

'DEVELOPMENT PLANNING'  
AT THE SUB-REGIONAL LEVEL  
WITH SPECIAL EMPHASIS ON  
RIVERBANK EROSION AND FLOODING

THE CASE STUDY OF JHALAKATI DISTRICT

A Project Report



A.K.M. Shah Alam



Submitted to the Department of Urban and  
Regional Planning, Bangladesh University of  
Engineering and Technology, Dhaka in par-  
tial fulfilment of the requirements for the  
degree

of

Postgraduate Diploma in URBAN AND REGIONAL PLANNING

UNDER AIT-BUET PROGRAMME

NOV. 1989


DEVELOPMENT PLANNING AT THE SUB-REGIONAL LEVEL  
WITH SPECIAL EMPHASIS ON RIVER-BANK EROSION &  
FLOODING: THE CASE STUDY OF JHALAKATI DISTRICT

A Project Report

by

A.K.M. SHAH ALAM


Approved as to style and contents  
by

---

(Dr. Mir Shahidul Islam)  
Professor & Head  
Department of Urban and  
Regional Planning  
BUET. Dhaka


Chairman  
(Supervisor)

---

(A.S.M. Abdul Quyum)  
Associate Professor  
Department of Urban and  
Regional Planning  
BUET. Dhaka

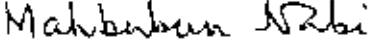
Member

---

Head  
Department of Urban and  
Regional Planning  
BUET. Dhaka

Member

---

(A.S.M. Mahbub-un-Nabi)  
Associate Professor  
Department of Urban and  
Regional Planning  
BUET. Dhaka

Member

November 1989

## ABSTRACT

This project work is an attempt to review the Regional Development Planning, elaborating mainly the theoretical aspects based on secondary sources of literature. Special emphasis is given on river bank erosion and flooding. Efforts have been made to find out the policy and strategy for development planning. Despite the fact that riverbank erosion dislocates thousands of people each year, people become homeless, and become migrants, there has been very little effort made to understand the socio-economic impact of this hazard. Here an attempt has been made in this research work to assess the impact of erosion hazard on the economic condition of the people of Jhalakati district.

Starting with problem identification, it focuses on the exploration of the coping mechanism at the individual and household levels, and analysis of traditional responses. It becomes clear from the findings and recommendations that pursuance of some non-agricultural occupation is the best survival strategy in facing the post erosion consequences. The years of severe erosion was between 1966 to 1987. Unlike other erosion prone areas, in Jhalakati district, the consequences of floods and erosion does not appear to be the same: in many instances erosion is preceded by the floods, but in Jhalakati erosion takes even without the affect of floods.

Recommendations of the study are made so that area specific problem such as erosion and flood receive planning attention. Except this, structural measures to accelerate accretion, may be initiated at the national level, mitigation can be largely upazila level activity. It is suggested that local level planning should activate total initiatives for non-agricultural occupations by creating facilities for growth centers in the upazila and district headquarters.

## ACKNOWLEDGMENT

The researcher expresses his profound gratitude to his Supervisor, PROF. MIR SHAHIDUL ISLAM, for suggesting this problem as research work and his generous guidance, advice, and affectionate touch. He is very much indebted to PROF. GOLAM RAHMAN for extending constant help and guidance. Deep gratitude is expressed to committee member Mr. A.S.M. MAHPURUN-NABI- Associate Professor of the Dept. of URBAN AND REGIONAL PLANNING, BUET, DHAKA for his guidance and constructive suggestions.

Appreciation for help and guidance is conveyed to DR. SARWAR JAHAN of URP, Bangladesh University of Engg. & Tech., Dhaka.

Thanks also due to DR. A.T.M. NURUL AMIN, Associate Professor at AIT, BANGKOK for his suggestions and help and for providing valuable literature.

The researcher is greatly indebted to the UNDP-BNPSCO, for providing fellowship and research grants and to the Govt. of Bangladesh for according permission to go to AIT for directed study there.

