data are needful for the description and analysis of different dimensions of travel patterns. It should be the dynamic and interactive process. The researcher, planner, and administrator should interact and manipulate spatial and attribute of facilities, and natural and cultural features constituting the tourism products of the destination. GIS could immensely help not only to visual aspects of tourism products but can also provide alteration at regular intervals to update the information. GIS-based tourist information system can help tourists in taking decisions and planning for tourist destination. In this study, a small effort has been made for suggesting development of Sundarbans Tourism. If the different tourist maps and other favorable user-friendly maps for tourist are uploaded at the Sundarbans Tourism website, it will be very useful for everyone. Information about Sundarbans through the website is only possible through GIS-based information platform. And at the same time as the study on tribal economy and tourism, it has been found that tribal economy recently depends on tourism of Indian Sundarbans.

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