2.0   REVIEW OF LITERATURE

2.1   TOURISM AND TERRORISM

To analyze the regional effects of terrorism on tourism, Konstantinos Drakos Department of Economics, University of Essex, UK and Ali M. Kutan Southern Illinois University Edwardsville, USA in 2001 utilized the consumer-choice model developed by Enders, Sandler and Parise (1992) to study the regional effects of terrorism on competitors' market shares in tourism sector where involved countries enjoy significant tourism activities but are subject to high frequency of terrorist attacks. The theoretical model is tested for three Mediterranean countries, namely Greece, Israel, and Turkey, for the period from January 1996 to December 1999, using the seemingly unrelated regression model. Italy is used as a control variable in estimations, acting as a proxy for tourist activities in the rest of the Mediterranean region and providing an additional destination for tourists to visit. Evidence indicates that the tourism industry in Israel and Turkey are more sensitive to terrorism incidents than in Greece. There are also significant regional contagion effects of terrorism. They found that a higher level of terrorist incidents in Greece is associated with an increase in the relative market share of Israel in the region, while terrorism in Israel benefits Turkey's market share. They also documented that the location (urban versus rural) and the intensity of terrorist incidents play an important role in the decision-making process of tourists for choice of destinations. Policy implications of their findings were also discussed.

Jonathan Essner IPS 688 – Security and Development and Dr. Laurance in December 2003 wrote Terrorism's Impact on Tourism: What the Industry May Learn from Egypt's Struggle with *al-Gama'a al-Islamiya*. This research attempts to examine the impact of terrorism on a developing country's tourism industry. General findings are developed upon analyzing Egypt as a case study where for five years beginning in 1992 a terrorist group named *al-Gama'a al-Islamiya* targeted international tourists in dozens of attacks, resulting in many fatalities and hundreds of casualties. The purpose of this research design was to evaluate the hypothesis that "*Terrorists adversely impact the tourism industry in a developing country by targeting its tourists*". The dependent variable – tourism – may be operationalized through several different means, including the examination of a country's balance of payments as reported by the International Monetary Fund and World Bank and "flight

arrivals" as reported to the WTO. This research design looked primarily at "tourism income receipts," another measure reported to the WTO. The principal independent variable is terrorism, which may be operationalized through listing specific attacks, referring to terrorism timelines and databases, and the number of casualties and fatalities. They also wrote if this were a comprehensive research design, the study would consider two additional independent variables. First, counter-terrorism efforts, most states suffering from tourist terrorism adjust policies in order to counter terrorist activity, such as increasing the number of police, redirecting police to tourist-heavy locations or advertising to offset a negative image. Operation lazing this variable might take into account the number of police forces, police force locations and advertising budgets. Second, regional and global economic performance, global economic growth rates and global disposable income figures.

Bukenya James Obadih of West Virginia University in 1999 applied GIS for Ecotourism Development Decisions Making in Uganda's national parks of Africa. This study demonstrates the uses of geographical information system (GIS) and multi-criterion decision-making framework (MCDM) in solving a spatial multi-objective problem of ranking and prioritizing Uganda's national parks for ecotourism development. The ranking model adopted allows formal analysis of the effects of alternative weighting schemes and their spatial sensitivity on national park ranking. The multi-criterion problem formulation and analysis procedure includes defining the desired goals, objectives or purpose of the project, Selecting evaluation criteria that can relate technology capabilities for achieving the desired project goals or objectives, identifying the alternatives that are candidates for ranking and performing the selection process using one of the MCDM techniques. The results show that (1) Uganda's national parks can be arranged and ranked into three subgroups, and (2) the national parks in the western region of the country are ranked higher than those of the other regions, because of beautiful weather and a perfect environment for wildlife.

"The Maoist Menace: Terrorism in India" by Prof. R N. Mishra and Dr. Anjana Maitra, published in Boloji.com in 2008. They wrote that an organized group of social and political activists perpetrating violence and keeping the people under threats in certain parts of rural India over the past few years are variously known as the Maoists, Naxalites and the Red Rebels etc. The Naxalites of the sixties have been divided into several splinter groups. One of them is called the Maoists who believe in spreading terrorism. They are of recent origin. The

term `Maoist' is widely used by the media and the common men for the terrorists of the present brand. Eleven states of the country including Orissa, Andhra Pradesh, Chhatisgarh, Madhya Prdesh, Bihar, Maharastra and Uttar Pradesh, are faced with the problem of terrorism from the Maoists. Between January 2006 and October 2007 as many as 1221 persons have been killed and the incidents of violence, which have taken place, have increased to 1258. The terrorists are equipped with land mines, bombs, self-loading riffles (SLR), A.K-47, cartridges and other sophisticated weapons. They have their hideouts in forests and hilly areas and operate in a well-organized way. The Prime Minister of India is reported to have said that the Maoist terror is the `single biggest internal security challenge' (1) that India faces now.