The researcher is grateful to his wife MAHFUDA ALAM-"MEELY" and his little son "SUVRO" for being constant sources of inspiration during the hard time of this study.

The love and encouragement of his mother has been an unending source of blessings during the study in AIT-BUET.

Finally, the researcher wishes to dedicate the research work to his late father MAMTAZUDDIN AHMED for his life long sacrifices to uphold the values for education.

# TABLE OF CONTENTS

Page no

ABSTRACT		
ACKNOWLEDGEMENT		
LIST OF TABLES		
LIST OF FIGURES		
BIBLIOGRAPHICAL REFERENCE		
CHAPTER-1..	REGIONAL DEVELOPMENT PLANNING	1
1.1..	STATEMENT OF THE PROBLEM	1
1.2..	GOALS AND OBJECTIVES	1
1.3..	REGIONAL DEVELOPMENT-POLICIES & PROCESSES	2
1.4..	IMPLICATIONS OF THE NEW STRATEGY FOR DEVELOPMENT PLANNING	4
1.5..	REGIONAL PLANNING AND DEVELOPMENT	5
CHAPTER-2..	PROBLEMS OF REGIONAL DEVELOPMENT PLANNING	6
2.1..	THEORETICAL AND METHODOLOGICAL FRAME OF THE STUDY	6
2.2..	REGIONAL VERSUS SECTORAL DEVELOPMENT PLANNING	8
2.3..	ASPECTS & RECOMMENDATIONS FOR REGIONAL DEVELOPMENT PLANNING	9
2.4..	THE CONCEPT OF A PLANNING REGION	10
2.4.1..	THE PROCESS OF REGIONAL DEV. PLANNING AND POLICY FORMULATION.	10
2.4.2..	FORMULATION OF A DISTRICT PLAN	12
2.4.3..	STEPS IN PREPARATION OF THE PLAN	13
2.4.4..	METHODOLOGY.	14
CHAPTER-3..	RIVERBANK EROSION AND FLOODING: IMPACT ON RESEARCH	16
3.1..	RATIONALE OF THE STUDY	16
3.2..	OBJECTIVES OF THE STUDY	23
3.3..	HYPOTHESIS	23
3.4..	SCOPE OF THE STUDY	24
3.5..	LIMITATIONS	24
3.6..	IMPACT OF RIVERBANK EROSION AND FLOOD ON RESEARCH	24
3.6.1..	THE PROJECT "RIVERBANK EROSION IMPACT STUDY" (REIS).	25
CHAPTER-4..	A SURVEY DESIGN FOR RIVER EROSION AND FLOODING	27
4.1..	CHOICE OF STUDY AREA	27
4.2..	SOURCES OF DATA	27

		<u>Page no.</u>
CHAPTER-5	AN EXTREMELY VULNERABLE DISTRICT: JHALAKATI	29
5.1	LOCATION AND PHYSICAL CONDITION OF SOIL	29
5.2	CLIMATE	29
5.3	OCCUPATION	29
5.4	SERVICES AND FACILITIES	30
5.5	INDUSTRY AND OTHER NON-AGRICULTURAL ACTIVITIES	30
CHAPTER-6	THE CONSEQUENCE OF RIVERBANK EROSION AND FLOODING	31
6.1	STUDY AREA AND HOUSEHOLD CHARACTERISTICS	31
6.2	MIGRATION PATTERN OF THE DISPLACEDS	31
6.3	HAZARD COPING MECHANISM FOR RIVERBANK EROSION AND FLOODING	31
6.4	CONCLUSIONS	35
6.4.1.	THE DISTRICT RIVERBANK EROSION AND DEVELOPMENT	35
6.4.2.	HOUSEHOLD CHARACTERISTICS, OCCUPATION, INCOME AND LAND-HOLDING	36
6.4.3.	HAZARD PERCEPTION, EXPERIENCE AND COPING MECHANISM	36
CHAPTER-7	A PROGRAMME STRATEGY TO COPE WITH RIVERBANK EROSION AND FLOODING	38
7.1	PREVENTION OF RIVERBANK EROSION	38
7.2	MITIGATION FOR RIVERBANK EROSION	38
7.3	PREPAREDNESS AGAINST THE RIVERBANK EROSION AND LOSS OF LIVELIHOODS	40
7.4	REHABILITATION AND RECOVERY	44

