CHAPTER - 1

INTRODUCTION

I.A. Conceptual Framework

I.A.1. Ecosystem: A Geographical Perspective

An ecosystem is evolved in a region, over a period of time, as a result of physical, socio-economic interactions between man, other organisms and environment. The quality of ecosystem is determined by the level of different attributes of physical and human resources that are available within a particular region. In reality man is the central part of the geographical ecosystem. Man modifies the system by breaking the ecological law and creates his own system. In the interaction of man and environment, man decides the utilization of physical resources, depending on their availability, his needs and technological advancement which are reflected on spatial pattern of numerous 'Regions'. The interaction varies, so do the levels of regional development. Hence geographical aspect of this interacting system is to classify the levels of regional development, identify the processes by which such levels have come up and suggest how to plan such "spatial system" so as to make them sustainable regions. The concept of man's role in the environment and their relationship are the basic themes to geographic study of an ecosystem. It deals with a continuum of environmental regions of various sizes which range from micro environment of the individual in his local surroundings to the macro environment of mankind as a whole (Haggett P, 1990). The discipline of geography deals with the elements of human and physical environment and the interactions and transformation processes on which man exists and depends. Fundamentally, an understanding of human and physical environment and their interacting cycle are the main objectives of geographical study. An identification and examination of human importance in the complexities of different
ecosystems and their changing character over time and space through a holistic aspect also constitute geographical perspectives of the environmental processes. Hence, through this concept, one should be able to understand the totality of the ecosystem and can plan for the environment towards a sustainable development.

I.A.2. Human Impact on an Ecosystem

Environment influences man's activities and at the same time it is influenced by man's action through technological advancement. Interaction of man with his physical environment may differ by different technological uses. The interacting ecosystems may vary even if the physical base may be the same. Changes can be due to both by human intervention and natural processes which change over time and space. Man has modified the ecosystem by destroying biodiversity for maximum productivity. By altering the physical and biotic environment, he has created forest land into a crop land, grass land into grazing land and by altering the hydrological cycle again he has created cropland into water logged and marshy land. At least half of the global land surface is no longer covered by natural ecosystem, but has been modified by humankind for various purposes: cropland, pasture, and plantation (Mooney and Sombrock, 1992). Due to development in technology, the complexity and magnitude of impact have been increased over time and space. In reality, the intensification of impacts and interferences in the ecosystem are mainly because of over population and increasing demands of per capita consumption of resources.

Human interference is always concentrated on the natural resources. Degradation of an ecosystem in any place is a continuous process of deforestation, soil erosion, deterioration of biological property, salinity, overgrazing and other biotic and abiotic stresses such as flood, drought, pest, disease etc. Many signs of the deterioration of the global environment coupled
with substantial losses in productivity are becoming evident in both agricultural and natural ecosystem (Brown et al., 1990). Man himself has created the degradation of land and degradation of environment. On the other hand, degraded environment is also a product of physical hazards. "Land degradation can undermine and frustrate economic development, while low levels of economic development can in turn have a strong causal impact on the incidence of land degradation" (Blaikie and Brookfield, 1987). Thus, each of the effects in the ecosystem is dynamic and complicated in nature. The human impact on land, water and climate is multifold. New landforms have been created by changing geomorphological processes. As a result, weathering, erosion, and deposition have intensified on the land surface. In response to different land uses, the vegetation cover has been destroyed and soil properties have been lost due to erosion, salinization and deposition. "Soil erosion brought about by agriculture is a more serious pollutant of the world's water than the industry: many of habitats have changed which affect the wild animals and are brought through agricultural expansion. Soil salinization and desertification can be regarded as two of the most serious problems facing the human race. Landuse changes, such as the conversion of forest to fields, may be at least as effective in causing anthropogenic changes in climate as the more celebrated burning of fossils, fuels and emission of industrial aerosols in the atmosphere" (Goudie, A. 1990). Agricultural activities have greater impact on the natural ecological balance through interference in hydrological cycle, depletion of ground water, desertification, degradation of soil, disturbing the bio-diversity. Considerable amount of environmental degradation has been the result of lack of awareness about environmental problems, faulty landuse practices and inefficient management in the rural agricultural sector. The changes are already occurring due to worldwide degradation of agricultural land by erosion, salinization, and waterlogging which are causing the irretrievable loss of an estimated six million hectares each year. More than half of the estimated 11.6 million hectares of forests cleared annually is to compensate for degraded agricultural lands. The recent estimates suggest that, rapid population growth and consequent expansion of agricultural land on marginal lands plus management of good land have accelerated the annual loss to 5-6 million hectares (FAO, 1991). This situation may get even worse,
with two billion hectares being degraded over the past 50 years alone, and about 25% of the present land being affected by human induced soil degradation (Oldeman et. al., 1990). Dregne (1991) suggested that 70% of the productive dry land is affected, that is about 3.6 billion hectares: 3.3 billion hectares of range lands, 214 million hectares of rainfed farmland and 38 million hectares of irrigated farm lands. Human impact is not only limited to land degradation but his intervention in the natural processes has also created significant changes in hydrological and climatic cycles. The UNEP State of the Environment Report (1992), 'Saving Our Planet', identified ten major environmental issues created by humans all over the world such as:

1. Atmospheric pollution (local, transboundary and global)
2. Stratospheric ozone depletion
3. Climatic change
4. Fresh water (quality and quantity)
5. Marine environment (pollution and resources)
6. Land degradation (including desertification)
7. Deforestation and destruction of natural habitats
8. Loss of bio-diversity
9. Environmental hazards
10. Generation and disposal of hazardous wastes.

In short, all changes are the net result of man’s direct and indirect impact on the environment. However, not only the human impact, but also the different physical hazards are considered as vulnerable forces for the degradation of ecosystems. Degradation of agricultural land by physical and human factors leads to extension of cultivated land into more marginal land with lower productivity which are already degraded. Those ecosystems which are subject to degradation cause ecological imbalances both from physical and socio-economic point of view. Degraded ecosystem in turn, create poverty.
Another important aspect in the environmental process is the growth of inequity between rich and poor, in terms of disparities in income, and sharing of resources. The disparities mean that the rich are getting richer while the poor are getting poorer. It is estimated that over a billion people (approximately 20% of the world population) exist in conditions of extreme poverty, lacking adequate nutrition, access to safe drinking water, sanitation, health care and housing (Reid, D., 1995).

If environmental degradation continues for a long time the man of any ecosystem will be facing backwardness. The root cause of backwardness is degradation of land. It creates a low level of economic and socio-cultural development in terms of landuse, land capability, yield, income, nutrition, health etc. Poverty makes the ecosystem more backward and is cyclical in nature. It has been noticed that, over a period of time the human sustainability has decreased. Instead of improving the environment, people have migrated to other places for food and for sustainability. As a result, the degraded ecosystem has become more degraded and has gradually reached an extreme limit from where, regaining the precious environmental situation is quite a difficult task. Hence, it is urgent to conserve and restore the environmental quality through suitable planning and management of physical and human resources for the sustainable ecological development.