Anil Biswas the then State Secretary of Left front government of West Bengal in 2005 wrote - "Maoism: An Exercise in Anarchism". According to him in recent times, some areas of West Bengal have witnessed activities of the 'Maoist' group. The group has tried to draw attention to itself through committing several grisly murders and by triggering some explosions. They are engaged in setting up 'bases' in the remote and relatively inaccessible locales of West Bengal that border Bihar-Jharkhand. They seek a foothold in some other districts of the state as well. A section of the corporate media has also been encouraging them, by legitimizing the Maoists' killing of CPI (M) leaders and workers in districts like Bankura, Purulia, and Midnapore west. The CPI (M-L)-People's War and the Maoist Communist Centre, two groups of the Naxalite persuasion, came together on 21 September 2004 to form a new party, the CPI (Maoist). As with the two erstwhile constituents, the Maoists are active in selected areas of Andhra Pradesh, Orissa, Chhattisgarh, Bihar, and Jharkhand. Because of the secretive style of their working, their political outlook and activities are largely unknown to the mass of the people. The name of the CPI (Maoist) has been associated with violent acts and spreading terror. Going by their programme and ideological stand, the party is a violent anarchist outfit.

Keshav Bhattarai, Dennis Conway and Nanda Shrestha from USA in 2005 wrote "Tourism, Terrorism and Turmoil In Nepal". Given Nepal's geography and state of underdevelopment, its attractive natural scenery has yielded adventure tourism as a viable economic activity to develop remote areas. However, the industry faces many hurdles; the most problematic being the ongoing Maoist war and September 11 impacts, along with its dependency on foreign capital. Additionally, the industry's uneven growth, monopolistic class character, and neglect of rural impoverishment are all preventing it from taking off.

Given this scenario, regionally based religious pilgrimage, especially oriented towards Asian markets, could be more promising than Western-oriented adventure tourism.

2.2   **GIS IN DEFENSE AND INTERNAL SECURITY MANAGEMENT**

In the annual meeting of Association of American Geographers - 2001, New York City Police Chief Jack Mannion presented a paper titled "Crime Mapping: GIS Goes Mainstream". He demonstrated the use of COMSTAT, a crime-mapping tool that allows the fictional Washington D.C. police department the ability to view crime patterns. According to him COMSTAT and other GIS crime mapping applications have become widespread and almost commonplace in law enforcement agencies nationwide as well as worldwide. The 1994 Violent Crime Control and Law Enforcement Act provided a boost to the implementation of GIS by providing funding for crime prevention programs. He wrote, GIS helps crime analysis in many ways. The foremost use is to visualize crime occurrences. This allows law enforcement agencies to understand where crime is occurring as well as determine if there are any patterns. Areas of high crime density are known as hot spots. Hot spot analysis is a valuable tool as it allows police to not only identify areas of high crime but also explore variables that are affecting crime patterns. One of the latest examples is the use of GIS to triangulate gunfire. In conjunction with consultants, the Police Department in Redwood City, California implemented Shot Spotter. This application uses strategically placed microphones in conjunction with GIS to locate gunshots using triangulation. With the increase of GIS in crime mapping has come increased public access to crime data. The most accessible and popular method emerging is through Internet access. In 1995, the Police Department of Vacaville, California was one of the first law enforcement agencies to put crime maps on the web. Now, there are many agencies that publish their crime data via the Internet.

