

Politico-Environmental Issues and Sustainable Development

Dissertation submitted to
Jawaharlal Nehru University
in partial fulfilment of the requirement
for the award of the Degree of
Master of Philosophy

Debi Dutta Tripathy

**Centre for International Politics
Organization and Disarmament,
School of International Studies,
Jawaharlal Nehru University,
New Delhi - 110 067.**

1995




जवाहरलाल नेहरू विश्वविद्यालय
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067

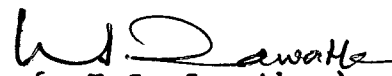
Centre for International Politics Organization
and Disarmament Studies
School of International Studies

July 20, 1995

CERTIFICATE

This is to certify that the dissertation entitled **POLITICO-
ENVIRONMENTAL ISSUES AND ~~XXXXXXXXXXXXXXXXXXXX~~ SUSTAINABLE
DEVELOPMENT ~~XXXXXXXXXXXXXXXXXXXX~~** submitted by Debi
Dutta Tripathy in fulfilment of six-credits out of the
total requirement of twenty four credits for the award of
Degree of Master of Philosophy (M.Phil) of the University,
is a bonafide work to the best of my knowledge and may be
placed before the examiners for their consideration.


(Prof. R.C. Sharma)
Supervisor


(Prof. K.S. Jawatkar)
Dr. K.S. Jawatkar
Chairperson
Centre for International Politics
Organization and Disarmament
School of International Studies
Jawaharlal Nehru University
New Delhi-110 067

DEDICATED TO
MY PARENTS

CONTENTS

	Page
List of Maps.....	i
Acknowledgement.....	ii
Preface.....	iii-v
Chapter I Introduction.....	1-11
Chapter II Political System and Geographic Environment. A Review of earlier Models.....	12-26
Chapter III Dimensions of Sustainable Development.....	27-44
Chapter IV Politico-Environmental Issues of Chilka Lake	45-62
Chapter V Sustainable Development of Chilka Lake.....	63-80
Chapter VI Conclusion.....	81-92
Bibliography.....	93-98

List of Maps

Map of Chilka lagoon showing the
Salinity Profile.....49.1

Map of Chilka lagoon showing the
zone of Siltation.....53.1

Map of Chilka lagoon showing the
zones of Weeding and Swamps.....54.1

Map of Chilka lagoon showing the
zones of Land Reclamation.....61.1

Map of Chilka lagoon showing the
proposed developmental sites.....65.1

Acknowledgement

Many people have helped me prepare this dissertation, I owe my sincere thanks and heartfelt gratitude to my supervisor Dr. R.C.Sharma for his continuous guidance rendered with kindness. I wish to acknowledge my deep gratitude to Dr. M. Mohanty for providing me with an excellent academic environment.

I thank the library staff of J.N.U, the officials of CDA and the faculty members and staff of Department of Geography, Utkal University.

I am extremely grateful to Sunny who has done a clean job in typing this dissertation and my friend Babi who inspite of his busy schedule helped me give final touches.

My friends Asit, Subhransu, Shellie, Subrat, Hemant and others have always inspired me to move along with the research.

My family members and Bebie have always been with me providing me with constant encouragement and support.

However, entire responsibility for any shortcomings in this work is absolutely mine, and I am alone to be held responsible.


Debi Dutta Tripathy

PREFACE

Geography is the science of the surface of the earth and its inhabitants. Human geography is that branch of geography which studies man's activity over the surface of the earth. The political activities and processes as organised by man creates some kind of relationship with the geographic environment. This interrelationship is analysed by the political geographers.

The proposed research intends to analyse the interrelationship that exists between the political processes and the landscape, keeping in mind the sustainable development of the environment. Empirical study is beyond the scope of this study, hence a unique eco system off the eastern coast of India is the case. This is a brackish water lagoon 'Chilka'.

In order to analyse the interrelationship, it becomes essential to understand the various relationships which have already been given. There are various models through the development of the thought of Political geograhay which have established the relationships. They provide an excellent base for further research.

The models have always been presented keeping in mind a specific goal. This goal in need at the present time is Sustainable development. Sustainable development is the path of development which ensures the need for the future as well as the present needs. Sustainable developmet is also a very relative concept and various dimensions can be given to it. The various angles from which sustainable development needs to tbe analysed are the Economic front. Social front, the environmental front, Political front and the technologi al front. The most effective process through which sustain-able development can be achieved is an effective governmenetal policy. This is possible only through a good analysis of the environment concerned.

This proposed research includes a case study. Chilka, a brackish water lagoon is endangered due to optimal level of degradation. This degradation is created through both physical procsses and human interference. The lagoon being of international importance needs to be conserved. This lagoon is also very important economically due to prawn, migratory birds and other fishery sources.

The sustainability of the lagoon Eco system is possible only through a scientific analysis of the causes of the processes of degradation, the various political processs

that tend to put an impact on the environment. The laws resulting from this process and the final change that will occur or has occurred. Thus a brief study of the framework of the policy is very essential, certain required suggestion and required policy framework also needs to be discussed.

This in term will establish the relationship between the various political processes and the environment keeping sustainable development as the basic focus. The case study of Chilka would seem to establish cerertain relationship for a broader study in future.

CHAPTER - I

INTRODUCTION

The nation state of the present day performs a complex set of functions and gives it a political expression. The ideas and the ideals that characterise the nation are also political expressions. This may include all the political processes which have a spatial attribute as a part of the study of political geography. Thus it may be said that any political phenomena on any aspect of political organization of space, at any level, is regarded a valid subject for political geographical study so long as it has a territorial component and the techniques of spatial analysis are relevant to the study. Political geography involves politics in the first hand, hence the basis of the study is generally regional in nature where the unit of study is a political area. Most of the land mass on the earth is politically owned and has set rules and regulations working on it. This is the expression of politics on the geographic landscape. But this necessarily does not mean that the scope of political geography does not include the area beyond any boundary as its unit. The interrelationship between two political units or many political units can also be included in the purview of political geography.

Political geography also includes the study of the geographical extension of the state, the command of the state on its resources as also the well being of the population, the nature of states alliance, be it the states dependency on others or others dependency on it. The trade

and commerce of the state is generally reflected in policies. The attitude of the nation towards its own populace, its geographical neighbours and etc. These are few of the scopes which political geography provides for research.

This research proposal intends to analyse the political processes that work for the development of the landscape, keeping in view the sustainable development as its goal. The two factors that needs elaboration are the political processes that puts an impression on the geographic environment and the question of sustainable development.

The function of the state becoming more and more of a welfare state rather than the pre-existing police state has a remarkable influence on the lives of its populace. With the emergence of the modern welfare state model, the ubiquitous presence of the government is felt all through the life of its citizen, virtually every aspect of living is affected by some degree of public policy. The economic activity of any country now is greatly affected by the political standing of that country. This has been given more emphasis with the emergence of Keynesian economics after the Great Depression of 1930's. Thus a more productive note for the government is to maintain the health of its economy and to stimulate when it is on the decline and hence provide a constant rise in the standard of living of its citizens. Thus the political processes of a country have their impression on the landscape also.

The major welfare policies in which the governments are generally involved are in providing a minimum level of subsistence for all, security schemes, provision for social services and redistribution of income basically through the policy of taxation.

The effect of the government on the landscape can be expressed in many ways. The most important ones are the expression of security, where the state goes in for its policies of changing the landscape in order to provide security for its citizen and thus a healthy economic life. To maintain security along international boundaries the landscape may be strewn with features such as custom house and immigration post etc.

In order to function properly all through the landscape of territory the government builds public buildings of uniform function, uniform land survey, including routes that has been sketched upon the landscape antecedent to settlement.

The most important feature in most of the developing countries is the development of infrastructural development which generally precedes the settlement. The development of power sector, roads etc. are common under the category. Along the line the government also develops heavy industries. This tends to produce uniformity in cultural impress

even when the natural landscape is diverse. The government often stimulate migration into newly acquired areas by offering holdings larger than those current in regions from which settlers are drawn. The same process can be induced by the imposition of favourable tariff. Thus the laws affect both the tempo and direction of migration, they also induce branch factories in border towns and thus modify the landscape.

The effect of the government on the landscape is also a function of the system of the governmental organization, whether it is a unitary or a federal one. In the unitary system the central authority has maximum power and all laws and activity of the government are carried on by central authority. The other authority is the local authority which has very limited power. The next system is the federal system where other than the local government and the central authority, there is state government in between the two. Unlike the local government the state has a great degree of autonomy, especially in the economic activity and hence has the capability to induce a change in the landscape or create its impression on the geographic environment.

The nature of governmental process also has varied influence on the location. The totalitarian and the democratic form of government has different degree of capability to put an impress on the location.

The resource utilization pattern and level of an economy also gives an overview of the amount of effectiveness of the government in leaving an impression on the geographic environment. The other elements which has an effect on the government in its role as a modifier of the environment are culture, ethnicity, language as well as the social units functioning in the political unit.

There are few other factors as well as elements of the political process which impress upon the environment viz, the behavioural reactions to values by the central authority, either being supportive or oppositional also have some effect as they are a part of the political process which may translate into a change in the landscape.

It is not always that there is a change in the landscape through any political will, there are certain sections in the political process which resist the move, this opposition might result in a better synthesis and can be a great force in the interaction between man and his environment.

The interaction discussed so far is highly subjected to a variety of elements and factors, making it a very complex process of interaction. There are no linear interaction between man and his environment. There are many variables which have a considerable amount of effect on man's activity over nature. To integrate this interrelationship between

man and his environment, various geographers have tried to establish theories, but so far no concrete theory has been established.

The interrelationship between man and his environment have been studied since the historical past. The two basic schools which developed early in geographical thought were determinism which emphasized the dominance of environment and the other was possibilism which emphasized on the dominance of man on his environment. There were some facts where man continued his activity even in diverse conditions against nature and yet has not been able to overcome each and every hindrance caused by nature. Hence a middle path was established. This was the stop and go determinism which was a controlled form of man's activity over environment. There emerged another school of thought which enabled man to continue his activities over nature only on those occasions where it was economically profitable. This was known as the economic determinism. Basing themselves on these basic streams of thought there have been several interrelationships which have been given by various geographers.

The theories so far propounded and the models discussed have generally dealt with the process involved in the decision making and the effect produced in the environment. There is a model developed by Cohen and Rosenthal which discusses the territoriality on one hand and the political action area on the other, with the intermediate steps of

social forces and the landscape. The concept developed by E.W. Soja projects that modern geographical research has centred round the search for order and regularity in spatial system, a search that has spawned an increased interest in the behavioural basis of spatial interaction and organization.

Peter Taylor has developed the concept of political ecology. The main objective was to examine links between the environment and political activities in the Third World Countries. It aimed at highlighting common themes and suggest areas of further exploration. There have been many other theories and models propounded to analyse the interrelationship, but they are generally just these two ends of political processes and environment. But the simplicity with which they are projected are not sufficient. There needs to be certain specific and concrete goals to achieve when any impression is created on the geographic environment by the political processes. This goal could be sustainable development.

Sustainable development here means in general terms as the meeting of the ends of today's generation without diminishing the prospects of the generations yet to come. This does not mean the total preservation of all the resources but constant and optimal utilization of the resources without diminishing the availability of the resources to the future generation. Thus sustainable development is not a

fixed state of harmony. It is dynamic. There is constant change in which the utilization of the resources, the direction of investments, orientation of technological developments and institutional changes are made consistent with the future as well as the present needs.

The development of the concept of sustainable development came into account late in the present century when the homeostatic mechanism of the in built self regulating mechanism of the environment was disturbed to an irreversible condition of imbalance. This imbalance was brought about by the interference of the human race for its own reasons. Since the Industrial Revolution in the 19th century man has become capable of intervening with the natural environment according to his own will. In the process of development man has caused so much of disturbance in the environment that now his very own existence is being questioned. In the name of development man has created too much of adversity for himself, as through multiple pollution viz, pollution of land, water, air and general social pollution. Social pollution is manifested in its various forms like population explosion, sociological pollution and economic pollution. The other forms of ecological degradation that has been caused by man induced hazards like the physical, chemical or nuclear and the biological hazards.

These hazards are presently beyond the limit of the homeostatic mechanisms of the environment to stay in the

state of equilibrium. Hence the whole problem has now become irreversible, boiling to a point of inevitable crisis. They cannot be solved by themselves and hence the intervention of man becomes essential.

These problems emerging from the interferences of human beings in the nature as well as certain natural processes themselves have caused considerable damage to the environment. The problem arising from these are known as environmental problems. There are many which have arisen due to the negligent attitude of the people, the law and other political processes which have induced these problems into the environment. These are the politico-environmental problems, and the issues which arise from them are the politico-environmental issues.

Though adversely affecting the environment, there does exist some opinion in favour of these activities as opposed to the views for an untouched environment. It is the polarity of these views in the political spectrum which gives rise to the politico-environmental issues. These issues be it just environmental or politico-environmental have to be understood to properly and from a number of angles to put forward the best of solution for the problem arising from the issue. Thus the goal which needs to be set in mind before analyzing the issue and the problem is that of sustainable development. A thoughtful response to these environmental concerns is neither a stoppage of economic growth

nor a continuation of previous patterns of growth but a designing of new models of sustainable development.

The development of new models for the growth pattern keeping in mind sustainable development of the region, nation or a locality is what the present day studies require.

The proposed research intends to analyse various environmental problems as well as politico-environmental issues and try to suggest certain policies for the sustainable development.

The globe becomes too vast an area of enquiry and too varied for the study and analysis. Any kind of macro examination is beyond the scope of this study hence a small locality has been identified. The research proposal has a brackish water lagoon on the eastern coast of India as its case study.