I.A.3. Need for Development

Backwardness and underdevelopment of any ecosystem are controlled by the geographical environment formed by its natural and man-made artificial processes. Resources are arranged by nature and exploited by human being. Many forms of development erode the environmental resources on which they are based, and similarly, environmental degradation can also undermine economic development. Poverty and environment are reciprocally linked, poverty being recognised as a major cause and effect of global environmental problems (WCED, 1987).
To protect the ecosystem from further degradation, there should be a break in the vicious cycle of deterioration. Planning and management must be the long term future goals for the sustainability of an ecosystem and development of physical and human environment through comprehensive and far ranging programmes. Local and regional study will be more helpful for the better understanding of the complex interactions of man with his environment at a grassroot level. The developmental planning in these cases have to be integrated and multidisciplinary in terms of restoration and improvement of degraded lands, optimum use of natural resources and findings of alternative economic sources within the limitation of ecological boundary. It is necessary to find out options for land development and improvement of carrying capacity through better yield of crops with higher calorie and protein. Thus, classification of land in relation to their capability and selection of landuse will be more meaningful for the sustainable use of land. Moreover, planning should concentrate on alternative sources of development. The conservation of ecological processes and life support system, restoration of genetic diversity and sustainable utilisation of resources, should be the main objectives of any planning programme. It can generate support for the present generations while maintaining its potentiality for the future. The sustainable development should be the primary long term goal which will ensure sustainability of man in their origin, where they can continue their development within the specific ecosystem. The importance of the concept of sustainable development is that it is built on the realization of the need to alleviate the global crisis in a systematic way that integrates human, ecological and economic factors (Reid, 1995). The concept of sustainable development includes:
The two key concepts of sustainable development are linked by their dependence on equity; human needs cannot be adequately met unless resources are shared. The limited goal of physical sustainability requires equity, both inter-generational and intra-generational (Reid, 1995). The risk of unsustainable outcome and negative impact on ecosystem can be avoided through the use of environmentally sound technologies. Moreover, by limiting the consumption of resources, the impact of economic activities can be brought under the level of sustainability. The restoration of potentiality of resources, increasing sustainable yield by environmentally suitable practices, improving farm and non-farm activities etc., the ability of ecosystem can be improved to absorb the impact of developmental constraints. Finally, planning for the development of ecosystem should be integrated and applied with the participation of local people through the organization of farmers, women, and youth in co-operation of government and non-governmental organizations.

I.A.4. Regional Concept in the Study of Ecosystem

Various physical and human indicators and their inter-relationships constitute the unique structure of a region. A region is a spatial unit with a homogeneous geographical identity in terms of physical and human resources. The ecosystem of any region is different from others, depending
on the environmental quality in which plants, animals and human life develop and interact in a similar way. It reduces the physical, biological and socio-economic variety by a comprehensive boundary of homogeneous features. However, a demarcation of a regional boundary cannot be easily identified depending on the physical base. Internal variations may occur within the region, because interacting ecosystem of any region may differ according to the technological use of man within the same physical base. Hence human factors have equal importance for the demarcation of regional boundary.

The demarcation of space is one of the major aspects of interest in the regional planning. It is a relatively new field in geographical study which is concerned with spatio-temporal dimension in developmental planning. However, the demarcation of regional boundary also depends on the objective of the study and the element of planning, such as, identification of resource potentiality, utilization and associated problems. The regional study is formed of two concepts: inter-regional study and intra-regional study. Inter-regional concept is based on the study of physical and human environment and their differences with a geographical boundary by taking region as a whole; while intra-regional concept is related to the study of variations that exit within the region. Identification of resources and developmental potentiality are important aspects of regional development studies. This framework of regional studies is realistic as each region is considered as a system in physical and human resource based on common developmental problems. Each region is formed of an ecosystem, depending on the interaction between the physical and human environment. For the planning of any ecosystem it is important to identify the components, processes and structure of the environment which form the base for the development of an area which is known as a ‘region’.

I.A.5. Ecosystem of a Coastal Region

In a coastal eco-system, both land and sea are considered as equally important physical units. Human activities also depend on both land and sea. The characteristic of the coastal ecosystem
is dominated by different geomorphological processes; it is shaped by the geological structure where the land and sea meet. Erosional and depositional processes are interrelated to the pattern of sea waves, currents, rise and fall of the tides and create various types of physical features like cliffs, beaches, spit, marshylands etc. However, most of the coastal plains are formed by depositional activities. As a result, the coastal soil becomes homogeneous in terms of structure, mineral contents and soil nutrients. This also limits the biological characteristics including the human activities such as landuse, agriculture, occupation etc. However, the coastal areas are most suitable for human habitation as the land provides an opportunity for agriculture, fishing and trading activities with the development of natural ports in the coastal region. Besides these economic activities, it also provides different recreational facilities. The coastal plains and coastal oceans occupy respectively 3% and 5% area of earth's surface, but perhaps account for about 25% of the global biological production and include the most productive ecosystems on earth having very important human civilizations (Ray, 1989). However, the coastal region is also subject to different physical hazards like, marine ingression, flood, erosion, deposition, cyclones and the problem of salinity in soil and water. These factors pose limitations over the growth of plants, animals including the development of human beings.