Maj. R. Baijal, M. K. Arora and S. K. Ghosh from Indian Institute of Technology Roorkee in 2000, developed A GIS assisted knowledge-based approach for military operations. They opined that military history is full of incidents wherein a smaller army having a good knowledge of the terrain has defeated a much larger well-equipped and organised army. Nearly, all military activities are terrain sensitive and need careful planning and reconnaissance to ensure success. However, planning of military operations is a complex process and is guided by the experience and capability of the commander and his staff who

provide the necessary inputs to him. This decision making process can be made intelligent by developing Knowledge Based (KB) expert systems. In this paper, a knowledge-based approach has been used to produce a number of thematic maps useful for various military operations. The approach developed is capable of taking inputs in the form of data layers that may be generated from satellite images, aerial photographs, topographical maps or other ancillary data. Some common military operations such as selection of sites for bridges, ferries and helipads, identification of tactically important roads and vehicle mobility movement are considered. The development of such knowledge-based approached shall tremendously assist the military commander to provide efficient and real-time information in an organized way for any military task. In this paper, the knowledge based classifier in the well known Image Processing and raster GIS software namely ERDAS Imagine has been used as a shell to develop a knowledge-based approach for the military operations mentioned above.

Karthik Krish Project Manager-GIS of Induscorp India PVT Ltd – Bangalore, India, wrote "Application of GIS in Crime Analysis and Geographic Profiling". According to him Geographic profiling helps to organize an abundance of information via geographical links in order to accelerate the apprehension process. While geographic profiling is an effective tool to hit upon the most probable residence of the offender, it cannot "solve" cases. Geographic profiling enables crime officers and analysts to focus the investigation in a small area of the community, rather than on the whole metropolitan area, which means it cuts down on the amount of time and resources required for what can shape up to be a major investigation. Geographical analysis highlights the crime location, any physical boundaries that were present (that might not otherwise be noticed), and the types of roads and highways that come into both the abduction and body dump sites. It can also track the routine activity of the victims, because people tend to stick with familiar territory. That means that an analysis of all the crime scenes could provide clues about where an offender lives. Like psychological profilers, those who concentrate on geographical analysis are also trying to determine how sophisticated and organized an offender is, whether the crime was planned or opportune, and whether the offender approached a high or low risk victim. However, they have also tried to take it a step further to use objective measurements to pinpoint as precisely as possible the locus of criminal activity

P. Satyanarayana and S. Yogendran in India 1999, carried out a research on Military applications of GIS. They wrote that Geographic Information System (GIS) play a pivotal

role in Military operations as they are essentially spatial in nature The concept of Command, Control, Communication and Coordination in military operations are largely dependent on the availability of accurate information in order to arrive at quick decisions for operational orders. In the present digital era, GIS is an excellent tool for Military commanders in the operations. The use of GIS applications in defense forces has revolutionized the way in which these forces operate and function. Military forces use GIS in a variety of applications including cartography, intelligence, battle field management, terrain analysis, remote sensing, military installation management and monitoring of possible terrorist activity. This article presents a brief overview of the use of a GIS in military applications in land and sea based operation.

Kemper et al. (2001)[71], demonstrated the utility of very high-resolution satellite imagery like Ikonos and IRS-D, satellite photographs like KVR and KFA and small-scale military aerial photographs in land use change detection of Istanbul. The first set of satellite imagery of 2000 was IRS/D with 5m resolution in panchromatic and 25m in multi-spectral mode. Two IRS-D pan imageries as well as 2 MS-Scenes have been selected to cover the project area. For a particular part of the area, IKONOS imageries have been used as a MS set (blue, green, red and NIR) with 4m resolution, and as pan with 1m. A colour-composition and pan sharpening was also done. The year 1988 was prepared based on Russian satellite photographs from KVR-1000 camera with 2m resolution and KFA-1000 camera with 5m resolution. The historical imageries for the years 1968 and 1945 have been created out of aerial photographs. The population growth and the increase of residential area have been compared. A number of environmental indicators related to political keys, such as law-restrictions were used to measure the sustainability of the area.

2.3   GIS IN ECOTOURISM PLANNING AND MANAGEMENT

Bukenya James Obadih (1999)[46] applied GIS for Ecotourism Development Decisions Making in Uganda's national parks of Africa. This study demonstrates the uses of geographical information system (GIS) and multi-criterion decision-making framework (MCDM) in solving a spatial multi-objective problem of ranking and prioritizing Uganda's national parks for ecotourism development. The ranking model adopted allows formal analysis of the effects of alternative weighting schemes and their spatial sensitivity on national park ranking. The multi-criterion problem formulation and analysis procedure includes defining the desired goals, objectives or purpose of the project, Selecting evaluation criteria that can relate technology capabilities for achieving the desired project goals or

objectives, identifying the alternatives that are candidates for ranking and performing the selection process using one of the MCDM techniques. The results show that (1) Uganda's national parks can be arranged and ranked into three subgroups, and (2) the national parks in the western region of the country are ranked higher than those of the other regions, because of beautiful weather and a perfect environment for wildlife.