Chilka being a brackish water lagoon gets fresh water from river systems of the main land and saline water from the Bay of Bengal through a channel. The lagoon has a unique eco system functioning as compared to the neighbouring area. This lagoon has a large variety of flora and fauna and is balanced very delicately through all the natural processes that function in the eco system. Any interference in it has to be highly calculated in order not to

destabilize the equilibrium. But due to the ignorance of the population living and depending on the eco system, have created some irreversible damage to the lagoon system. The law makers, the political processes have been very negligent about the damage, thereby deteriorating the lagoon system manifold.

The lagoon provides economic resources in the form of fishing and tourism to the locality around, but heavy economic activity and big money involvement have destroyed the system. The legal proceedings, the policies framed and the local bodies functioning need to be analyzed in order to give suitable solution.

Thus the above mentioned characteristics of the lagoon makes it a very suitable case to study the policy matters and sustainable development. This may not have empirical importance but will indeed help at finding out certain policies which are essential for the development of an area.

To summarize it can be said that policy suggestion, or in general a framework for policy makers keeping in view the politico-environmental issues arising in a locality [Chilka Lagoon] and the ultimate goal of sustainable development of that region is the main objective of the research proposal. To make a detailed analysis of this elements of study it is essential to go through the historicity of the development of thought in this area of study.

CHAPTER-II

POLITICAL SYSTEMS AND GEOGRAPHIC ENVIRONMENT - A REVIEW

OF EARLIER MODELS

Human geography is that branch of geography which analyses man's activity over the surface of earth. A branch of human geography, Political geography tries to analyse the various inter-relationships that exists between the various Political processes and the environment or space. In other words it is the spatial analysis of a political phenomenon. The inter-relationship that exists between man and his environment encompasses politics as one of its main factors as the nation state today exists to perform a complex set of functions, most of which relate to protecting, fostering and giving political expression to the body of ideas and ideals which characterize the nation of which the given state is a political expression.¹ Today, any political phenomenon or any aspect of political organisation of space, at any level, is regarded a valid subject for political geographical study so long as it has a territorial component and the techniques of spatial analysis are relevant to its study. Hartshorne includes that, the fundamental purpose of any state, as an organization of a section of land and a section of people, is to bring all the diverse regions of the state or area into a single organized unit. He advocated an emphasis on security as he puts it "because we live in a world in which the continued existance of every state-unit is subject to threat of destruction by other states."²

1. R. Hartshorne, "The Functional Approach in Political Geography," *Annals of the Association of American Geographers*, 1950, Vol. 40, pp. 104-105.

2. ibid.,

The concept of a unit comes into existence and the unit of a politico-geographical enquiry is a nation state. Thus the study of political geography is generally regional. Most of the land in the world is politically owned and has set rules and regulations working on it. This is the expression of politics on the geographic landscape but this does not necessarily mean that the scope of political geography does not include a large boundary as its unit. The inter-relationship between political units can also be included in the purview of political geography.

Political geography also includes the study of the geographical extension of the state, the command of the state on its resources as well as the well being of the population, the state's dependency on others and others dependency on it. The trade and commerce of the state is generally reflected in policies, the attitude of the nation towards its own populace, its geographical neighbours and etc. These are few of the scopes which political geography provides for in research.

The emergence of the welfare model of the state, the functioning of the state is felt in a more concrete manner. The ubiquitous presence of the government is felt all through the life of its citizen, virtually every aspect of living is affected by some degree of public policy. The economic activity of the state also is dependent upon the nations of

the political process. The Communist and the Socialist forms of government have a great influence on the economic activities while the capitalistic societies have also adopted governmental interference, with the emergence of Keynesian economics, after the great depression of early twentieth century. The role of the government has become more important as it has to look into the health of the economy, stimulate it when on decline and provide a constant rise in the standard of living of its populace. Thus the political processes of a country leave their impression on the landscape.

The above mentioned facts present a complex inter-relationship that exists between the political processes and the environment. The scope of Political geography also provides for research, the interrelationships. Through the development of the thought of Political geography, there have been various models which have tried to analyse the relationship. As an academic discipline political geography has received recognition as an independent branch of geography only after the publication of Ratzel's 'Politische Geographie' in 1897, but the theme of Political geography which have traditionally dealt been with, in one of great antiquity. The relationship between states and the national conditions of their areas have been a subject of considerable philosophical interest among students of history, politics, geography from the earliest times. This was the period of political environmentalism when Political geography was viewed primar-

ily as the study of the role of physical environment in shaping the political life of man. Ritter gave a geographical theory for the study of the growth of states and the evolution of cultures, the birth, maturity, and the decay of the state. This was the cycle of culture. Ratzel developed the theory of states which viewed the state as organic entity fixed in space and involved in a constant struggle for larger living space. This was the beginning of the development of the approaches into analyzing the the impress of political process on the environment. Derwent Whittlesey was one of the pioneers who analyzed the impress of the central authority on the national environment.

The Impress of the Effective Central Authority upon the Landscape:

Man's political organization has an influence over his environment was first stressed upon by Derwent Whittlesey in 1935 in a paper published in the Annals of the Association of American Geographers. He stressed that 'Political activities leave their impress on the landscape, just as economic pursuits have widely ramified impress upon the landscape is stamped by the functioning of effective central authority'. He showed the various ways in which the central authority expresses itself on the cultural landscape. To elucidate this , he divided his study into four sections:

1) **Expression of security:** Security is the exclusive jurisdiction of the modern nation-state. This is a guarantee

against disturbances from within the state and external threat.

Habitation and settlement pattern, agricultural mode, organisation of town and villages, economic life are different in a state which feels secure and different for a state which is newly formed.

2) **Special Features of Boundaries:** In modern countries which is marked by zonal boundaries can lead to various kinds of traumatic experiences for the border people. These boundary units always remain under the constant threat of aggression. Routes which were in use before the demarcation of boundaries are now altered and the reconstructions are made. This is substituted by new ones suited to the alignment of the territory.

3) **Expression of governmental activity:** Each Government has a specific way of evoking its whole territory in particular aspects. This tends to produce a uniform cultural impress upon every natural landscape which is governed by the same authority. There is transfer from regions which are favoured naturally by environment to region with environmental landscape. This kind of transfer of both funds, technology and human populace to places induce changes in the landscapes.

4) **Laws resulting in landscape modifications:** Central authority operates differently in different areas. Due to the difference in the natural endowment of the land and for the above mentioned factors, the laws are different for different region or they work differently at different regions as

laws generally affect the use of land and natural resources.

This was the first step towards an analysis of the effect of the political process upon the environment. The function of the state with relation to other states was proposed by R. Hartshorne. In his functional approach he suggested the study of one distinct phenomenon in the total differentiation of areas, namely the section of areas organised as a political unit.¹ He also suggested that the limitation of the approach is, it is regional and no empiricity can be scientifically developed. Jones did not accept this and developed his own model in 1954.

A Unified Field Theory of Political Geography

Based on the ideas of Derwent Whittlesey, Richard Hartshorne and Jean Gottman, S.B.Jones has framed his theory of the Idea-Area chain. The theory simply states that the idea and the state are the two ends of the chain. The chain follows Political idea-Decision-Movement-Field-Political area.² This theory has been substantiated by its application to political area, study of national power, boundary, capital and cities. Three aspects which the theory provided were:

i. This provided a nomenclature :- It helped in completeing

1. R. Hartshorne: op. cit. pp95-130

2.S.B.Jones: 'A Unified Field Theory of Political Geography', Annals of the Association of American Geographers, Vol 44, 1954, pp111-123.

the tie between morphology and function and between region and process. It shows a relationship between ground ideas and the earth surface.

ii. The Orientation :- The chain being the core of the theory provides for the direction in which the geographers should proceed and provides a link between political science and geography.

iii. The idea being at one end of the chain and the area at the other the theory unites the two main parts of geography, the possibilist and the regionalist view in one concept.¹

The next generation wanted to take political geography out of the backwaters of ideography to the wider world of nomothetic studies. Thus a new methodology A Generic Approach - an approach that could help operate general spatial theory of political organisation and behaviour. This was given by R.D.Dikshit in 1971. Robinson suggested it would be profitable to classify the states of the world into some scientific categories or groups with characteristic features that a generic approach to their studies may yield results of general importance. To take a specific example, we may classify the states of the world into the federal and non-federal states. Federal states share certain set characteristics in their form and working, and viewed closely federalism appears to be the most geographically expressive form of government. Thus the emphasis on structure of the

1.R.D.Dikshit:Political Geography: A Contemporary Perspective, Tata McGraw Hill Publishing Co.Ltd., N.Delhi, 1982, pp144-145.

government. The differences that occur in the process and the changes that have taken place or should take place. This was the generic approach proposed by R.D.Dikshit¹

Giving importance to the structure, two different structures were identified. The unitary system where there are two levels of political authority, local and the national. The local government has less power for the change in landscape as it follows the outlines provided by the national government. The second is the federal, where between the two levels the national and local is the state authority, which is endowed with some degree of autonomy including the fields of economic activity and culture.

No less important than the administrative structure is the nature of the governmental process (democratic or totalitarian). The influence of the different processes of the government whether multiparty democracy or one party democracy on the location of economic and other human activities on them is different.²

Apart from the structure and process, the decisive element in determining the effectiveness of the central authority is the stage of a country's resource development. The more developed the resource utilization, more coordination is required and the vice-versa.

1.R.D.Dikshit, 'Towards a generic approach in Political Geography.', Tijdschrift Voor Economische en Socials Geographie, Vol - 61, 1970, pp242-245.

2.R.D.Dikshit, The Political Geography of federalism: An Inquiry into Origin and Stabilitypp23-24.

The actual functioning of the governmental authority is greatly modified by the regional distribution of ethnic elements within a state. They may modify the uniform pattern of developmental plan by the central authority, but however they do not enjoy the autonomous power. In the unitary states however such complications do not arise as "the sociological unit of the region is not powerful enough to demand social accounts."¹.

This in brief is the relationship proposed by R. D. Dikshit. The next model which has great importance in this aspect of the study is the model proposed by S.B.Cohen and L.D.Rosenthal.

A Geographic Model for Political System Analysis

They have advocated three basic points towards an approach into studying Political Geography.

i) Political geographers should turn more directly to political processes and to spatial consequences, the efforts be cast within a politico-geographical framework.

ii) Process is the key to spatial arrangement and relationships which in turn becomes the...

iii)...explanation of areal arrangement of landscape the object of geographical study of political process.

The emphasised political geography as being concerned with 'the spatial attributes of political processes'.² The two

1. J.R. Boudeville, Problems of Regional Economic Planning, Edinburgh University Press, Edinburgh, pp55.

2. S.B. Cohen and L.D. Rosenthal, 'A Geographical Model of Political System Analysis', Geographical Review, Vol 61, pp5-31.

elements involved are political process and spatial attributes.

Political process:- Process and system are inseparable in politics as process functions within the system. The basis of a system are the societal processes which frames the institutions and finally the transactions of the institutions with the environment. The political system is the end product of the process by which man organises himself politically in his particular social and physical environment.

The other relevance of analysis are the locational perspectives and the openness or closeness of the economy. Time scale is another important aspect of analysis where process is concerned. There are different time dimensions when we talk of political process and spatial attributes. The introduction of transactions and its diffusion from place to place is short term. The area formation from that and interaction between them to change the political structure takes longer. The change of political structure through societal changes and the changes of the fundamental landscape takes still longer time. The overriding societal forces, then can find a focus in the study of acts of governing that flow from these forces. Thus the law is formed and finally a change in the landscape.

Spatial Attributes:- The analysis of process in a spatial context is to study man's behaviour in space. Thus the theme of this study will lead to a changed or different landscape with a changed characteristics which will inturn

reshape the political area. Spatial is defined as the distributional patterns of political processes and spatial relations of these patterns with pertinently related phenomenon. Such patterns and relations form unique political action area. The zone in a political area over which the political process creates an impact is the political action area. The zone where the processes do not have any impact is a zone of counter force. The legitimacy of the government is analysed by studying the three types of areas mentioned above.

This in brief is the first holistic approach towards an interrelationship between politics and the environment. This can be accepted universally upto a certain extent.

The other model suggesting the relationship is 'A Paradigm for the Geographical Analysis of Political Systems' by E.W. Soja. Central to the organisational structure of this paradigm is the integrating concept of a spatial system. Berry defined a spatial system to be consisting of places, the attributes of these places, the interaction both between places and between their attributes.¹

This model has spawned an increased interest in the behavioural basis of spatial interaction and organisation as Soja puts it in his own words; "Much of contemporary geography rests upon the assumption that there is an inherent geographical order in human society"; a spatial 'anatomy' of

1. B.J.L. Berry, 'International Regions and International Systems', Geographical Review, Vol 59, pp450-451.

human behaviour, and societal organisation which has regular and discoverable characteristics. Rather than emphasising the unique character of specific areas, modern geographic research has centred round the search for the order and regularity in spatial systems.

One method of evaluating the management of natural resources is to formulate normative theory given some assumed objectives and constraints, and then compare the empirical case with the referent model. One such model is the General Model of Municipal Stress Management.

This model tries to establish a relationship between the stress created upon a city, the perception of the stress and the evaluation of the articulation of the stress. Manager has his goals and values and gives a decision taking into account the feedbacks he gets from the environment. There maybe some constraints on the decision but a final action comes into the environment and again the environment through catastrophic or slow changes creates a stress on the city. In other words "the model presented here is simply a way of ordering the process by which the managers of a municipal political system evaluates and attempts to solve the stresses acting upon a city".¹

This models so far have tried to analyse the various relationships between the political processes but none have so far analysed the relationship between the environmental

1.R. Kasperson & J.V. Minghi: Structure of Political Geography, Aldene Publishing Co., Chicago, 1969, pp484-486.

hazards that occur and the political processes working on it. In other words the relationship between the concern of ecology and the political process. One such concept which has been developed recently is the concept of Political Ecology by Peter Taylor.