Generally, coastal regions of an enclosed sea e.g. gulf, delta, etc. are dominated mainly by depositional action of rivers and the sea. Tides and floods over large flat, low lying areas of the gulf bring muddy saline water which creates tidal mudflat, salt marsh, spit, beaches etc. The marine biota affect coastal geomorphological processes in a wide variety of ways -- building of reefs, accumulation of carbonate sediments, erosion by boring organisms, shoreline stabilization by mangrove and salt march communities (Spencer, 1987).

Many coastal environments have been changed by the dynamic natural processes and to some extent are modified by the direct and indirect impact of human activities. For example, deforestation and various landuses within the region and catchment of rivers draining to the
coast increase the discharge of sediment and pollutants. As a result, it increases the rate of siltation. Marine ingression and flood increase the salinity of soil and water. These problems are most acute especially in low areas associated with agricultural development, deforestation, wetland reclamation and river management on the fluxes of water. Man simultaneously changes the coastal landscape for maximum productivity. Estuaries, shelves, seas and the continental slopes are extensively used by people in a wide variety of ways, e.g. recreation, energy production, transportation, etc. It provides 95% of the total marine fish catch and receives much of the waste materials that result from urban and industrial development (Bernal and Holligan, 1992). It has been noticed that, many coastal regions are over exploited and poorly managed by the human beings. If this trend continues for a long time, these coastal regions will be non-amenable to sustain human beings in future.

I.B. Objectives of the Study

The study intends to throw light, from a geographical perspective on the physical processes and interaction of man in that physical system on the one hand and the impact of human activity on the other with reference to coastal ecosystem of the Bhal region of the Gulf of Khambhat in Gujarat.

The main objectives of the study are as follows:

1. To know the physical and human components and processes of the coastal area of the Bhal region;

2. To identify the impact of physical and human factors for the degradation of the ecosystem and the effects of land degradation over time and space (1971-91);
3. To know the intra-regional disparity in micro level sustainability;

4. To find out the physical and human resource potentiality at macro (regional) and micro (village) levels; and

5. To find out suitable measures for better conservation, management and development of the environment and planning for a sustainable development.

I.C. Literature Review

From the literature survey conducted for this study it is found that the studies on man and environment which are directly related to the coastal eco-system are limited in number. However, a few relevant studies are mentioned below:

Studies on ecosystems by various ecologists, biologists and geographers provide a detailed analysis of ecosystems from various points of view. All the studies are concerned with the geographically distinct units and complex ecological systems. The concept of ecosystem and the relationship between diversity and stability in particular was promoted by Odum (1963). Odum suggested how certain ecological principles can be applied in a practical way to our environmental problems. Van Dyne (1966) suggested that the ecosystem implies interacting, interdependent complex relationships. Ecosystem, according to Margalef (1968), is a set of different elements or units which is linked by reciprocal influences and constitute a feedback loop. Clapham’s (1973) work also provided a detailed understanding of ecosystems, ecological cycle and ecological principle. The work of Smith (1976) provided a complete theoretical concept of the complex ecosystem. The study of Haggett (1975) provided a complex concept
of ecosystem from geographical point of view. His study is relevant to current concern relating both with the environment and ecology and with the regional contrasts and imbalances in human welfare. The work of Darling and Dasmann (1976) suggested individual animal, plant or human survivor within an 'ecological niche'. It is defined with the habitat and the role played by the organisms within it. Blaikie and Brookfield (1987) suggested a simple classification which may be modified to be applicable to ecosystem in general, such as, Ecosystems of low sensitivity and high resilience; Ecosystem of high sensitivity and high resilience; Ecosystems of low sensitivity and low resilience; Ecosystem of high sensitivity and low resilience. Park (1980) described ecosystem as a basic functional unit. Further, he has classified the environmental systems into three categories such as, Natural system unaffected by human interference; Modified system affected to some extent by human interference and Control system by human interference. According to Miller (1991), an ecosystem has six major features: interdependence, diversity, resilience, adaptability, unpredictability and limits. Sinha's (1990) work highlighted some of the natural resources and their system in relation to man, as spatial linkages on economic, social and political grounds.