Garrod Brian (2003)[61] emphasised on local participation in the planning and management of ecotourism. His study sets out to identify a number of elements of good practice in incorporating the fundamental principles of local community participation into the processes by which ecotourism projects are planned and managed. Taking lessons from this good practice, and drawing on a model previously developed in the early 1990s by Susan Drake, Brian introduced a revised model approach for local participation in the planning and management of ecotourism. He begins his study by examining various theoretical approaches to local participation; in particular, the 'involvement' of the local community is contrasted with their 'participation'. Thus he outlined some of the major benefits of moving from the former, which is common in the ecotourism planning and management context, to the latter, which is evidently less so. He then highlights some elements of best practice in incorporating local participation in the planning and management of ecotourism. These include the requirement for effective leadership, the need to empower local communities to participate, the need to link economic benefits to conservation, and the importance of allowing the local community to participate at all stages of the project cycle especially in monitoring and evaluation.

Boyd and Butler (1996)[43] demonstrate the application of GIS in the identification of areas suitable for ecotourism in Northern Ontario, Canada; in particular natural areas, containing rare or endangered species or habitats in remote/peripheral areas. Basically they produce an inventory of various characteristics associated with natural landscapes. GIS was used for inventory mapping, buffering (identifying areas of human intrusion) and overlays mapping.

International Council for Local Environmental Initiatives (ICLEI) in their Seventh Session, at New York (1999)[4] presented a paper on tourism and sustainable development from a local authority perspective. They inscribed that a truly legitimate and practical discussion on sustainable tourism must take place in and with the communities that are being

influenced by tourism industry development. It must create accountability of the tourism industry to locally defined development visions. They raised a general call for the tourism industry, through both its local and transnational agents, to join and support the local communities where tourism is a fundamental development force. According to them the true proof of "sustainable tourism" will be the sustainable development of local communities that serve as tourist destinations. Increased local social welfare; greater and more equitably distributed local economic wealth; and enhanced integrity of local ecosystems; - were described as the three basic objectives of sustainable tourism development.

Ologun, Taaiwo and Adeofun, (2004) they discuss for tourism potentials in Nigeria to beautified sustainably, the necessary infrastructure and enabling environment and information on tourism which will attract tourist must be available. Enabling environment in this case refers to all the parameters required to make complete tour, such as good road, functional telecommunications, and good accommodation adequate security. Information on the existence of attractions sites and these infrastructure must be available to tourists and the general public this means that raw data on tourist sites and infrastructures has to be gathered ,processed, structured ,then stored and organized in a such way it is easily retrievable from storage.

Williams et al. (1996)[111] also use GIS to record and analyses tourism resource inventory information in British Columbia, Canada. They argue that competitiveness requires tools beyond traditional marketing and finance techniques to manage the development and delivery of nature and heritage-based tourism experiences, in the context of environmental pressure, resource scarcity, inter and intra-industry competition for resources and land-use issues. One of the problems for tourism stakeholders is that they do not have the types of information needed to effectively assert their point of view in land-use planning issues. The systematic inventory of natural and cultural resources is important to both tourists and the tourism industry. The GIS produced, broadly speaking, three different types of information: tourism resource maps, tourism use maps, and tourism capability maps

Banerjee et al. (2002)[37] dealt with Remote Sensing & GIS to identify potential ecotourism sites in forest dominated Western Midnapore of West Bengal in India. After identifying the potential sites, a demonstrative plan has been made for ecotourism development based on locally available natural resources. IRS 1D LISS III Data and soil

samples has been analyzed to generate vegetation density map, land use/land cover map and soil productivity map. These maps are taken as the parameters to evaluate the area of high ecological importance. For this purpose a weighted approach was adopted to identify the areas having ecotourism potentiality. Banerjee et al. opined that the higher the vegetation index and higher the soil productivity, the higher will be the forest density, so such sites were considered for conservation. 4.42% of area comes under highly potential ecotourism spots followed by 25.67% under moderately potential and 9.62% which comes under low potential are advised for development of ecotourism infrastructure.