LIST OF FIGURES

<u>Figure No.</u>	<u>Page No.</u>
1	17
2	18
3	19
4	22
5	39
6	45

LIST OF TABLES

<u>Table No.</u>	<u>Page No.</u>
1	20
1.1	21
2	32
2.1	33
3	34
4	41
5	42
6	43

## CHAPTER-1

### REGIONAL DEVELOPMENT PLANNING.

Regional development planning in developing countries received tremendous attention and boosts in the late 1950s and early 1960s. Today it is a major part of planning activities and consideration.

However, a definite answer to the question of what regional development planning shall be, and in which direction it will go, is still under vivid research.

The years of euphoria have been quickly followed by those of disillusionment. The hope placed in regional planning as an instrument for overcoming the problems of inter-and intra-regional disparities has so far not been fulfilled.

Unbalanced growth, regional disparities and the fast growth of metropolitan agglomerations affect social and cultural conditions, economic development, and ecological balance. These underline the necessity for establishing appropriate regional development planning as an important means of promoting the social and economic development of a country.

#### 1.1. STATEMENT OF THE PROBLEM.

The last decade has witnessed a growing interest in local level rural development planning in many developing countries of Asia and the Pacific. The rural development planning is primarily concerned with planning at the village level, often for a single sub-region of a region. There is a need to specialize at an intermediate level between macrorregional national development planning and community-based rural development. Development planning in a wider regional frame-work should contain issues which can be properly tackled at the local level.

#### 1.2. GOALS & OBJECTIVES:

Development planning is seen as a problem-oriented tool for coordinating measures and projects which are envisioned to overcome social and economic underemployment by optimizing existing regional resources and potentials, operationalizing the concept of integrated rural development, and emphasizing basic needs



and self-help approaches.

The following are the crucial phases of the planning process and may be identified as the objectives of a regional development

planning:

---- identification of regional development problems, resources and socio-economic needs.

----Analysis of development trends and constraints, including demographic and economic development forecasting;

----formulation of regional development plans;

----design of strategies and policy options of district development plans and programs,

----development and use of instruments for implementation, enforcement, and control of plans and programs, and the management of development projects, at the district level.

Regional development planning relates to a variety of rural development activities in which planners, managers, and administrators employ rational, technical methods to analyze rural regional problems and to recommend or take appropriate action for problem solving as well as to formulate viable rural development programmes and management of available means such as natural political and institutional resources. It also deals with the optimum use of these resources for the accomplishment of the stated goals of development. In a broader sense, rural regional development planning encompasses planning; implementation; monitoring, evaluation and feedback of experience gained into future development planning.

### 1.3. REGIONAL DEVELOPMENT POLICIES AND PROCESSES:

The policy responses to national goals and objectives and to regional inequalities (disparities) form the central theme of the title-conflicting national and regional development goals often lead to contradictions between national and regional growth policies. Balanced regional development and dispersal of economic activity are closely inter-related. Growth and diversification of economic activity in an underdeveloped area can take place only if the infrastructure required for this is provided in an adequate measure and programmes for conservation and development of natural resources undertaken.

A regional development policy, has yet to evolve in Bangladesh. Perhaps, elements of such a policy are present in the matrix of our national development policies, but they are so disjointed that they do not constitute a coherent whole and cannot help in identifying the instruments needed for making policy decisions.

The policy instrument relevant to regional planning is the direct and indirect controls/interventions exercised by the Government. Examples are the location of public sector projects, the industrial licensing policy and various incentive measures and tax concessions to encourage specific activities.