So far as geological and geomorphological studies of coastal ecosystem are concerned, Davies' (1972) work dealt with different geographical variations in coastal development. Further, he has classified the mudflats and their characteristics on the basis of tidal conditions into sub-tidal, inter-tidal and the high-tide flats. Similarly, Pethick (1984) examined the processes for mudflats, salt-marsh and other morphological features in the coastal tract of Netherlands. The work of Nayak and Manikiam (1989) dealt with the analysis of physical and geomorphological structure of coastal landforms, wetlands and mapping of changes in shoreline of coastal areas of India through Remote Sensing data. Ahmed's (1972) work provided a detailed understanding of coastal geomorphological structure of India. Gregory and Walling (1979) analysed the various physical processes and human response to an environment. Postma and Zijistra's (1988) work dealt with variable geomorphological features and energy which was determined
by tidal and wind mixing, upwelling, the influence of ocean currents and effects of fresh water inputs on coastal circulation. Hayden et. al. (1984) compared the structural and functional properties of marine ecosystem and suggested developing methods for classifying coastal ecosystem at different scales. Kempe (1988) studied the functional attributes of marine ecosystems including bio-geochemical and bio-geomorphological processes that represent mechanisms of biological feedback on the marine environment. Ray's (1991) work suggested the effects of physical and dependent chemical (e.g. nutrient inputs) processes on biological productivity and diversity which are likely to be different from coastal habitats. Spencer (1987) explained the marine biota affecting coastal geomorphological processes by building of reefs, accumulation of carbonate sediments, erosion by organisms, shoreline stabilization by salt-marsh and mangrove communities. The study of Marine and Water Resources Division in RSAG of Space Application Centre (1992), Ahmedabad provided a detailed information on the present status of the coastal environment in India including the current conditions of coastal wetlands, erosional and depositional areas, classification and areas under different categories and shoreline with changing maps.

So far as coastal hazards, environmental degradation and reclamation are concerned, Pethick (1984) worked on flood and cyclone hazard and measures of reclamation of agricultural land and resettlement in the context of problems and prospects in Bangladesh coastal region. Rao, (1990) studies the impact of cyclonic storm on delta and coastal environments of the east coast of India. His study dealt with positive and negative effects of flood during cyclone on landuse pattern and reclamation measures for better landuse. Panda and Sinha's (1990) work dealt with environmental hazards of the coastal and deltaic areas, especially the nature and characteristics of periodic flooding by the rivers and tides on coastal planning of Orissa. Bernal and Hilligan's (1992) work was concerned with the exploitation and sustainability of living resources, the degradation of marine and coastal environments, and the dynamic properties of the land-ocean interface. Their suggested models predicted future states of the marine and
coastal systems due to the interactions of both climatic and human effects. Chapman's (1977) work highlighted the human impacts on the shoreline along with modifications and destruction of mangrove, coral reef, lagoon, seagrass and salt-marsh habitats. The study of Erickson (1979) provides a detailed analysis of wetland environment and assessment of their ecological impact. Bird's (1979) work is concerned with the coastal processes. Haggett's (1975) work related to human impact on environment, argued that, the gross changes on the global level are the result of subtle environmental adjustments on lower spatial levels and the understanding of the interplay of human intervention and environmental adjustments. This gives a comprehensive view of the nature and magnitude of changes in the environment. The problem of quaternary development of relief was reviewed by Demek (1973) against the fact that 55 per cent of the world's dry land surface is intensively used by man; that 30 per cent is partly modified by man and the remaining 15 per cent is only slightly modified. Pereira's (1973) work focused on water resources, while Chorley's study (1973) highlighted the control system which is concerned particularly with man and the way human activity operates as a regulator in natural systems. He suggested that, in the ecosystem state control merely involves the manipulation of the negative feedback loops in order to stabilize the system operation at some optimum state. Coate's (1979) study is concerned with man-induced changes of sub-surface materials and processes. Walling's (1979) study had pointed out various ways in which the hydrological processes and cycle was modified through man's activities by internal processes and additional moisture inputs. Grainger (1990) suggested that degradation of land and desertification are caused directly by four main types of poor utilization of land: over-cultivation, overgrazing, deforestation and poor irrigation practices. Guoudie's (1990) work is concentrated on certain highly important changes which human beings have brought about, especially chemical changes (such as salinization, lateritization), various structural changes (such as compaction) some hydrological changes (including the effect of drainage and the factors leading to peat-bog development) and the most important of all, soil erosion. Sauli (1984) argued that, deforestation causes the removal of humus from topsoil, leading to high rates of soil erosion and leaching, deposition of sediments and waterlogging on valley floors and flats with
associated soil acidity and the loss of soil phosphorous. Ahmed’s (1995) work provides an overview of the coastal area of Bangladesh, including various resources therein, resource utilisation practices and resource management, major threats to coastal resources, institutional structure for the planning and management of coastal resources. Sinclair and Fryxell (1985) identified two contrasting views of the crisis in the Sahel, and particularly that of Ethiopia in 1984. Grainger’s (1990) work has looked mainly at the processes of desertification, and the reasons for its occurrence and has also described the degradation. Blaikie (1985) argued that soil degradation and erosion are the result of sets of decisions about landuse made over time by landusers and that these cannot be isolated from their political economic context. Barrow’s (1995) work provides a detailed information regarding the causes of desertification, soil degradation and environmental problems associated with agriculture. Rao (1994) argued that environmental degradation is attributed to the slow rate of land - augmenting technological change and the inequitable distribution of gains resulting in pressure on the environment from the poor as well as from the affluent.