In India, Sudhakar et al (1995)[108] carried out a forest change detection study over nine districts of West Bengal. This paper deals with the monitoring of forest cover changes through digital classification techniques using IRS LlSS II satellite data of 1988 and 1991. They also have done a comparative assessment of forest density classes within each forest type between 1988 and 1991 to find out the changes from dense to open, dense to degraded, open to dense, open to degraded, degraded to dense, degraded to open and finally the decrease or increase of plantation area in 1991 with respective to 1988. To achieve this goal they developed new software for aggregating the data of 1988 and 1991 and generated a "truth table" in the form of matrix for all the major classes to compare the class pairs from 1988 and 1991 according to the logic in the truth table. The change detection map depicted the change and nature of change. This study on forest cover change detection of nine district of West Bengal revealed that there was an increase of 0.65 percent of forest cover and about 0.97 percent (around 1 percent) of total vegetative cover to the total geographical area of the state.

2.4   GIS IN SUSTAINABLE LAND USE PLANNING

A case study by Erdenetuya and Khudulmur (2002)[57] on land cover changes and pasture estimation of Mongolia was based on the normalized difference vegetation index (NDVI) derived from NOAA/AVHRR data. Considering the resolution of the AVHRR data and seasonal spectral curve of all classes, minimum mapping unit and expert's views in the field, 11 land cover types were identified for Mongolia for 1992/1993 and 1997. They have made DEM analysis to distinguish grassland area and forest. NDVI value was the main tool to estimate vegetation dynamics for whole territory of Mongolia. From the interpretation of multi-date NOAA/AVHRR data of 1992, 1993 and 1997, they have found that the total forest area in Mongolia including deciduous needle-leaf, deciduous broadleaf, coniferous forest and

all mixed forest is about 12.7%. Grassland consists of permanent pastureland and a tall and a short mountain grasses with shrubs. The cropland has complex cropping patterns depending upon the topography, seasonal climate, and vegetation condition. In the southern part of Mongolia is Gobi desert, and it has too sparsely vegetation.

Yamamoto and Sukchan (2002)[112] carried out a land suitability analysis concerning water resource and soil property. In this study, the land suitability for major crops in the Northeast Thailand such as rice, sugarcane, and cassava ware assessed based on soil properties and water resource availability. The criteria for soil suitability in Thailand are defined by the Soil Survey and Classification Division (2000) of Land Development Department (LDD). Following the criteria, soil suitability maps were produced. Water resource in this analysis was restricted to surface water such as ponds, reservoirs and rivers, which seemed to be easy to use by farmers as reservoirs. Soil suitability map and water resource availability map were integrated to produce the land suitability map and it was then compared with the current land use map produced by multi-temporal satellite imagery to consider the conformity to it.

Symeonakis et al. (2004)[109] highlighted the relationship between landuse / landcover (LULC) changes and land degradation in Spain and Greece, using remotely sensed and ancillary data. The areas of study have both been subjected to changes in LULC, such as abandonment, overgrazing, forest fires and tourist development. Landsat MSS data of 1970s were used for the mapping of historic landuse /cover types whereas Landsat TM and ETM+ data were employed for the analysis of their recent state. The SCS Curve Number method (SCS, 1972) was utilised for the estimation of event runoff. In a GIS environment they have used a physical-based soil erosion model developed by Thornes (1985, 1989) in order to study the susceptibility of the areas affected by changes to overland flow and rain-splash erosion. The model consists of four parameters, namely soil erodibility, slope, vegetation cover and overland flow. Their results show increased susceptibility to runoff and erosion mostly for those areas were forest fires, urbanization, and/or overgrazing were the main causes of change and they suggested that mitigation measures should be taken for prevention of further degradation.

A case study by M.K. Jain (2003)[67] on Danda watershed in Tehri Garhwal district of Uttar Pradesh also proves the capability of geoinformatics in land use planning and

management. All spatial information for this study has been derived from SOI toposheet, IRS-1C LISS-III data and IRS-1C PAN data. From the details of various soil profiles and landscape features, the land capability classification was done and grouped into three land capability classes viz. Class IV, class VI and class VII lands. Database chiefly derived from remote sensing, on natural resources such as present landuse, land capability, slope, soils, hydro-geomorphology etc. were organized in different layers using Integrated Land and Water Information System (ILWIS) software. An integrated layer of Composite Land Development Units (CLDU) was created by intersecting the resources layers and set of decision rules were applied on CLDUs to generate action plan map, showing location specific recommendations in the watershed.