Political Ecology

The phrase 'Political Ecology' combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land based resources and itself. In fact during 1980s scholars from diverse academic and institutional background began to examine links between environmental and political activities in Third World countries. Their basic objective was to highlight common themes and suggest areas for further exploration. In this process three critical areas of enquiry were evolved.

I) Contextual sources of environmental change:-In this area of enquiry, we can identify, state policies, Interstate relationship and Global Capitalism as the main thrust area. The state is the protector as well as the developer of the environment through its policies. The Interstate relationship, be it peaceful or hostile they create an impact on the environment. The third area is the Global Capitalism. Global Capitalism, environmental degradation and poverty have been extensively and systematically interrelated. Profit motive and high level of energy consumption lead to environmental change.

Coming to state policies once again, these policies are

not created in a political and economic vacuum, rather they develop from struggle between competing factors seeking to influence policy formation and formulations. These factors are:-

- i) Governmental department and agencies.
- ii) Transnational and national corporations.
- iii) Non-governmental Organisations.
- iv) Multilateral agencies.
- v) Foreign Government and etc.

II) Conflict over access:- Basically it examines the relationship between access rights, local struggle and ecological transformations. In seeking to understand the conflict over access, both the historical and contemporary dynamics of struggle must be addressed. Most of these scholars resort to historical perspectives, studies inducted, compare and contrast the colonial and post colonial experiences.

III) Political ramification of environment change :- This area of enquiry explores the ways that environmental change influences socio-economic inequalities, and by extension of political processes. Just as political process contribute to environmental change, the modification of land and forest has important political ramification. Here, attention needs to be directed towards socio-economic impact and political process. Political ramifications has been guided by two basic questions - to what extent are the cost of environment change borne by socially disadvantaged group, and under what circumstances does unequal exposure to environmental change modify political processes ?

To conclude, one must say that the agenda for third world political ecology is both complex and challenging requiring analytical refinement as well as empirical exploration.

The above mentioned brief introduction to the existing models give us a specific direction into analysing the relationship between the political processes and environment. There have been many cause and effect relationships analysed but without any definite universal goal. The goal now most essential for a better future and a consistent present is the path of sustainable development.

CHAPTER-III

DIMENSIONS OF SUSTAINABLE DEVELOPMENT

The world faces a wide variety of critical environmental threats, degradation of soil, water and marine resources essential to increased food productions, wide spread health threatening pollution, stratospheric ozone depletion, global climatic change and loss of bio diversity. Despite the growing affluence of many, there is persistent poverty and wide spread human misery is another picture of a pattern of economic growth that is worsening rather than remedying such disparities. This has been rightly referred by an economist Herman.E.Daly. He says "We human beings are being led to a dead end, all too literally. We are living by an ideology of death and accordingly we are destroying our own humanity and killing the planet. Even the one great success of the programme that has governed us, the attachment of material affluence is now giving way to poverty.

Since the Industrial Revolution in England, human beings have tried to use resources to the fullest of his own convenience but has never tried to optimally utilize the resources. Man has always tried to achieve their material affluence and luxury through the unthoughtful and irrational utilization of resources available to him. This usage of resources has taken us to such a juncture that we have committed irreversible damage to the nature. This in turn posits a great danger to the man kind of future. Civilisation has never given a thought towards finding out answers which were never a hindrance to its luxury or development. Today due to the various problem which have

been caused by man various problem which have been caused by man himself by his own activity are being questioned. But man has caused several irreversible damages to the nature which will be difficult to recover until and unless severe steps are taken into operation or alternative ways and better substitutes are found. If man in years to come wants an environmentally secure, economically prosperous world characterized by growing peace, freedom and human welfare, than the current generation must also come to grips with underlying trends that threaten to make these problems worse. For example the trends in population growth which has doubled since 1950s and is expected to double again by the middle of the next century will always increase the economic activity along with it. These trends in economic activity are also not very different registering a growth of more than than 3 percent every year since 1950s. This will dramatically increase the pressure on the natural resources and natural systems. The carrying capacity of the ecosystem is being utilised much beyond its limit through these processes. They in turn have a very negative impact on the human beings themselves.

There are many other examples like deforestation, degradation of through over usage, pollution of water air and dumping of waste and still further dumping of toxic and nuclear waste pose grave danger to the environment and man himself. Few of the impacts are already being felt. They may include the declining per capita food production in 69

developing countries¹. The increased health problems due to water and air pollution, severe degradation of soil, through leeching and sedimentation elsewhere, the loss of many endangered species and determination of typical diversities are but a very few examples of the many effects which have been caused by man himself through his unthoughtful and irrational use of resources for selfish reasons and competition.

The present world isn't headed towards a sustainable future, but rather towards a variety of potential human and environmental disasters. Over the past 20 years, since the Stockholm conference on human environment, the world has started to recognize that environmental problems are inseparable from those of human welfare and from the process of economic development in general and that many forms of development erode the environmental resources on which human livelihoods and welfare ultimately depend.

Hence it has been very well established that protection of the environment and promotion of economic development are not separate challenges and development cannot subsist on a deteriorating environmental resource base and environment cannot be protected when growth plans consistently fail to consider the cost of environmental destruction.

1. World Resources 1992-93, Food and Agriculture, Table 18.1

Thus a synthesis was required, a new developmental path, that not only sustained human progress in just few places for a few years, but for the entire planet into a distant future². This was termed as sustainable development.

The United Nations established the World Commission on Environment and Development and later on defined sustainable development as that which "meets the needs of the present without compromising the ability of future generations to meet their own need".³

The concept of sustainable development includes two key components. They are the concept of needs, in particular the essential needs of the worlds poor and the second is the idea of limitations that are imposed by technology and society on the ability of the environment to meet those needs. Taking into account these two basic components sustainable development means the meeting of basic needs of all and extending an opportunity to all to satisfy their aspiration for a better life by an acceptance of consumption standards within the bounds of ecological possibility and to which all can aspire is also implied.

2. **World Commission on Environment and Development, Our Common Future**, Oxford University Press, New York, 1987, pp4-8.

3. **ibid**

Many people have tried to define sustainable development the way they have envisioned sustainable development. There are some who have focused on the physical aspects of sustainable development. They stress the usage of renewable resources so that they are not degraded or diminished for the usage of the future generation, there have been some economic developments, subject to maintaining the services and quality of natural resources⁴. Another economist feels that, "The use of resources today should not reduce real incomes in the future"⁵. This implies that our economic system should be managed so that we live off the dividend of our resources maintaining and improving asset base.

But economic development doesn't mean economic growth. The type of an economic activity can change without increasing the quantity of goods and services. Thus right kind of economic growth is the one necessary to relieve poverty and generate the resource for development and prevent further environmental degradation. Thus quality of growth has been emphasized than mere expansion. There are still others who feel sustainable development should

4. **Edward.B.Barbier**, *Economics, Natural Resources, Scarcity and Development: Conventional and Alternative Views*, Earthscan Publication Ltd., London, 1989, pp185.

5. **Anil Markandya and David.W.Pearce**, *Natural Environments and the Social Rate of Discounts (Project Appraisal)*, Vol III, No.I, 1988, pp11.

incorporate redistribution of wealth and not just growth.

Sustainable development is often defined as development of human resources that is the improvement in health care, education and social well being. Nowadays these kind of human development is also referred to as critical to economic development as well as to early stabilization of population. This is very important as the centre of attention should be human beings, where development is woven around people and not people around development⁶.

An important component of virtually all definitions of sustainable development has to do with equity, for people living now who do not have equal access to natural resources on to social and economic goods, this concept is highly relative as it is highly regional in nature and hence subjected to high degree of difference between the less developed regions and the more developed regions.

Thus to put it more empirically the definitions of sustainable development as improving the quality of human life within the carrying capacity of supporting eco systems. In other words sustainable development is best understood as a process of change in which the use of resources, the direction of investment, the orientation of technological

6. United Nations Development Programme, Human Development Report, 1991, Oxford University Press, New York, 1991, pp1.

Using biological resources without diminishing biodiversity will require improved efforts to prevent degradation of key natural habitats and to preserve the health of the eco system. should be incorporated in the policy framework.

In addition to economic incentives, the pressure of public opinion can be a strong force supporting the adoption of cleaner and more efficient technology. Citizens groups and non-governmental organizations play a key role here¹². Technology should always come in hand for adoption in local condition according to their preferences.

These are few of the basic broad outlines suggested for framing a policies to follow sustainable development. The practical application of these policies may or may not reduce the required result. However, the effective implementation of these policies and the resultant action are important. To analyse, this proposed research has taken up a case. The case in this proposed research is a brackish water lagoon "Chilka". There are various problems in the eco-system of Chilka. These problems have a root in both the natural processes as well as the human interference in the eco-system. The policies suggested in this chapter and the various dimensions analysed here about the path of sustainable development may be helpful to find out a

12. World Resources 1992-93, Policies and Institutions.

solution to these problems. This is possible only through proper analysis and implementation of policies framed by the policy makers keeping in view the local problems, habits and economic activities.

CHAPTER-IV

POLITICO-ENVIRONMENTAL ISSUES OF CHILKA LAKE

Inspiration for poets and a dreamland for golden scenery creative artists, Chilka lake, geographically known as a Brackish water lagoon is of great International importance. It was identified under the Ramsar convention as a wet land of international importance in 1974 at the city of Ramsar in Iran by I.U.C.N. This lagoon has got a typical eco system of its own and is of high economic importance. Of late this dream land is in the throes of ecological trouble and political controversy leading to the emergence 'Chilka Bachao' a movement piloted by eminent persons of the state. Chilka has been referred as a 'Stormy Island'¹ and Chilka is 'getting choked'² by newspapers. This lake which used to span before eyes like a dream and offer plenty of opportunities to enjoy and rejuvenate ones soul has become an eye sore because of environmental havoc being wrought by the prawn Mafia the politico-economic monarchs of the area. This is because of the 'Prawn Dollar' disaster developing around Chilka.

The delicate balance between the various natural forces functioning and the human interference into the lake eco system has also created a great deal of ecological problems. Though a natural lagoon is born and dies a natural death yet a great deal has been contributed by human beings for its environmental degradation. Hence it is also important to -----

1. Stormy Islands, The Hindustan Times, N.Delhi, 21st Sept. '93.
2. Getting Choked, The Hindustan Times, N.Delhi, 26th Sept. '93.

know the various natural processes working in the region as well as the extent of human interference.

Chilka is the largest Brackish water lagoon in Asia, situated to the south eastern part of Eastern Ghat of Orissa. It is located between 19 degree 55 minutes north and 85 degree 06 minute to 85 degree 35 minutes east. On an average it covers an area of 1050 sq.kms. swells up to 1165 sq km in rainy season and reduces to 906 sq km in the summer. The lake is circumscribed by a 60 km long barrier bar of the Bay of Bengal along the Eastern Margin. The north has the dynamic delta of the Mahanadi river system.

As every lagoon has a channel opening into the sea, so also Chilka which is connected to Bay of Bengal through an outlet near Arakhakuda village in the extreme North Eastern side which cuts through the linear spit that separates the lagoon from the sea. This channel is 25 km. long from Satpara village to the sea and embodies a number of epherml islands. There are several creeks which are hundreds of metre long and two to three metres deep. The lake is 65 Km's and 18.5 Kms wide in the north and tappers down the south. The lake has been divided into four zones for their special bearing.

Northern Zone:- The width is 30 kms long. The rivers Daya and Bhargavi fall into the Chilka wetland in this zone and fresh water enters the zone. There is heavy silt deposition

in this zone from the river system. The depth is 0.5 metres to 1 mtr. in an average.

Central Zone:- Average Depth is around 1.5 to 2.5 meters. Comparatively a more stable zone.

South Zone :- The width of this zone is less and the average depth varies between 2.5 to 3.5 in summer and rainy seasons respectively. The wetland is connected to the river Rusikulya and the sea through Palur canal.

Mouth of Chilka:- The Channel originates from Magarmukh near Satpara and meets the sea at Arakhakuda. The mouth is only 200 metres wide. The mouth has been highly dynamic and a general shift towards the north - north east has been recorded in the recent years. The reason can be attributed to the littoral drift which causes severe deposition because of which the mouth has closed down from one mile in 1780 to just over 200 mtrs in the recent times.

Islands of the lake : The two types of islands found in the lagoon are the ones formed due to deposition by sea and river deposits. The other are the remnants of Eastern Ghats. The former types of island are Nalabana island with an area of 35 Sq. Km. and the other types of Islands are Kali Jai and Ghanta Shila. The islands like those of Pari Kuda, Bada Kuda, Sana Kuda and Titipo are entrenched Sand dunes.

This is the general physiography of the lagoon. The general theory accepted towards the origin of the lake is as follows : The coastline receded during the post Pleistocene period along the Bay of Bengal coast, the gulf along the coast during the Pleistocene period resulted in the present physiography due to the various marine and fluvial activity. The deposition along the coast due to the littoral drift which caused in the formation of the spit from the Palur hills in the South. The elongation of the spit in the North, North East direction has brought the lake to its present configuration. The zone has undergone an upliftment before 3780 years to its present level by 20 to 30 metres³.

Drainage and Fluvial activity : Ten rivers and twenty five rivulets and stream fall into the lagoon. They are of two types as per their origin. The first one are the distributaries of Mahanadi System. eg. Nuna, Makara, Harachandi, Daya and Bhargavi. The other types of river which enter the lagoon originate in the eastern ghats, which are in the stage of early maturity, example Salia, Kusumi, Khira, Khalajhara, Malguni, Dhanua and Jhunka.