So far as planning and development of degraded environment are concerned, Blaickie (1985) studied the links between environment, economy and society. He argued that, reciprocal links between poverty and environmental degradation forces are the ‘desperate ecocide’ of the poor. Adams (1990) established an understanding of the problems of environment and development. He highlighted the inadequacy of a narrow view of environmental impacts, and the response based on traditional measures of conservation. Dikshit (1991) studied the man-nature interaction and resultant landscape and suggested the eco-generation and development of the Western Ghats. Norse et. al. (1992) study dealt with agriculture, landuse and planning of degraded environment. This study suggests that major driving forces of landuse and degradation, rapid population growth, outstrips the ability of economic and social development. Poverty forces many people to adopt unsustainable landuse practices. The demand for goods produced from the land and the present trends to encourage consumption overburden the environment. Dooge’s et. al. (1992) work (based on a conference held in Vienna, Austria in November 1991) brings
together the understanding and the judgement of the world's scientific community on the issues of highest priority for the future of the environment and development. Their study is grouped into three aspects: problems of environment and development, scientific understanding of the earth as a system and Responses and Strategies. Raza (1992) examined different aspects of the development and ecology and analysed the impact of developmental policies on agriculture and conceptual parameters of the problems. Doi's (1991) study dealt with landuse analysis, agricultural efficiency and land capability, classification of the semi-arid land system of Morel river basin. Shankarnarayan (1988) suggested strategies for the wasteland development and utilization of wasteland through scientific and sustainable way. FAO report (1976) provides a detailed information regarding land evaluation, procedure including the structure and range of land suitability, economic and social analysis with land. NRIS-URIS's (SAC, Ahmedabad, 1992) project report on Bharatpur district provides information on implementation of GIS packages for regional planning on different aspects like, landuse, land capability, agricultural developmental assessment, settlement-hierarchy and planning of services. Weyland's (1993) work is related to the everyday life and the struggle to survive under extremely hard economic condition including a detailed exploration of the changing assumptions and expectations of the villagers like, labour migration, household organization, changing gender assumptions, agricultural production etc. Kozlowski and Hill (1993) suggested that planning for sustainable development should be framed by four major environmental dimensions: territorial, quantitative, qualitative, and temporal and the dimensions determine constraints, called Ultimate Environmental Thresholds (UETs) scale and the type of development that should take place, over what time period or at what rate, so that a rational use of natural resources can be secured. In 1990-91, Centre of Studies in Resources Engineering, IIT, Bombay, undertook a study on Socio-economic profile of the Bhal region in Kheda district. They have analysed the physical and socio-economical constraints for under-development of the region. Reddy (1988) has given importance to the problems of availability of different resources in required quantity, their proper allocation and their effective utilization in all the developmental activities. Desai's (1990) study dealt with rural development and their issues and problems. He argued that
various institutions for rural development can help in harnessing the energies of the people. Rao (1990), argued that the integrated area development should be viewed in the context of multilevel planning which is certainly different from the concepts of growth and economic development and conveys much more than community development. Shafi and Raza's (1994) work highlighted on the need of development a new and balanced man-environment interface whereby natural processes and resources are made to serve man's varying needs without endangering the eco-regulatory mechanisms of the environment. The concept of eco development was articulated by Dasmann et. al. 1973; Riddel, 1981; Adams, 1990' which has been defined as development at the regional and local levels consistent with the potentials of the area involved, with attention given to the adequate and rational use of the natural resources, and to the applications of technological styles and organizational forms that respect the natural ecosystems and local socio-cultural pattern. Shapira's (1994) study pointed out the six-step ecological approach to the environmental planning of one of China's fourteen 'open port' city region. His proposed plan is based on a primary industry-oriented scenario which includes compatible resource conserving urban uses with compatible uses of recreation/tourism. The Brundtland Report, Our Common Future (WCED, 1987) stressed the interdependence between environment and development and the need to deal with world poverty and inequality. Environment accounting procedures were advocated by Pearce at. al. (1993) in Blueprint for a Green Economy, which also called for: valuation of the environment; extension of the planning horizon and provision for less advantaged people. Redclift (1987) suggested that sustainable development means that lessons from ecology should be applied to economic processes; certainly to achieve it there must be ecological, social and economic sustainability. Dooge, et. al. (1991) pointed out that the achievement of sustainable societies requires an improved understanding of the complex forces which generate the environmental problems and hinder social and economic development. Mandal’s (1981) work on population pressure and threshold relationship suggested that, the density of population, per capita availability of net sown area, and the density of population into rate of population growth per thousand are the indicators of population pressure, besides population concentration in relation to areal
expansion and the distribution of rural settlements. Ramachandran (1990) has explained various issues involved in sustainability of agricultural growth. The central issues of his study are concerned with the goals of maximizing output of a single product against the maximization of output of resource system, the weights attached to the 'long run', as against the 'short run'.