Prasad et al. (1999)[96] used Remote Sensing and GIS for Sub-watershed Prioritization and Watershed Management in Nepal. In this study, sub-watersheds of Trijuga River watershed in Eastern Nepal were prioritized by considering their degradation condition and land sensitivity. They defined land sensitivity as the locational relationship between forest loss and soil loss. Universal soil Loss Equation in conjunction with Remote Sensing and GIS had been utilized for estimating soil loss and land cover change. The rate of forest degradation of the study area ware estimated to be 0.57 per cent per year, which was too high while considering the sustainability, along with 0.42-mm/year increments in soil erosion rate between 1978 to 1991. Prasad et al. proposed the new concept of conservation prioritization by considering sub-watershed degradation speed, sensitivity index and present rate of soil erosion. Based on conservation prioritization, slope stabilization, slope failure protection, gully control by check dam, reforestation, growing of horticultural crop along with some other intensive soil conservation activities are proposed for the first ranking sub-watersheds. Fifth ranking sub-watersheds need little attention like maintaining the crown cover and protection of the existing forest along with managed agriculture. Other sub-watersheds are advised to be treated by intermediate activities according to their ranks.

Sharma et al. (2000)[101] used Remote Sensing and GIS for micro-watershed development plans in a part of Shetrunji River basin of Bhavnagar district, Gujarat. The methodology comprises an integrated approach using multi-date satellite data for preparation and study of multi-thematic maps at 1:50,000 scale. Based on subject domain decision rules for land and water management, they have integrated the natural resources and demographic theme in GIS to identify the problem areas and to provide prescriptions for solving them. The

action plan maps thus generated were consequently validated in the field in consultation with local experts. The main recommendations for water resources were a) prospective sites for rain water harvesting / ground water recharge through construction of small, low cost structures like small masonry check dams, nala bund and nala plugs using local material and techniques across lower order streams. b) Desilting / deepening / modification of existing tank / pond structures to increase the water holding capacity and facilitate recharge to ground water. The land resources plans depict conservation measures with suitable change in land use / land cover. Priorities (high, moderate and low) for development have been provided based on existing physical parameters within the micro-watersheds. The suggestions are: staggered pits and afforestation with non-grazing variety of trees, contour trenching and deforestation, contour trenching and silvipasture, protective bunding and silvipasture in sheet erosion areas, agro-forestry, Double Cropping with ground water exploitation etc.

Indian Ministry of Rural Development in 1992-94 conducted a developmental program called "Integrated Mission for Sustainable Development". Under this mission a case study by Radhakrishnan et al. (1994)[97] on Nayagram Block of West Bengal, is relevant to this thesis. As per the emerging trend of planning where a natural boundary like a watershed is considered as the basic unit for development, they have selected a small watershed enveloping the Nayagram block for the study. The Action Plan is derived on the basis of the integration of the satellite data sets - along with the collected socio economic and rainfall data. Land capability map along with water resource development / management and watershed prioritization map are also prepared. A Backwardness Index map is utilized to fix the priority for phase wise implementation. For optimal as well as rational utilization of the local resources, an action plan of the study area has been prepared through integration of the various theme maps. The action plan also included the locale specific futuristic considerations such as exploitation of ground water, efficient system of soil conservation and surface water management.

Another case study under the same mission (Integrated Mission for Sustainable Development: Phase-II) by Parthasarathi Chakrabarti (1994)[49] covered Dwarkeswar watershed of Purulia and Bankura districts and Subarnarekha watershed of Medinipur district, West Bengal. The main aim of his study was to generate action plan for the area under consideration, which is optimally suitable for the terrain as well as for sustainable use of the local resources. In response to that, the various theme maps have been integrated through GIS

or manual method for preparation of an Action Plan Map with village boundary and watershed boundary. This action plan map was supported by a detailed write-up for conjunctive use by both the decision makers/planners/administrators and executives.

Mahapatra et al. (1996)[80] applied remote sensing technique for sustainable development in Donari Jor Watershed of Orissa, India. IRS-IA LlSS II FCC has been analyses to gather information on various natural resources. Integration of all such information enabled him to evolve an action plan for sustainable development of the area. Socio-economic aspects and natural resources information have been superimposed for preparation of the action plan. The groundwater potential in the piedmont zone and the moderately buried pediplain in the western part of the watershed found to be good. Areas where groundwater condition is good and the soil moisture is moderate to good, allotted to relay crop, which utilizes the natural moisture in the soil, and intensive agriculture by exploitation of groundwater. Thus most of the land under kharif crop has been allotted to agro-horticulture / agro-forestry / horticulture. Groundwater in shallow buried pediplains in the southeastern part of the watershed was poor. In this part surface water harvesting structures for irrigation is advised. In the hill slopes and pediment areas the suggested action plan includes horticulture and hortipasture. Intensive forest plantation has been suggested for degraded areas inside forest boundary which are degraded or under thin cover of vegetation.