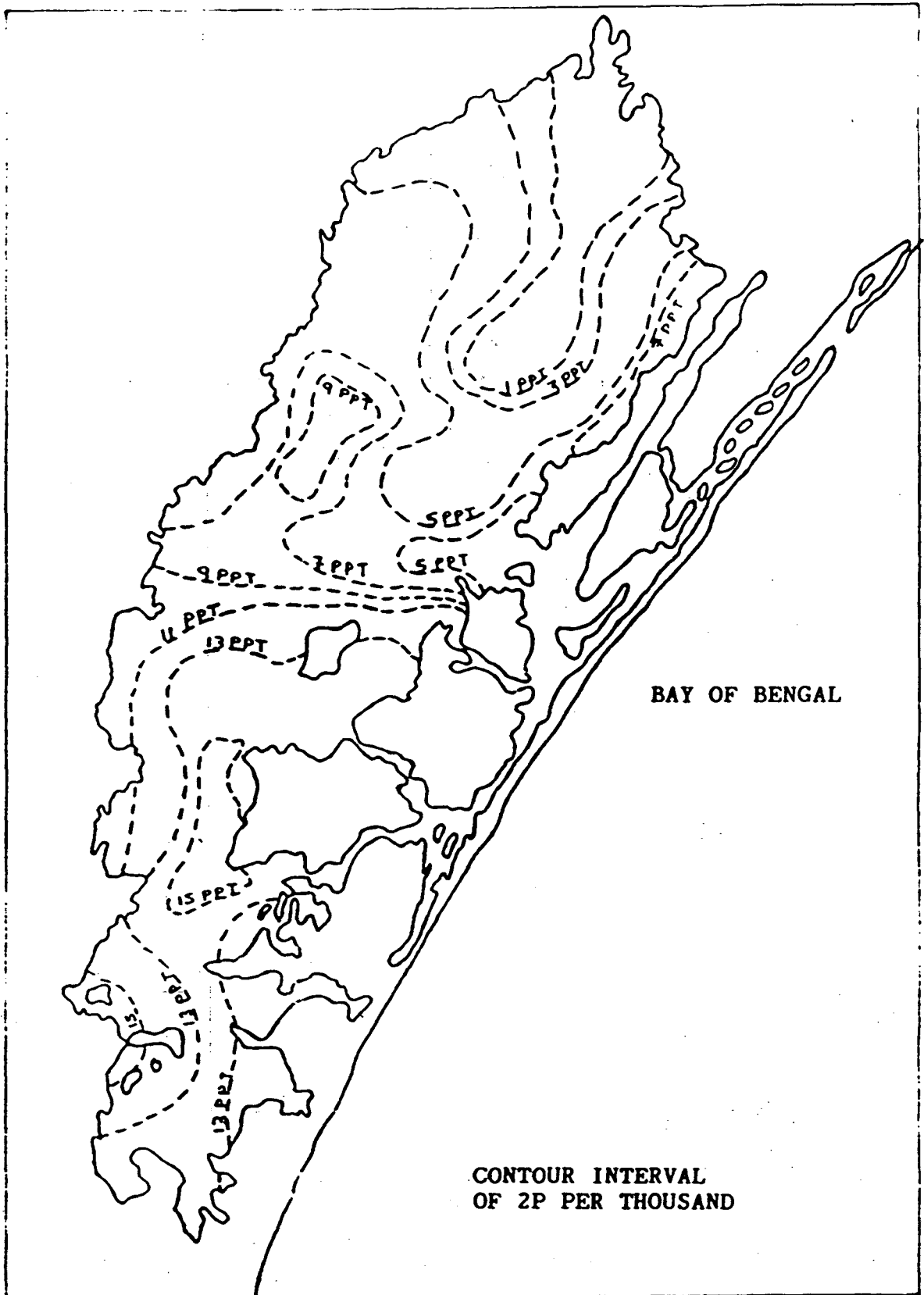
Climate :- The location reveals the climate to be a tropical monsoon climatic zone with high temperature and

3. Oldham drew the conclusion from remains of organisms in the south-west extreme of esturine shells at a height of 20 to 30 feet above the present level of flood-plain in Chilika. 1859.

abundant rainfall. The mean temperature varies from 26.6 degrees - to 27.7 degrees Celsius to a maximum of 31 degrees Celsius in March and 22 degrees Celsius in December. The mean annual rainfall is between 120 cms. to 160 cms. of which 80 % occurs in the monsoon months. The mean annual rainfall and its intensity increases from the south west to north east. The average evaporation from the bases annually is 180 to 240 cm. The average wind speed is low around 10 to 13 km/hr in winter and 25 km/hr in Summer. The coast experiences more fierce wind system where as the inland has a very slow wind system ranging from 5 km/hr to 10 km/hr in winter and summer respectively. Chilka is also prone to cyclones as per the past record. The cyclone has a great impact on the physiography, as the islands of Krishna Prasad Garh and the shifting of mouth as well as the opening of a new mouth in September 1973 are all effects of the cyclonic turbulence caused.

Salinity and Physio-Chemical properties :- There is great variation in the Salinity, the physiography, and chemical properties of the lake. The variation ranges from diurnal and locale to Annual and for the lake as a whole. The average salinity profile is as follows. The salinity in the northern region is less saline due to constant influx of fresh water, and varies during the rainy and summer season. It is 8 to 10 % during March to June and declines further in the rainy season. The southern part has higher salinity around 25 %.. The mouth and the Channel opening into the

MAP SHOWING SALINITY PROFILE OF CHILKA LAGOON



sea has higher salinity due to the influx of the tidal water. The salinity is around 29 per thousand.

The dissolved Oxygen in the water ranges from 5.3 mg/litre to 13 mg/litre. The northern part has higher concentrations due to higher photosynthesis. The Carbon dioxide occurrence is 2 mg/litre in the outer channel and occurs in traces in the rest of the lakes. The PH value ranges from 6 to 9 which increases from the Channel and central sector to the north and south.

Land Use pattern:- The land use is highly dominated by the Physiography, climate and the natural vegetation. Stone Quarrying is important in the rocky region. There is over grazing and over felling of the trees in under 40 % of the total forested area. Social and institutional factors govern the cultivating patterns in the northern zone. Cereals are grown on the flat flood plains. Cultivation extends upto the shores. Fruits and other Cash crop cultivation is on the rise off late.

The most important reason for settlement development around Chilka is the lucrative prawn cultivation which has transformed these areas into commercial centres. This also accounts to the development of few town and fishing villages. The Naval Training Centre is located in the central zone. Barakul and Rambha are two of the important tourist spots.

This physiographic set up and the activity pattern around causes a good amount of dynamism to the natural processes. There are natural processes which degrade the environment of the lake but worse is the extent of human interference which has caused environmental degradation. The primary degradation caused to the environment are generally the natural processes, the interference by human beings act as a catalyst. The two effects are to be studied separately for a better analysis.

Environmental degradation of Chilka through the natural process : - The natural processes which enhance the eco system and the processes which add to the dynamism of the lagoon are highly interdependent and inter-related. The lagoon dies a natural death, but for the human interference which enhances and even speeds the degrading process. The natural processes which degrade are as follows:-

Tidal Currents :- Study during May and August of twelve hour of observation reveal that the currents are semidiurnal. In May the peak season inflow of sea water into lake, the surface tidal currents have a maximum of 18.3 cm/sec and a maximum ebb current of 12.3 cm/sec. Near the bottom the maximum peak and ebb current speed in 23.8 cm/sec and 15.2 cm/sec respectively. During August there is continuous flow towards the sea with a high speed of 57.3 cm/sec and a ebb tide maximum of 45.7 cm/sec. There is siltation in the

summer on the weeded and mud flat region as there is no outflow of the river sediments, there is also siltation along the outer channel during the summer. This causes degeneration.

Long Shore Drift - When the waves approach the shore line along with the influence of the wind the water level is slightly raised near the shore by a slow shoreward drift of water. The excess of water being rushed forward creates the longshore current moving parallel to the shore in a direction away from the wind. Then the longshore current becomes an important source of sediment and the principal cause of the shift of the mouth.

Winds and Waves :- Along the eastern coast of Chilka the wind is generally from the South, South West. There is also a history of storms and cyclones. They are important carriers of terrestrial sediments, as well as a cause of turbulence in the water. These have been the main causes for the opening of a new mouth in September 1973 and the building up of the islands of Krishnaprasad Garh. The waves attain a height of 1.125 mtrs in Seven Seconds during the monsoon and post monsoon periods. They are chief sources of sedimentation. Thus the degradation of the lake eco system.

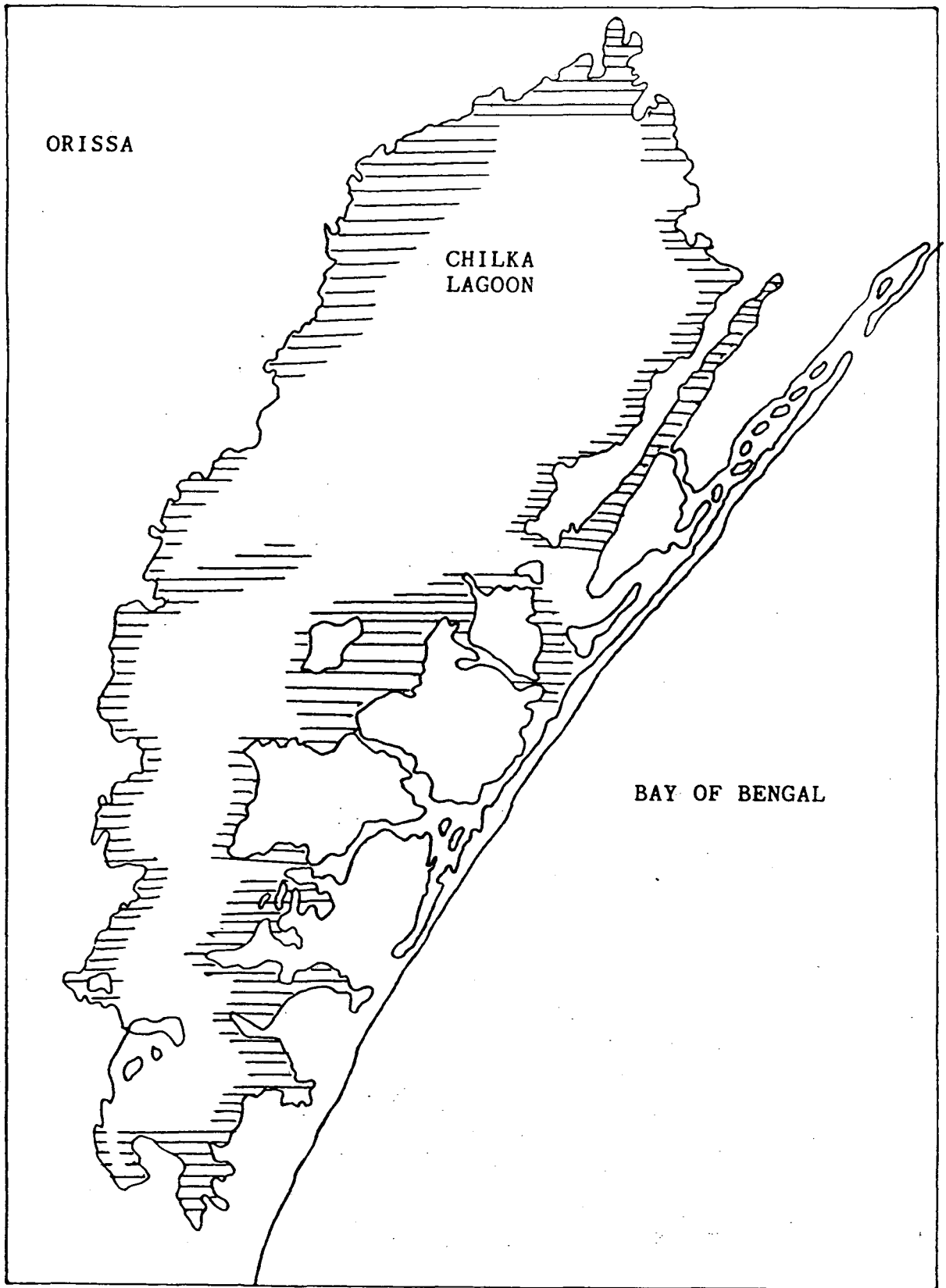
Shifting lake mouth and deteriorating Salinity:- The conspicuous feature observed in the deterioration of the saline environment of Chilka seems to be due to the shifting

of the lake mouth in the north north East direction and the reduction of the width of the mouth and reduction of the depth. The shift in the mouth is due to the deposition by the littoral drift along the Bay of Bengal coast which started at the Palur hills at the south during Pleistocene and added to the elongation of the spit and the bar. The suspended and the bed load of the longshore drift aided the whole process. This drift also takes in a good amount of sediment through the mouth with the tides and gets deposited in the lake as there is no flushing of the water due to the poor dynamism of the push and pull factors operating in the lake as the inlet and the outlet of the water entering is one and narrow also. This process of closing down may project the future of Chilka to be a fresh water eco system.

Catchment Degradation and lagoon Siltation:-

Fourteen million tonnes of silt and sediments reach the lagoon from the 10 rivers and 25 riverlets which makes the region of the lake turbid and shallow. The sedimentation of the lagoon is attributed to the rapid denundation in the catchment and removal of the vegetal cover. The mouth being shallow the silt load from the lagoon is hardly pushed into the sea. The marshy land in the Chilka environment has increased from 109.5 Sq. Km. in 1975 to 221 Sq. Km. in 1987. Every year Chilka is shrinking by 1.45 Sq. Km. along the marginal zones.