It is necessary to emphasize here that, no matter what policies we adopt for regional development, they must be treated as the means to achieve the national goals-economic growth, equity and environmental quality.

At present so far as our data matrix is concerned only with the arithmetic of macro-economics; this should now be supplemented by the geometry of regional development, the sociology of income distribution and the ecology of environmental development.

This problem of conflict between goals affects not only the regional and national development policies, but also the inter-regional at variance with those of the adjoining regions. This is partly because of psychological barrier. The inter-regional mobility of factors of production can lead to other goals, harmonious or conflicting depending upon the overall context in which the developmental processes operate.

Here it is pertinent to note that the question of regional balance in economic development has its roots in the overall national goals and objectives.

In the process of regional development planning, the regional policies and programmes are aimed at reducing the income differential among regions. The goals of planning have been basically economic, and hence the social and environmental dimensions of development have not stood out clearly. There has been no attempt to evolve a national policy for regional development.

#### REGIONAL POLICIES:

A policy essentially means an integrated programmes of action which an actor is accustomed or intends to undertake in response to a given problem or situation with which he is confronted. When applied to government policy, it means "actions taken by the Government in pursuit of certain aims"----- such as the aims of preserving law and order, of guiding the freedom of expression and choice, of reducing regional tension etc. In the context of spatial planning, a policy may be aimed at reducing regional inequalities/disparities.

#### GROWTH CENTRE POLICIES:

A recurrent feature of contemporary regional and sub-regional plans and strategies is the concentration of growth and development in a limited number of centres. The advantages of such a policy relate to the theoretical discussion of growth poles. The concentration brought industrial advantage; urban advantage, and a nucleus from which growth could spread into the rest of the region.

#### 1.4. IMPLICATIONS OF THE NEW STRATEGY FOR DEVELOPMENT PLANNING:

The new strategy for spatial development seems to be the one that the southeast asian countries adopt to speed up economic development in the region. This strategy calls for certain fundamental changes in our development ideology as well as in processes, policies, and administrative actions. Our planning should now be regarded as a social process as much as an economic exercise and the normative criteria for decision-making, based as they are on the experience of the western countries, must be modified to fit the socio-political realities of our own environment.

The proposed strategy, if it is to be of practical value, must be preceded by certain definite steps and experiments in various aspects of planning and development. We may consider these steps and experiments as the basic imperatives of pre-requisites for the success of the strategy itself.

To elaborate these, the operational problems thrown up during the implementation of the new strategy may not come as total surprises threatening the very possibility of giving the new strategy a fair trial.

### 1.5. REGIONAL PLANNING AND DEVELOPMENT

Regional planning, as conceived at present, is an exercise in the spatial development of a country. It implies: (1) an accurate formulation of the needs of a region within the overall context of the needs of the nation as a whole and a precise knowledge of what the people want in each region; (2) an accurate assessment of the limits and opportunities imposed on the natural and resource endowments of each region; and (3) an appropriate choice of policies and strategies for the development of a spatial pattern of human activities which can lead to autonomous processes of a socio-economic changes in the desired direction.

## CHAPTER-2

### PROBLEMS OF REGIONAL DEVELOPMENT PLANNING

In characterizing the quite complex development problems of the presently more than 120 countries of the third world-----mostly overlooked- spatial aspects should be considered as even more imminent than the often cited world wide "North-South Incline": the increasing gap of the already pronounced regional disparities within these countries together with the dynamics of their metropolization.

It is necessary to develop and to implement a strategy, not only on the national but on the regional level as well-both integrated with each other. Generally speaking, such regional development planning should aim two fold: firstly to transform the existing spatial structure from a monocentric into a polycentric one (in which of-course one center remains as the first-) in order to slow down and counterbalance the rapid and one-sided development of the capital region. Secondly, not only to stop but in the course of mid term regional planning to reduce the existing and still increasing regional disparities in spatial as well as in functional terms in order to overcome these dualisms in general as well as the rural stagnation in particular in the future.- In recent years only the pressing necessity to implement such strategy oriented towards regional, i.e. particularly rural development by reducing the regional im-balances together with the overwhelming primacy of the capital region has come to consciousness of the planners and politicians of the concerned asian countries.