Land use / land cover changes also assessed in urban districts of India. Based on the remotely sensed spatial data as well as the non-spatial data available from the various sources for different periods, M. Mohan (2005)[86] studied the changes of land use land cover of National Capital Region (NCR) Delhi lying in the Faridabad district. The Indian Remote Sensing Satellite IRS 1C and 1D multi-resolution sensor as Panchromatic (PAN) and Linear Imaging Self Scanner (LISS-III) imageries of the study area with ground resolution of 5.8 and 23.5 meters respectively have been used for two different periods. The Geographic Information System (GIS) and Remote Sensing (RS) tools such as the Arc/Info, ArcView, GeoMedia and ERDAS have been used for geographical analysis, integration, and presentation of the spatial and non-spatial data. At first he analyzed the urban land cover and existing land use changes; then examined the urbanization impact on the land cover / land use changes; and lastly he explored the suitable strategies for sustainable urban development. According to him the spatial digital data is comparatively more useful than other methods of data collection especially for urban land cover / land use change detection studies.

2.5 ECOTOURISM AND ECONOMIC DEVELOPMENT

Kahveci et al. (2003)[69] sustainable development of 48 proposed forest and forest villagers in Turkey by ecotourism development. They wrote that lack of social and economic infrastructure in the forest villages leads to social pressure on forest resources, which should be reduced for the sustainable management of forest resources. Ecotourism implementations in suitable forest villages may be the best income-generating activities that are also ecological. In this study, firstly ecotourism understanding of the Turkish foresters and related publics are introduced regarding the relation among ecotourism, sustainable forest management and rural development. Then, expectations of the ecotourism activities are discussed and some projects those are implementing or in formulation stage are explained concerning their aims, activities and constraints. In order to develop an effective ecotourism management in Turkey, Kahveci et al. have made following suggestions. A feasibility study should be realized, public awareness on ecotourism should be increased and local as well as national ecotourism development strategies and policies should be developed.

Sarraf et al. (2004)[100] of World Bank Environment Department, estimated the cost of the environmental degradation in Lebanon and Tunisia. It was a process toward using environmental damage cost assessments for priority setting and an instrument for integrating environmental issues into economic and social development in the Middle East and North African region. The report represents one of the first attempts in the region to quantify and monetize the cost of degradation across a wide range of environmental issues. They wrote that Lebanon, at twice the income level of Tunisia, has suffered severe coastal and natural resource degradation in the past three decades, associated in particular with uncontrolled construction. There is for instance now very limited potential for international beach tourism due to this degradation in Lebanon, in contrast to Tunisia with millions of beach tourists along relatively well-preserved coastal areas. As to the specifics of the estimates presented in this report, the annual damage cost of environmental degradation in 2000 in Lebanon was estimated at 2.8 - 4.0 percent of GDP with a mean estimate of 3.4 percent of GDP, or close to US$565 million per year. In Tunisia, the annual damage cost of environmental degradation in 1999 was estimated at 1.5 –2.7 percent of GDP with a mean estimate of 2.1 percent of GDP, or close to US $440 million per year.

From USDA Forest Service, Greg Mc.Pherson and David J. Nowak (1995)[85] quantitatively discussed the role of Colorado's urban forest in providing environmental benefits to the community in monetary terms. Aside from the obvious aesthetic benefits, they also discussed the role of trees in improving air, protecting water, saving energy, and improving economic sustainability. Monetary valuation of carbon sequestration, reduction of other pollutants, rainfall interception and soil loss reduction by a mature tree, were also done. They wrote that unlike urban areas in the eastern US, canopy cover in Colorado decreases along an urban to rural gradient. In other words, since most trees have been planted, much of the tree cover is in urban areas as opposed to "natural lands". Therefore, estimated pollutant uptake rates are higher for residential compared to natural or unmanaged lands. They advised that air pollutant uptake benefits from tree planting may be optimized by planting in areas where air pollutant concentrations are elevated and where relatively high planting densities can be achieved thereby enhancing the health of urban dwellers.