MAP OF CHILKA LAGOON SHOWING ZONES OF SILTATION

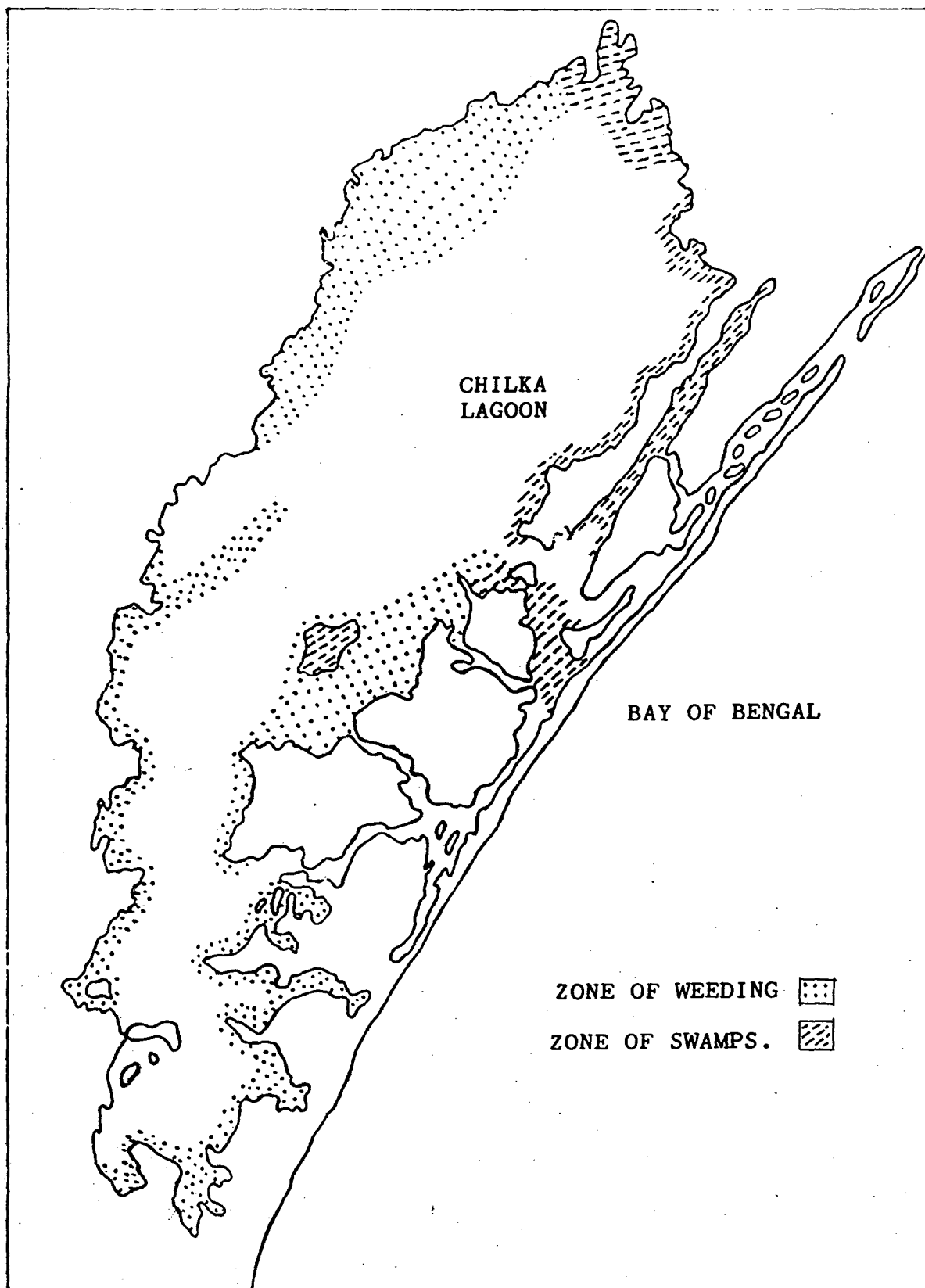


Depletion and Change in the Flora and Fauna:- The fauna of Chilka lagoon system has also undergone a change in its composition as presently the composition is that of Littoral Shrubs, Samophytes and the Aquatic Vegetation of the lagoon, but originally the littoral Shrubs were Mangrove forests which have been depleted due to human interference. A recent survey also proves that fresh water weeds are seen to be on the increase in the northern zone due to the decrease in Salinity. These plants are exotic to the flora of the lagoon eco system.

Chilka has a variety of fauna surviving on its resources. The sand and mud fauna like Ceolentrates, molluscs, decapods and Cruestacene worms, Chilka is also the store house of the most economic class of fishes which meet 60 % of the States' demand. 158 varieties of fishes and prawns have been identified of which only 27 species are of fresh water. The general physical degradation has also led to the reduction in the annual fish catch.

Chilka also hosts a great number of species of birds. Of the 150 species seen, 95 species are migratory in nature coming from as far as Siberia, Caspian Sea, Himalayas. They are aquatic (32 %), Waders (42%) and terrestrial 46 % . The migratory birds are some of quite rare species like the Flamingos, Herons, Eguetes, Spoon Bills, Painted Storks, White Ibis and Gulls. The general trend in the number of

MAP OF CHILKA LAGOON SHOWING
ZONES OF WEEDING AND SWAMPS.



migratory birds coming is on the decline. This is due to the reason of high degree of insecurity and commercialization of the lake.

The physical environment described so far gives an account of the population staying in and around the lagoon. The availability of resources for the survival of human settlement is plenty in the lagoon eco system but yet there is human interference upto such an extent that there is severe degradation of the lake. This makes it essential to go in for a socio economic survey of 51 villages around the lagoon from the total number of 132 villages chiefly dependent on the lagoon for a livelihood⁴. The total population of these villages is 23,275 of a total of 1.5 lakhs of the 132 villages. The survey for these 23,275 population gives the following picture. The number of Scheduled Castes are 12,574 and the rest belong to other castes. The religion which predominates is Hinduism. There has been less migration in the first 40 years of independence. They account for only 1234, but in the last five years it has gone up and the population of immigrants is 932. The main occupation is fisheries and most specifically prawn culture which in fact is the reason for the immigration. The survey reveals that the number of fishermen, male including adults

4. Orissa Remote Sensing and Application Centre (ORSAC), Socio-economic survey around Chilika, Environment Monitoring of Chilika, Department of Science and Technology, Govt. of Orissa, Bhubaneswar, March '92.

and children pertaining to Caste only is 6493, the same for women being 5864. The population of fishermen actually engaged in fishing only is 3560 adult male, 168 of adult female and 579 of children. The total number of boats used for fishing is 1064. The average per capita income for all the villages from fishing is Rs. 500. It naturally becomes important to analyse the assets of the fisherman and the general population. The total amount of land possessed by fishermen is only 259.13 hectares, but the other non fishing people possess 1156.268 hectares. The total land of fishermen for cultivation is 225.2 hectares whereas the others have 1294.6 hectares. The average per capita income from agriculture is Rs. 155 and average per capita income from all these villages from all other sources is Rs. 352. The number of people engaged in agriculture is 9900 of 1574 families. These statistics are highly substantiated by the literacy rate statistics which are far too low. The literacy rate is 27.2 %, the general castes have a higher literacy rate with 29.75 % and the fishermen have 22.09 %. These conditions given reveal the problematic caused by the population may also be attributed to the socio-economic condition of the population.

The physical problems have already been discussed but, the socio economic activity, the administrative methods and policies have also aided the environmental degradation of the area. There have been major institutional mistakes which have created perpetual problems for the lake environ-

ment. Though they are all linked up with the physical processes yet the political and social bearing also has created an impression on the ecology of the lagoon.

1) **Siltation of the lake** :- Deforestation in the Mahanadi catchment in Madhya Pradesh and Western Orrissa aid to the siltation of the lake and no process can stop the deforestation untill and unless strong political steps are taken towards strong management.

2) **Poaching of Migratory birds** :- Nalabana Islands are very important as they home migratory birds in Chilka. This region was open to tourist as well as the local population. Due to the insensitivity of the government there was severe poaching untill recently. There have been a general decline in number of Migratory birds. The most important reason being the security problem. They have shifted their zone from Chilka to small ponds in the nearby region. This is a matter of grave concern, as they are of international importance and tourist attraction.

3) **Fishing** :- Fishing is the most important occupation of the population living around the lagoons. 132 villages with a population of 1.5 lakhs are mostly dependent on the lake for their livelihood. The recent trend is prawn culture, but with this fishing in general goes on a daily basis. The process of fishing involves long hours of netting in the lake and traditonal ways of creating boundaries to dilineate

ones own territory of fishing sources. These have aided to the heavy siltation as they check the suspended as well as the bed load of the sediments carried down by the lagoon. There have been other problem like inter village and inter community conflicts for the habits of these people and the administrative lacunas.

4) **Prawn Culture** :- Prawn culture has suddenly gained importance as an occupation in the region as this eco system is highly conducive for the culture of Prawn which has a very high export value. This export value has given rise to the heavy usage of land in and around Chilka for the purpose of Prawn Cultivation but the malicious usage of the administration as well as the faulty programmes have led to disastrous consequences in the region. To understand the existing problem, the history of the policy is also necessary to be studied.

Traditionally the fishermen as well as the non fishermen had the right to fishery sources of the lake, though the non fishermen had limited areas of access. The Rajas till 1953 and on the abolition of Estates, from 1953 to 1959 the Anchal Adhikaris had the right to lease out the various fishery sources such as Jano, Dian, Bahani and Prawn Khandas to the fishing as well as non fishing population, and collected taxes from them.

Chilka the organization scheme in 1959 gave rise to a

dual cooperative structure. This had 48 primary fishermen Co-operative Societies at the grass root level, now the number of PFCS has increased to 65 and the apex body was the Central Fishermen Co-operative Marketing Society Limited. The Revenue Department through the collector of Puri and Ganjam gave the sources to be leased out by the CFCMS to the PFCS. The leasing were done on this basis, 212 of the fishing sources were leased to the Fishermen. They were the important sources like the Bahani, Prawn Khandas, and Jano. 96 Sources of which 88 Dian and only 4 Janos were leased out to the non fishermen. The leasing was handled by the CFCMS. The unleashed water in the lake was free for fishing only for consumption of the non fishermen during the period from 1st of March to 31st of July, where anything extra other than consumption purpose would be handed over to cooperative. The tax taken for the kind of fishing was directly collected by the collectorate for a very nominal rate. This form of tax was known as the Chuli Munda tax. This system continued till 1988 from 1959.

The various problems arising from this policy are the discrepancy created between the non-fishermen and the fishermen population. The agricultural land is poor because of saline soil which is not good for production. This has led to the stealing of fishing rights from the fishermen sources as they have better sources by the non fishermen community. The over utilization of the Chuli Munda tax and fishing for commercial purposes was also carried on.

They also started encroaching upon the Fisherman Sources for their own catch.

Prawn culture gained massive importance in Eighties. This led to large scale sub letting of the leased out fishery sources by the primary fishermen co-operative society, massive illegal encroachment of fishery sources by non fishermen and outsiders as well as wide spread conversion of traditional fishery sources like Jano, Dian, Uthapani, Bahani into Prawn culture ponds or net enclosure Gheris.

The leasing is not realistic as it lacks co-ordination between different concerned departments as well as the conspicuous lack of built in mechanism has led to the present form of sub letting, illegal encroachment and Mafia raj in Chilka which instead brought in muscle power into the situation for which the fishermen and the non fishermen both are to be held responsible.

The adoption of extensive culture fishery in the Chilka has marginalized the interest of the traditional fishermen, their traditional right to fishing in the lake has been usurped by the non fishermen and the out -siders.

In 1991 again the leasing was increased for a longer

period and the concept of 'capture' and 'culture'⁵ fishing was brought into the law in order to reduce the mafia in the region and give a more equitable share to the fishermen as well as non fisherman community, but the most recent problem is the ambiguity between the two terms which, has created new problems as well as aggravated the existing ones.