The combination of the two regional planning strategies (i.e. spatially equable development and spatially polarized development) could be named as Integrated Area Development (I.A.D.)- strategy.

#### 2.1 THEORETICAL AND METHODOLOGICAL FRAME OF THE STUDY:

The Relevance of the "Development center strategy" and the "Central place Theory" as Regional Development planning strategy concepts:

The strategy of polarized development is represented since more than two decades first foremost by the "Growth pole" strategy.

The growth pole approach by itself, within the foreseeable future, will not be able to generate better standards of living and wider employment opportunities for the larger masses.

A pole will be able to realize his main objective to generate real development only as a multi-sectoral and multi-functional center simply because the target is "Development" and not only "growth". Therefore, these centers should not only be named but, above all interpreted as development centers instead of growth poles as this happens up to the present in 99 to 100 cases. Only from this promise of such an understanding this strategic concept can and will be useful for the necessary regional development.

As "growth pole" concept, this strategy has been incorporated in the development plans of most Asian Countries. Its application or even its implementation as development center strategic concept in any region not to mention a country as a whole, however, is still pending upto now.

Let us come back to our results; firstly polarized development should be considered as an integrated part of an overall regional development strategy and secondly- such a pole to be interpreted as development center can fulfill its function only as a multisectoral and multi-functional center. In this connection, especially regarding the above mentioned unsolved questions of practical applicability we inevitably come across the "Central place theory". No wonder that this subject has been taken up by the growth pole theoretical discussion. Within the frame of this study we have to restrict the undoubtedly wide practical applicability of this theoretical concept for regional development planning in naming its basic issues and regularities- mainly the central place, the central functions, the hierarchical system etc.

However, I have to mention two main deficiencies of this theory in its relevance as an instrument for regional development planning :

1. The first aspect is related to the definition of the central place as a settlement whose sole function is to provide the surrounding population with goods and services, in short: a service center. A weak point of central place is that starting with CHRISTALLER up to the present it has been limited to the service sector, which, of course, is only a part of the total, eg. economic, social and cultural spheres and therefore of the process of development.

2. The fact of CHRISTALLER'S system of central place is that it has to be viewed as a static model. The decisive aspect for each and every planning, the dynamics of the settlement system, remains unconsidered. Only the incorporation of the historical dimension, responsible for the development and the present structure of the settlement pattern, this understanding and the results of this kind of research again form the essential precondition for an effective application of each and every theory of polarized development as an instrument for regional development. In concrete terms this means:

- in general: under the specific circumstances (stage and potential of development; settlement pattern; resources.) what should be the optimal spatial structure to realise the spatial targets of development mentioned at the beginning of this study: reduction of the existing regional disparities and integration of the individual regions within the national frame, "optimal spatial structure" in this context includes the hierarchical settlement system in its quantitative (number of centers) and its qualitative (their equipment with development generating functions) terms.

- in particular: out of the presently existing regional centers what are the regional development centers preferably to be supported? In distinction to the regional centers, a regional development center, in accordance with our explanations should be considered as a center with sufficient development impulses and development potentials.

This last aspect leads us to the methodological problems of our study.

#### METHODOLOGICAL PROBLEMS REGARDING THE DETERMINATION OF DEV. CENTERS:

To sum up the results: The combined application of the two concepts, the growth pole and the central place theory, in short the development center strategy must be started as an unalterable necessity to achieve the spatial targets of development. In addition to the dynamics of these centers has to be examined and analysed as an essential decision basis which out of the existing regional centers is to be treated as development center.