The literature reviewed for this study proves that most of the studies are concerned with geomorphology and physical processes and are related to natural hazards. A few of the studies are concentrated on the problems and reclamation of flood, mudflat, salt-marsh, saline land and fallow land. Most of the studies are macro in nature. They have ignored the relationship between man and environment at the grassroot level in that particular eco-system.

I.D. Contribution of the Study

The study intends to throw light, from a geographical perspective, on the interactions of physical and human elements which are responsible for the backwardness of the region. The subject matter of this study is to know how people perceive the different environmental problems and how people have managed to adjust to those problems over the years.

The major contributions of the study are as follows:

1. The study has focussed on man and the environmental interactions through the regional approach, considering regional backwardness in term of physical and human resources.
2. Regional classification has been done at meso level with the computer software called GIS for land capability so as to suggest proper utilization of land and water.

3. Micro-level analysis has been done based on field data for physical and socio-economic planning of villages.

4. Physical and human potentialities have been found out for developmental planning at macro, meso and micro levels in terms of farm and non-farm activities for large and small farmers.

5. The software GIS has been used to classify the Bhal region by land capability, using physical parameters. Mismatch has been found out between land capability and landuse. Proper utilisation of land has been suggested as per the land capability.

6. Emphasis has been given on human organization, vocational training, use of appropriate technology and finally, on local participation for proper implementation of the programme both at micro and macro levels.