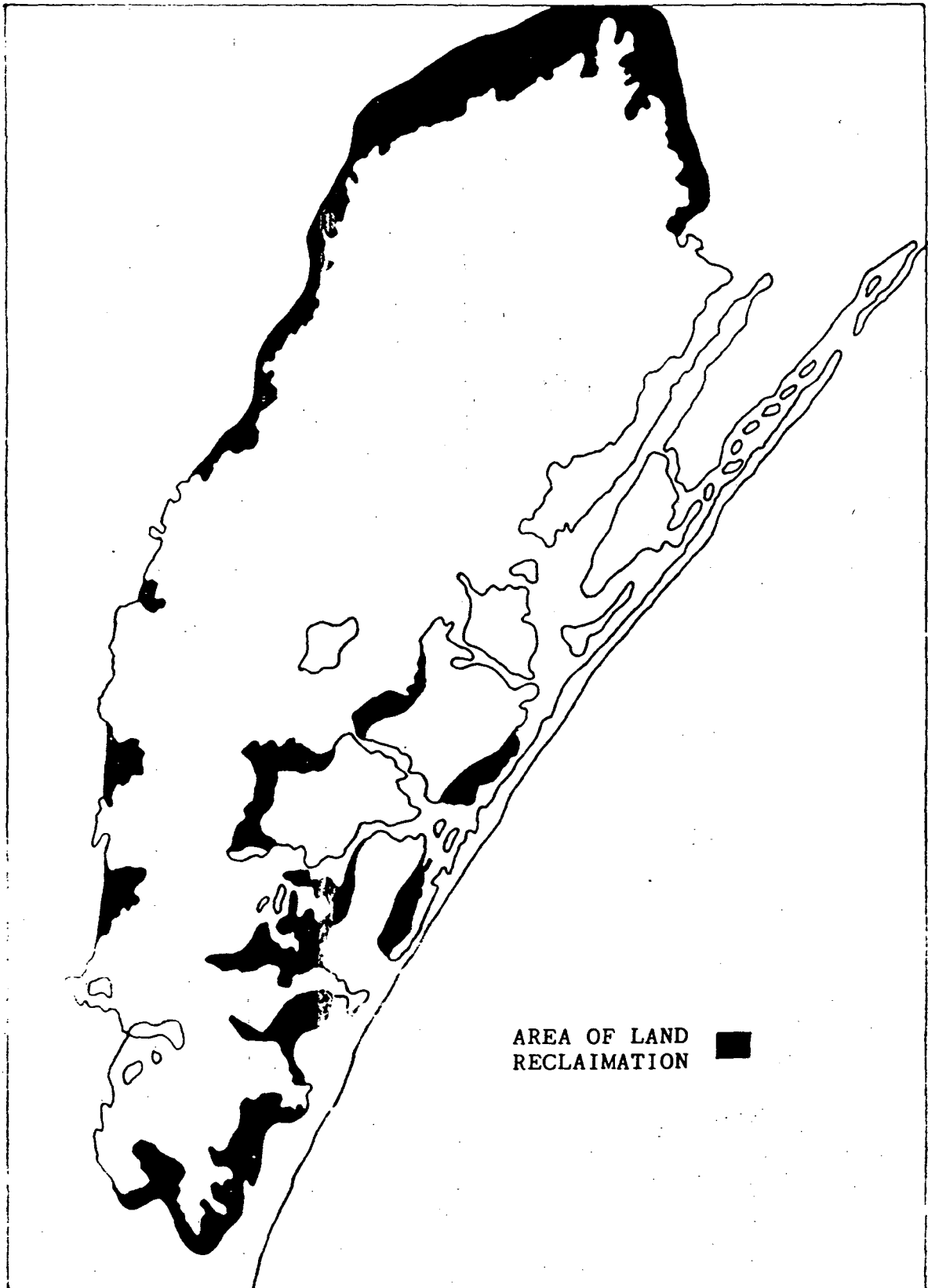
The semi intensive and the intensive culture with mechanization is of grave environmental problem. The project which was to be set up by the Tatas with collaboration with the Government of Orissa was planning to create a dam of fifteen kilometres long, use 150 pumps, each of 10 HP, 4 generators each of 75 KVA and 720 aerotors. There will also be toxic excreta from the artificial food provided to the prawn⁶. These are all severe ecological problems. Though the project has been cancelled yet the basic problem still remains.

Severe excavations have been made in the lagoon area, large number of dams constructed to prepare culture ponds, the free flow of water gets restricted, high degree of netting also causes severe siltation. The main affected

5. Old sources like Jano, Dian, Uthapani, Bahani and prawn Khanda are fisheries sources of capture type. Erection of embankments and other barriers for culture of prawn are culture sources. The High Court of Orissa, Cuttack, original jurisdiction case number 1653, 5643 and 8422 of 1992.

6. Orissa Krushak Mahasangh, 'Chilka Lake, will it be allowed to die?', Kwality Press Ltd. Bhubaneswar, pp7.

MAP OF CHILKA LAGOON SHOWING AREAS OF LAND RECLAMATION



areas also include the channel connecting the mouth.

All these problem though very social and economic in nature have an adverse impact on the ecology of the lagoon. It is true that there are a good number of natural processes also which hinder the sustainability of the lagoon but a good management of both the human interference as well as monitoring of the natural processes may increase the longevity of the lagoon eco system.

CHAPTER-V

SUSTAINABLE DEVELOPMENT AND CHILKA

Sustainable development is not a fixed state but a process of change in which the exploitation of natural resources, the direction of investment, the orientation of technological development and institutional change are made consistent with future as well as present needs¹. The definition of sustainable development as the name suggests is to exploit the resources with which human kind is endowed with for its present and future consumption. There has been a series of proposals made by different organizations to define sustainable development in accordance with different environments or situations, but the results have been varying excepting for the relationship between the present usage and the future need.

Thus, for the Chilka lagoon eco-system it is equally essential to find out a solution for the betterment of the present situation as well as conservation of the eco system for future generation. There are two different varieties of problem which produce a negative environmental effect on the eco system. They are the natural processes which occur and the secondly, human interference which have expedited or speeded up the process of deterioration of the lagoon eco system. These two problems in broader terms are the respective causes of most of the issues related to the present crisis of Chilka lagoon. It thus becomes essential to find

1. World Commission on Environment and Development., 'Sustainable Development - A Guide to our Common Future', Oxford University Press, New York, 1987, pp6.

out solutions for the problems and also decide upon policies to implement and sustain the same for the future. Dealing with both the sections of the solution differently will give the study a better view. This shall focus upon the lacunae of the present day functioning of the government and people working on the betterment and sustainability of the Eco system.

The first section of the chapter deals with the probable solution to the existing problem of the lagoon eco system. There are several natural processes which function and have to be altered upto a minimum level in order to get another equilibrium of the eco system at a different level. The problem and the solution are as follows:

i) **Siltation** : Siltation is a natural process which cannot be stopped realistically, as they are generally brought down by the river systems, the Mahanadi river system which gets in the maximum amount of silt has a catchment area of more than one lakh square kilometre and any check to the flowage of silt is not possible other than the upper stream which will have very less effect on the lagoon. The same goes for the tiny rivulets joining the lake. But to some extent the quarrying of rocks and high degree of deforestation needs to be stopped to avoid silting.

The other way by which silting in the lake can be avoided is the flushing of the incoming sediments. If the fresh water getting into the lake through rivers gets

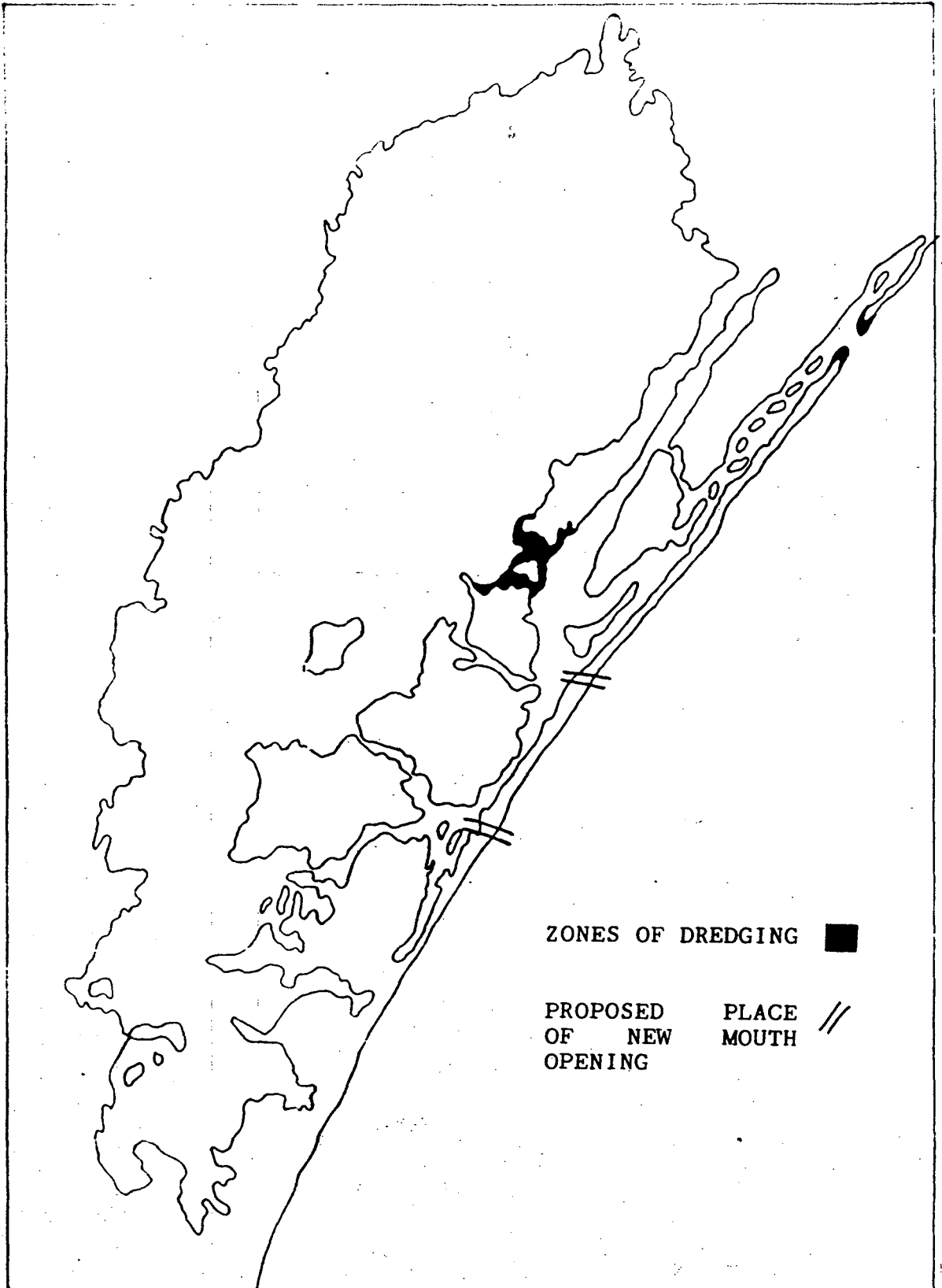
flushed out through the mouth of the lake into the sea the siltation inside the lake will reduce. This is possible through higher tidal effect inside the lagoon from the sea through the outer channel. Then the mouth of the Chilka lagoon which is the only entry point of sea water (tidal water) into the lagoon needs to be widened in order to have the effect of the tides in flushing out of the fresh water with sediments.

ii) **Salinity**:- The difference in the level of salinity may not be a very big concern, but the decreasing salinity and the low salinity is an important cause of concern. Low level salinity makes the lake not preferable for the existing flora and fauna of the eco system. They also aid the weeding of the environment. Fresh water species which can be called exotic to the environment are becoming more abundantly found in the area. Fresh water weeds and grass have also come up in the area. The problem of salinity can also be rectified only through a better flushing of the lagoon or more entry of Sea water into the lagoon. This is possible by the incoming sea-water at the opening of the mouth of the lake.

iii) **Shifting of the mouth** :- The mouth has been changing its position since the birth of the lagoon and has been moving in the north east direction. To stop this the mouth requires dredging and proper maintenance as the long shore drift is a constant source of supply of sediments along the sea side coast of the lagoon.

iv) All the previous mentioned problem can also be sorted

MAP OF CHILKA LAGOON, SHOWING AREAS OF PROPOSED WORK.



out if another mouth is opened up to the south of the existing mouth which in turn will allow the entry of more water and will connect the sea to the southern part of the lake directly in turn flushing out sediments and removing the exotic flora. Though more research is required to understand the stability of the lake after the opening of the new mouth.

5) **Flow of water** :- The siltation caused by sea sediments on the outer channel and the opening of the lake at Magar-mukh needs to be dredged in order to allow better flow of both fresh water as well as sea water. The dredging in both the areas will also restrict the weeding in their areas.

6) **Bird Sanctuary** : - The most densely populated zone of Chilka for birds both migratory as well as native birds, is the area around Nalabana. This zone needs to be a restricted zone. The area should be turned into a sanctuary as security of these birds is highly essential as few of the birds visiting are endangered species. Last year this zone was partially converted into a sanctuary and the results have been encouragingly positive².

7) **Fishing** :- Fishing generally involves two activities: First, common fishing of all species available in the lagoon and second is commercial fishing of prawn. Intensive prawn culture has given rise to an imbalance in the lagoon ecosystem which have been discussed legally. A few solutions

2. **More birds visit Chilka. Says Report, The Times of India, N.Delhi, 20th March, '95.**

rendered are as follows:

(i) The fishermen living around Chilka still continue and should continue to have the rights over fishing in Chilka as other avenues of income as from agriculture, not being very profitable in the region. The non-fishermen involved in the activity for purely commercial reasons should not enjoy equal rights as those of the fishermen. They should be given limited rights.

(ii) The very distinction between the various sources of fishery which are to be leased out needs to be demarcated thoroughly. This is to say that a proposed team needs to physically demarcate the various sources of fishing and categorize them under the culture fishery and capture fishery sources.

(iii) These policies should also benefit the fishermen and not the non-fishermen community only. The non fishermen have often adopted illegal means of fishing for the fast buck. This situation needs a legal coverage to avoid further blood shed and conflicts.

(iv) These conflicts have given birth to the mafia. The rise in the export value of prawn and the interference of big business houses, politicians and bureaucrats and their relatives have led to the entry of their muscle men³. This problem can be sorted out only through a more efficient security arrangement a more direct interaction and economic

3. Original Jurisdiction case No. 1653, 5643 and 8422. High Court of Orissa, Cuttack, 1992.

assistance to the village people with the absence of middle men or village touts.

(v) The upset price fixed by the government for the culture fishery sources are apt, as there is a constant steady and a still steeper increase in the price of a kilo gram of Prawn at the source itself.

(vi) There are many other hazardous effects of fishing in these areas which have caused concern. The type of intensive fishing is one of them. Then the environment friendly methods which should be ideally applied for the sustainability of the lake is used less and less in lieu of modern method. That is, Extensive culture fishery should be practiced as intensive culture fishery is harmful. No large scale production with heavy mechanizations should be permitted. The chemically processed food for prawns damage the lake irreparably. The interest of the population settled in and around Chilka lake should be safe guarded.

(vii) Environmental impact assessment should be made by a team of experts to examine the effect of the culture fishing practice at regular intervals, in order to understand the impact on the environment monitoring programme should be a regular feature of the lake eco-system.

(viii) The most important fact remains that all the human interference done and caused in the eco system have their roots in the economic activity. Thus an assessment of the economic viability of the practice should be obtained. A cost benefit matters needs to be calculated taking the elements of Private cost and Social costs and the elements

of Private benefit and Social benefit of sources at a micro and macro level.