#### 2.2. REGIONAL VERSUS SECTORAL DEVELOPMENT PLANNING:

##### THE PLANNER'S VIEW

The necessity that development planning should include both the

sectoral and the spatial aspect eg. regional development planning should be integrated with the national development planning and the multisectoral planning is a recognized fact since a long time by the public authorities, too. It can be started for the awareness that apart from the sectoral- the spatial (regional) development is of particular importance for the overall development of the country. In the context of decentralization of Bangladesh administration at the upazila level, the necessity of a "balanced regional development" is stressed by the reduction of the regional disparities in economic development.

### 2.3. ASPECTS AND RECOMMENDATIONS FOR REGIONAL DEV. PLANNING:

The spatial picture of the level of development of different regions-offers another important decision basis for the regional planning procedure: as it is impossible to develop all peripheral regions to the same extent and intensity at the same time these findings give us the possibility to determine out of the total number of regions preferably to be developed ("target regions") the final selection of the "action regions". "Action regions" are defined as those regions which should have the top priority for development and in which the instruments of regional planning including polarized development are actually applied and realized.

#### RECOMMENDATIONS FOR REGIONAL DEVELOPMENT PLANNING:

Summarizing the existing reflections regarding the application of our theoretical concept in practice, we can state three steps of empirical research as essential and unavoidable.

1. determination of the hierarchical network of regional centers (including their functional classification)
2. determination of the dynamics of these centers; eg. the possible regional development centers.
3. identification of the regional disparities within the study area.

Finally it has to be emphasized again that the strategy of polarized development must be incorporated in an overall concept of an integrated spatial development plan. Without such unification of the I.A.D.- strategy concept (mentioned already) the regional centers on the various levels can not act as development nuclei or development centers.



## 2.4. THE CONCEPT OF A PLANNING REGION:

The aim of planning for a region must follow closely the purpose for having the region, and the particular conception and perception of what constitutes a region from the point of view of the divergence of welfare interests is a basic requirement for any successful regional planning exercise. The present discussion focuses mainly on regions which are part of the nation or country.

### 2.4.1. THE PROCESS OF REGIONAL DEVELOPMENT PLANNING AND POLICY FORMULATION:

The following recent inter-related trends in concepts and practice of regional development can be highlighted.

- 1) Adoption of the regional approach as a national development strategy.
- 2) Focus on the social objectives of development.
- 3) Emphasis on predominantly rural regions and
- 4) Popular participation in development.

These four above mentioned interrelated trends and concepts in regional development carry with them important consequences with respect to the process of regional planning and policy formulation. Of these, the following three are particularly important and have far-reaching consequences in the regional development approach and methodology.

1. Regional policy and planning should be comprehensive. This requirement takes two directions: Firstly, regional plans (or strategies, policies or programmes) based on sound economic, social and physical (Technical) considerations should cover all relevant sectors of the regional economy and spheres bearing on the well-being of the population. A case in point is planning for rural areas, which has to include, besides the agricultural sector, the commercial, industrial, educational and social service sectors. Secondly, comprehensiveness of regional planning has a temporal meaning. Recent trends and concepts in this field make it imperative to plan not only long-term development process but also short-term operational actions. Naturally, short term regional plans differ substantially from long-term ones in character, scope and methods of implementation.

## 2. Regional policy and planning should be decentralized.

In order to give people an opportunity to participate in the planning process, it is necessary to designate planning fields in which the regional authorities would be free to make their own decisions according to the needs and desires of the inhabitants. Such decisions have, naturally, to stay within the scope of the local resources, supplemented by funds from the national budget. These decentralized planning fields can have a differentiated scope according to circumstances of a particular country. It is in the interest of good planning and successful implementation that the decentralization of regional planning be carried out as far as possible.

In order to secure harmonious development of centrally and decentrally guided spheres of the regional economy, it is necessary in the planning process to develop mutual information procedures and co-ordination and work out methods of overall guidance of the decentralized spheres of planning from the centre without inspiring the former's autonomy. It is also crucial to clearly define the dividing line between the centralized and decentralized spheres of planning in order to avoid overlapping of activities.