Lambur et al. (2003)[75] made a Cost Benefit Analysis of Virginia Expanded Food and Nutrition Education Program (EFNEP). The most useful part of this paper is that the cost of each and every appropriate disease / condition treatment is documented from relevant scientific literature. All treatment costs of diseases / conditions included in this study have been compiled from "Healthy People 2000" (U.S. Department of Health and Human Services, Public Health Service, 1990) unless referenced otherwise. Other data from the literature include the incidence of the disease in the US population, the percentage of the disease attributable to diet, the average age of onset of the disease and the average years of survival after treatment. The CBA of Virginia EFNEP suggests that the monetized benefits exceed costs of the program. Given all of the above, the benefit to cost ratio of Virginia EFNEP is estimated by Lambur et al. as $10.64 / $1.00.

Brown et al. (2004)[44] made A Cost-Benefit Analysis on noise pollution of O'Hare International Airport of Chicago, USA. To measure potential benefits, several methods are employed. First, a contingent valuation survey is conducted to get a idea of the value and individual places on reducing airplane noise. Second, numerous studies are consulted to shed light on the negative health and learning effects resulting from aircraft noise disturbances. Third, an econometric regression demonstrating hedonic pricing is used to illustrate the property value differences associated with airline noise emissions. Fourth, the averting costs of residential sound insulation are used to measure benefits through people's willingness to

pay. They have found that individuals exposed to airport noise are 60% more likely to develop hypertension and 40% heart disease. Using data from "Health on the Net Foundation" they showed that the total health related costs regarding hypertension and blood pressure related heart disease are $43,640,000 annually. Lastly Brown et al. suggested few noise reducing measures like installation of triple pane windows, installation of prime/storm doors etc. And total cost of that estimated to be $1,994,291,455, which is far less than $6,462,210,324 of treatment cost.

Sadowske and Alexander (1992) caution that prior to implement an expensive marketing strategy, communities should be aware of other costs associated with tourism development. They also argue that the key to success in tourism often lies in communities striking a balance between the private and social costs and benefits of rural tourism development. Tourism can be an important force for developing disadvantaged rural areas. In particular, rural communities with few other options for development may perceive that tourism represents a panacea for growth. While tourism can certainly be an important component of a sound development plan, this is not always the case.

Social Cost-Benefit Analysis of Delhi Metro (India) by Murty et al. (2006)[88] provides a thorough description of individual social entity affected by this project. This study revealed multiple benefits of Delhi Metro like reduction in air pollution, time saving to passengers, reduction in accidents, reduction in traffic congestion and fuel savings. The incremental changes in the incomes of various economic agents like passengers, transporters, public and government and unskilled labour due to the Metro have been estimated by considering the Delhi economy with and without the Metro. Murty et al. found that there are income gains to the government, public, passengers and unskilled labour while there are substantial income losses to the transporters because of the Metro. The economic rate of return on investments in the Metro is 21.5 percent at market prices, while the financial rate of return is only 17 percent. The economic rate of return increases to 23.9 percent after accounting the differences between shadow prices and market prices of unskilled labour, foreign exchange and investment in the Indian economy and the benefits from the reduction in urban air pollution in Delhi due to the Metro.

Modal et al. (2011) in the Tribal Jangalmahal Tribal Resistance analysis of tourism, economists emphasize the economic effects of tourism development on the economy.

Because tourism is a multi disciplinary activity that involves several industries and draws upon a variety of skills, its benefits are spread over a wider section of society comparatively to other sectors of the economy. Pioneering studies from have highlighted the potential effect of the tourism industry in promoting growth, creating jobs and generating revenue for the government. This economic relationship is known as Tourism Led-Growth hypothesis. According to this hypothesis, the international tourism is considered as a potential strategic factor for economic growth; so that, tourist spending, as an alternative form of exports, provides the foreign exchange earnings. Subsequently, it is used to import capital goods to produce goods and services, which in turn leads to economic growth in host countries. On the other hand, international tourism would contribute to an income increase at least in two additional ways: first, enhancing efficiency through increased competition among firms and others international tourist destinations and second, facilitating the exploitation of economies of scale in local firms. Likewise, Tourists usually demand main goods and services such as accommodation, food, transportation facilities and entertainment services in host country. In most developing countries, to satisfy this demand, the current level of production needs to increase. This provides two positive effects on the economy: first, increase in production and income and other, increase in employment (because the tourism industry is labor intensive).