(ix) There needs to be a good and direct interaction between the government and the population surviving and depending upon the lake. This will serve the dual purpose of benefiting the local population as well safeguarding the environment.

(x) There needs to be a government body to find out special programmes subjected by the central government, the state government to the local population and vice versa.

(xi) There should be greater representation from the local population, the government, the non governmental organizations, the environmentalists, the geographers and other specially qualified people to find out solutions to the problem existing and surfacing in the eco-system.

(xii) Lastly, it remains the fundamental duty of the government and the citizen to conserve and improve the eco system for a good today and a still better tomorrow.

The above mentioned solutions give us a picture that most of the work which needs to be done are highly complex and interdependent: They have to function together and that too on a large scale basis. There is a great degree of involvement of contradiction as well as a great degree of restrictions. Economic processes of people will be hampered. The involved processes and plans are not very profitable for the people around to do on their own. Hence a

systematic formula has to be analyzed and model formulated in order to give a more comprehensive and compact analysis of the above problems and solution.

The solution proposed, the progress done and the changes accepted in the recent past. Those which need further research and development to be conducted need to be put down more scientifically for better results. The unknown and mere faction which contribute in large to the existing problem and those which enhance it further needs to be taken care of at all levels. Hence the intervention of a large organizations without any profit motive and in favour of nature needs to regulate. The government, the largest organization along with other parties which have been responsible for the creation of the problem and have been a member contributing to the degradation and deterioration of the lake need to take the utmost care. Hence the following proposals which aims to get maximum benefit from the them can be termed as in the following:

- 1) An effective strategy must be founded upon a national political will and a policy framework derived through a democratic process. India being a democratic country, the apex body being the Parliament and in the state the legislature, elected members of these two houses should chair the organization which would specifically aim at the developmental programmes of the Chilka eco system. The orientation of this organization should be maintenance and not profit

making. This will get the best result. One such organization which functions for Chilka is the Chilka Development Authority. The chairman of which is the Chief Minister of the state of Orissa. This is a registered society⁴. This allows a more democratic functioning where the populace is given the prime importance. The Vice Chairman and other members are administrative officers, scientists, engineers and other related departments which will be important for the long term strategy planning for the lagoon eco system.

2) A long term strategy must be formulated, programmes with specific projects should flow from strategy. To elucidate this point, the programmes which are formulated by the various organizations must not be so flexible that they require change every now and then. In other words, there should be proper research done in order to understand the whole eco system and that the most suitable planning needs to be done so as to sustain the eco-system for the longest possible time and get the optimum out of it. Most of the natural processes are interrelated and interdependent, they have to be monitored both individually and also in a group. Thus specific programmes should come out to serve the purpose and they should hold good for the future to come. To summarize, strategy should be such that they hold the optimum level of equilibrium in nature.

4. **Chilka Development Authority**, Balugaon, Dist: Khurda, Reg'd No. 19257/57/1991-92, dated: 28.01.92.

3) Participation of the relevant local communities in the formulation, design, execution, review and further development of the strategy, policies and programmes is an essential feature. A fragile phenomenon which can be called the best explanation for the balance maintained between the natural processes as well as the natural processes and man. The balance needs to be worked out in such a way that a single factor affecting the balance is not disturbed and if disturbed has a chain reaction coming in with various other equilibria getting distorted. Thus the men who are into the process of the balance, the population indulged in the active interaction with nature their programmes and practices needs to be analyzed before the formulation of any strategy for the developmental process. For example the type of netting used to demarcate the areas inside the lake in Chilka causes a big problems, aiding siltation and providing obstruction to the flow of water, though being one of the traditional ways of putting up of a boundary inside the lake. Hence the practice needs to be analyzed and substituted immediately by other means. This can be done through the involvement of the local population. This also means, the changes needs to be accepted and executed they need to be reviewed. All these processes can be possible only through the involvement of the local populace or else the policies are of no use without their co-operation. Hence their cooperation and faith is of prime importance.

4) Effective participation calls for special efforts to build environmental awareness at all levels of government and the community. This delicate balance operating in the environment is highly flexible and interdependent, but the work force working on it has extracted to the maximum for its own benefit (human kind) and has done enough to damage and distort. This has led to a situation of irreversible bio-degeneration. This is a problem as it is a faster process towards the deaths of the eco system. The death of the eco system will lead to the death of the economy of lakhs depending on it. Thus effective participation here refer to a participation with some logical back drop and rational thought. All this is possible only if the people involved in the process of livelihood in the eco system are aware of the environmental processes. This rationale is also required by the government officials working there to get the best possible strategies for the eco system.

5) Decentralization of authority from the centre to local government institution is a vital link in the participatory process and an essential means of expeditory action. As has been said earlier, the project which needs to be taken can only be successful if power is delegated and worked upon at lower levels other than the centre only. There may be representatives, but they need to have power in order to execute and have more involvement. Other than the general factors which are necessary to decentralize, the other important ones are the emotional link which makes the

difference. This delegation of power will guarantee the speeding up of the process and more participation.

6) Programmes will succeed if they generate tangible economic and other benefits over the short and medium term, both for the government and the communities involved. The eco-system is presently under so much of pressure because of its economic importance. But these economic activities have only created a negative impact on the eco-system. Hence the policy formation in favour of the ecosystem will necessarily effect a cut in the economic process. But again policies will not work out if they do not get economic benefits. Hence solutions to be found out should be economically beneficial too or else they may not be effective all together. Though the prawn culture gets a good revenue for the state and the communities involved, harmful prawn culture practices should be avoided. Instead substitute methods which are eco friendly should be adopted.

7) Thus conservation and development programmes require continuous efforts aimed at strengthening the existing constitution and building up their capacity to provide effective services. Capacity building and ensuring sustainability will also call for investments with a long gestation period. The bulk of these being human resource development.

(8) Coordination is one of the most important necessi-

ties as the very combination of conservation and development is inter-disciplinary and have to be studied from various facets and angles. They have to be analyzed and taken account of various sections. Thus a sustained coordination of the various parties involved like those of the elected members, the officiating bureaucrats, the representatives from various branches of studies, research scholars, the population of the locality and of course most importantly though passively the eco system itself is necessary until and unless a proper understanding is involved between all these factors functioning along positive goal is almost impossible to be achieved.

9) The programmes are inter-disciplinary and multi-faceted. They need to be clean and compatible for execution. This means there will be a number of contradiction between various faculties examining the problem from different angles. But it should work in the direction of a synthesis and make it compatible for execution. Until and unless the definition of the programme is clear, it becomes quite difficult to be executed. Thus the coordination of the various faculties and the solution which comes at the end should be clear and must incorporate all angles and at the same time remain clear and worthy of execution with simplicity.

10) Flexibility and feedbacks are essential components in programme implementation and in the evolution of po-

licies. A practical phenomenon at times is highly essential to judge the authenticity of any programme or project on policy. Hence the whole process of policy making should be flexible enough to incorporate the various essential feature from various faculties and it should accept the feedbacks of those policies accepting the flexibility of the framed works for a better synthesis. Yet it should not be too flexible to be changed too often.

11) Continuous monitoring and evaluations:- Continuous monitoring and evaluation both of the physical phenomenon and the implemented policies should take place regularly in order to find out the exact standing of the facts related to the deterioration of the eco system and the effectiveness of the policies. The major factor for this environment monitoring is the fact that the various interdependent factions are so closely related that any imbalance may cause catastrophic changes. The policies which generally try to alter the environmental process (natural process) as well as the human action on it lead to severe such imbalances. Hence the effectiveness of policy and consequent study for further alteration and substitution of the policies, therefore require a high degree of environmental monitoring.

(12) Involvement of local NGO'S will increase the capacity to implement and sustain programmes. Effective participation in particular is often achieved through the medium of NGOs as the representative organ of various concerned and interest groups in the community. Profit not being their inter-

est feed backs and flexibility comes easier to NGOs as they have committed and motivated officials who perform their task properly.

In the same line they should not be considered a proxy to the government on the views of people, nor should the competence of the NGOs be taken at its overestimated face value for the non allocation of resources. But they being a pressure group, especially in the environmental sector of the country, have been of great importance for policy framing and implementation.

(13) There are various solutions which are yet to be justified totally, the opening of a new mouth into Chilka to the south of the present mouth is not being implemented instantly because of some scientific research which has not made the proposal totally acceptable. The unavailability of a sound technology reflects that sustainable development is lacking. Research proposals, user friendly affordable technology involving both the local people and the researcher needs to be developed. A sound technology here refers to all the possible work done in the eco system by human beings, at the least needs to be seen that they do not put any load towards the sustainability of the eco system, even if no good is accrued from them.

(14) The eco system provides the lucrative offer of prawn culture and fishing. There is great economic value of this occupation here but, there is a great degree of pressure on the eco system. Instead, if other employment opportunities

are developed around Chilka lake so that the pressure on the ecosystem is lessened needs to be given instant importance. Chilka is a great source of water sports facility, though never has it been properly developed. Chilka is a very good spot for tourists. Chilka has good potential source for adventure sports. Chilka has the facility of being one the greatest sight seeing places of migratory birds from as far off as Turkey and Siberia. Other than these sources of income and resources, Chilka has many other resources which can be generated. These relieve a lot of pressure from the ecosystem put in through fishing and prawn culture. In other words, off farm employment oppuntinities in the eco system should be a major thrust in relieving population pressures on this fragile environment.

(15) Social conditions are highly important for the understanding of any problem, be it social, environmental, economic or religious. In order to execute plans for any kind of a project in any area. The populace of that particular area needs to have a minimum level of educational qualification, a minimum understanding of the existing problems and that in turn might make them understand the bare necessity of the reason why sustainability of the eco system is being given importance. Thus human resource development has to be given a thrust for the development in any area. In other words: Universal and effective primary education improves , modifies and the ability to use resources sustainably and it encourages participation.

These were the main thrusts which needs to be emphasised by political processes to develop the landscape of the region. The problem is such that, only the political process can find an solution to the existing problem. The people in the region strive within the vicious clutches of poverty. There is a great degree of social backwardness which leads to many other problems as law and order situation , the existence of mafia and the other interference of outsiders. Social problems have taken the lead over the ecological or environmental problems. These social problems also add to the existing environmental problems. The problems discussed so far in the previous chapter and this chapter have at the least given us a direction regarding the existing problem. One realizes that it is just not the economic problem, nor is it just a political or an environmental problem. Instead, this problem is a politico-environmental problem. Greater thrust has to be given on the political process to take care of the eco system which is on the verge of optimum degradation.

There have been many formulas proposed and many a theories presented. There are a good number of programmes and organization to work upon these theories and formulas. But there is a marked lack of motivation and poor financial support. Here in order to work out the existing programmes, formulas and solutions proposed, aids either from the government itself or the funds which is raised by the govern-

ment in the form of loans from international organization and private donors should not be denied. These aids are a necessity. Thus donors also play an important role for the development of the area.

All this is possible only with the proper functioning of the political system. So ultimately in the end this project suggests a good leadership of the national and state government. The project should operate to support the development strategy programmes. The government has to be most effective to take care of the situation and also modulate the role of donors to support the developmental programmes.

CHAPTER-VI

CONCLUSION

Geographers since the ancient period have tried to establish the interrelationship between man and his natural environment. Two distinct thoughts developed, one which gave prime importance to the natural environment over human beings known as Determinism, this theory advocated that natural environment determines the life of human beings. The second thought which developed, though much latter, was that of Possibilism, which gave importance to man. It advocated that man with his knowledge and technology has the capability to overrule nature. Between these two extreme thoughts developed the middle path of Neo-Determinism, Stop and go Determinism and etc.

Through the development of Politico-Geographical thought, different approaches to analyse the interrelationship between man and his environment have been developed. The interrelationship being too complex and dynamic is very difficult to assess in general and give empirical judgement. The relationship keeps changing from time to time and the models developed do not fit into the situation always as the elements of the relationship keeps changing. But, these models have been very helpful in providing good theoretical base for further research, both at macro and micro level.

Humbolt, Ritter, and Ratzel were the pioneers who dealt with some aspect of the state geographically. Ritter suggested the cycle of culture and Ratzel described the state

to be organic and is always on the move for a larger living space.

Suggesting an approach into studying the interrelationship D. Whittlesey in 1935 put forward the various ways in which the functioning of the central authority brings about modification in the cultural landscape. Next the Unified field theory was developed. This for the first time developed the relation between the political process and the landscape. They developed a chain of thought which had political idea at one end of the chain and political area at the other end of it.

Much latter in the Seventies the politico-geographical model of political system analysis was put forward by Cohen and Rosenthal. This suggested how the social forces help in building up political structures which in turn aids transaction upon political action area and finally a change in the landscape. This related the political processes of spatial attributes.

Other than the process, the form and structure of the government are important factors in determining it's effectiveness as a locational agent. By structure he meant whether it was unitary or federal and by process he meant whether it was democratic or totalitarian. He also took into account the level of resource development, ethnic groups within the political unit and the active sociological units

of the region. This was put forward by R.D. Dikshit in his analysis of federalism.

The various interaction between the various location as well as the analysis of the attributes of the location were studied by E.W. Soja. In his concept of spatial systems - a segment of space which is formally and functionally organized through a patterning of attributes and a structuring of interactions. This could include the political spatial system as well.

All the above mentioned models did try to analyse an inter-relationship between politics and geographic environment, but the mere relationship has lost its ground of study as now it is not just the man - land relationship but the man-environment relationship which has become important. The saving of the environment, is the most important study. The environment is on the verge of optimum degradation. Thus through the eighties there has been various enquiries into this sphere of relationship.

Political ecology a concept was developed. This concept tried to suggest the relationship between ecological problems and the political economy. Peter Taylor in the process of examining the links between environmental and political activities, recognized three critical areas of enquiry. They were the contextual source of environmental change, the conflict over access of resources and political

ramification of environmental change. Though primary importance have been given to the economic activity, yet this concept has developed a dynamic relationship between environmental problems and political activities.

Though these concepts are valued to be very important, still they do not incorporate all the necessary elements to put forward a relationship between man and his environment. These theories lack the universal acceptance in the present situation. The dynamism of human activity on the environment has brought man into such a juncture that irreversible damage has been caused to the environment. Earlier economic activities and developmental activities were given primary importance. Environment was always side tracked. This led to the over utilization of resources which instead has disturbed the homeostatic equilibrium of the environment and this disturbance is beyond the limit of natural process of readjustment. Thus the birth of ecological problems. There were certain changes induced by the human beings on the natural environment which turned out to be severely dangerous for man himself. The developmental processes which caused most of these ecological crisis cannot be stopped as that will hinder the basic needs of man. Hence a middle path needed to be developed. The most effective way to have both the processes involved is the path of sustainable development.

Sustainable development is not a constraint or an

obstruction in the path of development, rather it is a self imposed restraint on the thoughtless and irrational usage of the natural resources and the environment. The concept of sustainable development also advocates the benefits which should be conserved for the future generation. Sustainable development in other words can be said to be the kind of developmental path which advocates conservation of resources and the natural environment for the usage and benefits of the future generation without stopping the present. This is possible only through a more sensitive usage at present.

To substantiate this concept and in order to elucidate the concept of sustainable development one intends to analyse the politico-environmental crisis of Chilka lagoon eco system as a case.

Chilka lagoon is a coastal brackish water lagoon, the largest in Asia, but, is fast diminishing in size due to heavy siltation. The lagoon opens into the Bay of Bengal along a narrow channel, the width of the mouth being only 200 metres wide. The lake is subjected to various natural processes and functions to maintain a balance and state of dynamic equilibrium. Every lagoon undergoes a natural process of death but this lagoon is undergoing a huge degree of unnatural interference which is degrading the lagoon eco system.

The catalytic factors which are speeding up the process

of degradation in the lagoon system are the economic activities that take place in and around the lagoon. The unscientific and irrational methods of fishing and deforestation have led to the silting of the lagoon, which in turn restrict the flow of water, creating poor salinity conditions and growth of exotic flora and fauna. Though this has been realized by the localites as well as the government, yet no strong process or legal forces have been used to restrict the unscientific economic activity. These processes of economic activities are highly traditional with little modernisations. Any change which has taken place so far add to the further degradation of the lagoon. The involvement of big money in the prawn culture and the export of prawns have led to the interference of the non-fishermen, outsiders, big business houses and the mafia into the lagoon eco system, thereby further degrading the lagoon eco system. To preserve the lagoon immediate government interference is required.

The longevity of the lagoon would have many positive feedbacks. The most important of them are the sustainability of the economic activity of the people around the lake, the preservation of an unique eco system in the region, the seasonal home of 95 species of migratory birds as well as a great source of tourism and entertainment would be conserved.

The interference of the government in order to induce

policies and frame institutions and organizations to conserve the lagoon eco system is essential. Direct governmental control over the lake is through the two Collectorates of Puri and Ganjam, the recently formed Chilka Development Authority and the Orissa Remote Sensing Application Centre. The C.D.A. looks into the developmental works in the lagoon. The O.R.S.A.C. studies the physical processes and changes which take place in the lagoon on a regular and constant basis.

Other than the government sources there are other organizations also like the fishermen cooperatives. The Primary Fishermen Cooperative Society and the Central Fishermen Cooperative Marketing Society Limited are the two. They are the link between the government and the people engaged in fishing. For academic purposes there have been many a noted studies done on the Chilka lagoon ranging from historical, political, economic, social to physical studies of the region.

All these studies and organisations have helped the government to decide upon policies to aid the sustainable development of that region. There have been some progress regarding the physical degradation of the lagoon which have been taken up by the government. The dredging of the mouth, the dredging of the connecting channel as well as the process of deweeding has also begun. The consideration of opening a new mouth for the lake has also been proposed.

But these do not solve the problems created by the human beings.

Socio-economic surveys, political reviews and legal files have led to the suggestion of a change in the activities of the population around Chilka. Hence the policy framework which needs to be developed should follow certain set rules and basic actionable agenda for the conservation of the lagoon. The sixteen principles for the betterment of the lagoon suggested in this research work needs to be given consideration.

Other than this the national government has set up a National Wetland Management Committee to advise the government on policy guidelines. There have been major international conferences to suggest actionable plans for the conservation.

The above discussed case study provides ample evidence of the politico-environmental crisis which can be solved with the help of the government through the process of sustainable development. The government has direct control over the landscape of its territory and hence any deterioration of the environment is a concern of the government. This does not mean the government should impede the developmental works for the sake of the environment, instead it should put that much of pressure on the environment which the environment can replenish on its own. To create a

balance' between the two factors, the environmental crisis and the developmental works is subjected to a debate as both of them are equally important. The government has to analyse rightfully and declare a policy for the best possible development of the environment. Broadly the government needs to follow the following suggested actionable agenda for a more healthy environment.

i) The ecological resources must be carefully priced to reflect the scarcity value.

ii) Compulsory audits and mandatory quotas are essential for the environment sensitive zones.

iii) Evolution of environment friendly technology.

iv) Significant financial resources need to be raised for both environment and development through some practical international agreement.

v) Global institutions are required to be framed to assist and finance the formation of national sustainable development programme.

vi) All countries should be encouraged to prepare environmentally sensitive national income accounts to reflect the impact of environmental damage on national and global output each year.

vii) Formation or sustainable human development strategies of both developing and developed countries should be coordinated at a global level.

viii) The United Nations should enforce stronger rules on the member county for a more environment friendly development.

So far the domain of political geographic analysis have analysed the relationship between political activity and landscape, analysis of political activity, political economy and environment have been done but no model has tried to get in the concept of sustainable development. They have suggested the need of rational usage of resources but they have not defined any concept which clarifies the rational usage. The models have been very scientific but none have given any importance to the philosophy behind the usage of the resources and man's attitude towards the utilisation of these resources.

Henryk Skolimowski's philosophy has some importance here. He developed that ethics in man has centred itself on various objects through history. It was god centred first, then with the coming in of renaissance it became human centred, in this century it is machine centred. Now what is required is the ethics should be eco-centred, where the world is not a machine but a sanctuary. He emphasised on a model of eco-dorma. This model gave the interrelationship between eco-justice, reverence, responsibility, frugality and diversity. This is a very sound philosophy which emphasizes on the immediate need to change the very basic concept of competition and lower down the human induced environmental hazards. But this is a very long term action based on impractical assumptions with great degree of psychological involvement. Though a model which serves as a solution to

the environmental crisis creates a problem for competitive development.

Thus the further research in this field of study should incorporate the concept of Political activity and the evolution of changing landscape through the policies of sustainable development.

Human being so far has been concerned only with the present but has not looked beyond the present. With the progress of man's activity with the same speed in the same direction will lead to a still worse future. Hence an immediate necessity is to look into the future through sustainable development

The development of models and theories in political geography should aim at providing more practicable models suggesting the interrelationship of political processes and the landscape. The various factors and elements which are required to be considered in the models are the concept of economic development and not growth, the impact assesment of these developmental works on the environment, the birth of political idea, development of political structure, development of a more practicable synthesis through the interaction between the supporters and the opposition on various environmental and developmental issues. The policy framework keeping in mind the sustainable development should be adopted and finally the impress of these policies on the

geographic environment.

A more healthy future and a better environment are possible through a practical, rational and much more ecologically scientific technological usage of resources. This needs the aid of local, regional, national and global interaction. This interaction is possible only at a political level. Hence interaction between political activities and the landscape is very important for a more sensitive and practical assesment of the future.

BIBLIOGRAPHY

PRIMARY SOURCES

Chilka. A Brief Overview, Govt. of Orissa
Department of Forests and Environment,
Bhubaneswar, May 1994.

Chilka Banchao Andolan - Project Reports
Gopinathpur Village, P.O. Paraspada,
Dist. Puri.

Memorandum of Association and Rules and Regulations;
Chilka Development Authority, Department of
Forest and Environment, Govt. of Orissa,
Bhubaneswar, 1992.

Chilka Lake, will it be allowed to die? Orissa
Krishak Mahasangh, Kwality Press, Pvt.
Ltd. Bhubaneswar.

Chilka Wetland Development, Chilika Development,
Authority, Forest and Environment
Department, Govt. of Orissa, India, 1992.

Environmental Monitoring of Chilika, At a Glance.
Orissa Remote Sensing Application Centre,
Department of Science and Technology,
Govt. of Orissa, Bhubaneswar, 1993.

Report of Chilka Database for the year of 1991-92.
Orissa Remote Sensing Application Centre,
Department of Science and Technology,
Govt. of Orissa, Bhubaneswar, 1993.

The Report of the Fact Finding Committee on Chilika
Fisheries; submitted to the Hon'ble High Court of
Orissa, Cuttack on 16th August, 1993.

Original Jurisdiction case no. : 1653, 5643, & 8422
The High Court of Orissa, Cuttack, 1992.

Chilka - The Pride of our Wetland Heritage,
Orissa Environmental Society,
Bhubaneswar, 1988.

SECONDARY SOURCES

- Asthana V. Limnological Studies of Lake Chilka Orissa, School of Environmental Sciences, JNU, New Delhi, 1980.
- Boudeville J.R. Problems of Regional Economic Planning Edinburgh University Press, Edinburgh, 1966
- Chorley, R.J. and Haggett, P. Socio-Economic Models in Geography London Nettuen Co., London, 1967.
- Chorley, R.J. and Haggett, P. Models in Geography London Nettuen Co., London 1971
- David W. Pearce, Edward B. Barbier & Markandya Anil Sustainable Development and Cost Benefit Analysis, London Environmental economic Centre, London, 1988.
- Dikshit R.D. Geography and Federalism1971.
- Edward B. Barbier Economics, Natural Resources, Scarcity and Development: Conventional and Alternative Views, 1989.
- Eitzen, D.S. Social Problems, Allyn and Bacon, Inc. Boston, USA.
- Hartshorne, R. Political Geography in Jones, C.F. and James P.E. (Ed.), American Geography Inventory and Prospect Syracuse University Press Syracuse, 1954.
- Administrative Environment - A Bunch of Case Studies, Indian Institute of Public Administration, New Delhi, 1979.

- Nicholson M. Environmental Revolution: A Guide for the New Masters of the World, London : Holder and Stoughton.
- O'Neil John Ecology, Policy and Politics, Human Well Being and the Natural World London, Routhedge, 1993.
- Reddy M.P.M. A Study on the Factors Responsible for the shifting of Chilika Mouth. I.G.J. Madras.
- Sinha B.N. Environmental Degradation of Lake Chilika and its Environ Bioclimatic and Thematic Mapping of the Eastern ghats Deptt of Geography, Utkal University, Bhubaneswar, 1987.
- Skolimowski H. Dancing Shiva in the Ecological Age, International Centre for Eco philosophy. Indian Institute of Ecology and Environment, New Delhi, 1995.
- Skolimowski H. Ecology and the Sanctity of Life Eco philosophy centre, Ann Arbon, Mich, USA, 1992.
- Singh S. Environmental Geography Prayag Pustak Bhawan, Allahabad, 1992.
- Sinh, D. The Eco-Vote. People's Representatives and Global Environment, Prentice Hall of India, Pvt. Ltd., New Delhi, 1985.
- Soja E.W A paradigm for the Geographical Analysis of Political System in : Cox, K. R., Reynolds D.R. and Rokkan S. (Ed), Locational Approaches to Power and Conflict, New York, Halsted Press. US, 1974.

Sethi, M.S. Understanding our Environment
Common Wealth Publishers,
New Delhi, 1992.

Turner K. Sustainable Environment
Management : Principles and
Practice. Belharen Press
London, 1988.

ARTICLES

Berry B.J.L. A Review of B.M. Russett's
International Regions and
the International systems in
'Geographical Review' Vol.59,
1969.

Cohen S.B. and
Rosenthal L.D. "A Geographical Model for
Political Systems Analysis"
Geographical Review, Vol.61
1971.

Das H.S., Mishra P.K.
and Sinha B.N. "Some observation of Chilika
Wetland Eco-System," Papers
presented at the National
Seminar on Environment and
Eco-System, Department of
Geography, Utkal University.
1978.

Dinesh Kumar, P.K. "Our changing coastlines"
Science Reporter, Vol. 26,
No.5, CSIR, New Delhi 26.
1989.

Directory of Wetlands in
India, Ministry of Environ-
ment and Forest, Govt. of
India.1989.

Herman E. Daly "Towards some operational
principles of sustainable
development," Ecological
Economics, Vol. 2.1990.

Hartshorne R.

"The Functional Approach in Political Geography", Annals of the Association of American Geographers Vol. 40.1950.

Jones S.B.

"A Unified Field Theory of Political Geography," Annals of the Association of American Geographers, Vol. 44,1954.

Robert Repetto

"Coping with the Eighties : Lessons from the Seventies," Report prepared for the United Nations Department of International Economic and Social Affairs, New York.1981.

Trison, C.L.&
Zutshi D.P.

"Ecology and Management of Wetland Eco-Systems in India" Report of the meeting of the National Man Biosphere Committee of Central and South Asian Countries, New Delhi, 1985.

United Nations Development Programme, "Human Development Report 1991, "Oxford University Press, New York, 1991.

World Commission on Environment and Development. "Our Common Future" Oxford University Press New York,1987.

NEWSPAPERS

The Times of India	(New Delhi)
The Hindustan Times	(New Delhi)
The Samaj	(Cuttack)
The Sambad	(Cuttack)