## 3. Policy formulation and planning at the local level should be integrated with regional planning.

If regional planning is supposed to accommodate the recent trends and concepts of development, it has to acquire a new dimension: it has to be dis-aggregated into local planning processes. This is particularly the logical consequence of the emphasis put on the social aspects and on development of rural areas, with an active participation of local population.

Changes in regional planning in the above three directions require a proper institutional setting at the regional and also local levels. The local and regional planning units have to perform a relatively new and difficult function: that of promoting popular participation in development. This requires special abilities and skills on the part of regional planners, who acquire relevant organizational skills etc. These are skills traditionally

not expected from regional planners. In the new situation, the term regional planner acquires new meaning -he has to be an action oriented developer.

#### 2.4.2 FORMULATION OF DISTRICT PLAN:

For the purpose of formulating a district plan, we can classify districts into (i) homogeneous natural sub-regions; (ii) developed economic regions; (iii) backward economic regions and (iv) heterogeneous natural and economic regions. The first type of districts are ideal for sub-regional planning and they can be used to exploit the resources available there to achieve higher productivity and development. The development strategies of these districts have to be carefully weighed and integrated with those of the state and national plans. Hence the sub-regional planning at the district level can not be uniform for all districts.

The first step in the formulation of a district plan is the demarcation of development activities which should go into the district plan. Such a demarcation is based on the extent to which development activities may be decentralized and entrusted to district level implementation machinery. Thus, the district plan as sub-regional plan is conceived here as a rationalized scheme of development programmes which are of district importance and are confined to the administrative boundaries of a district. A district plan is primarily intended to promote the socio-economic interests of the people living in that district though the benefit spill-over can not be prevented.

In the formulation of district plans- we have to determine certain broad objectives in conformity with the objectives of the national and state plans. It is necessary to integrate the national objectives into the long term development potential of the district. Therefore, the initial general objectives which are in conformity with national macro-plan objectives may be considered as the broad objectives of a perspective plan of a district.

One of the most important exercises involved in formulating a district plan is an inventory of resources of the district's natural, human and economic-both existing and potential. Then

an assessment has to be made of the levels of economic development as well as socio-economic infrastructure facilities reached in the district in terms of certain comprehensively defined indices. Next, the needs of the district should be identified spatially and by class of people and again as immediate (annual), short term (five years), and long-term (perspective) needs.

After identifying the needs, the extent to which they can be met has to be considered. The district plan has to be formulated to satisfy these needs specified in the objectives. For this purpose, need-based objectives of district plans have to be translated into specific sectoral targets and programmes. Once the sectoral specific targets are determined, the investment requirement, of each programme has to be worked out having due regard to the problems of consistency with the specific and general objectives of district plan. The programmes and projects in turn will have to be located in different areas on the basis, the specific objectives to be achieved and according to the needs the people in different areas of a district. The spatial distribution of different projects within a district should also be taken into account, the concentration of the poorer sections of the district. This will be necessary to fulfill the objectives of achieving growth with social justice.

At this point of discussion we should bring in the question of taking care of inter district and intra-district economic imbalances. There is no dispute over the need for reducing such economic imbalances.

#### 2.4.3. STEPS IN PREPARATION OF THE PLAN:

The various steps taken in the preparation of the regional plan have to be viewed in the light of the fact that there was no well established methodology for such a work. Very broadly the steps in which the plan be prepared could be summarized as follows:-

1. A resource Inventory would be prepared, based on an analysis of the on-going governmental schemes for development and the physical resource potential especially related to agriculture, irrigation, forests, soil, land, use, urban structure and industrial structure etc.

2. An attempt should also be made to indicate the hierarchy of settlement pattern, and locational aspects of social and certain economic services (i.e. education, health, marketing etc.), so as to enable an appropriate area development approach.

3. Having arrived at the broad investment, income assumptions and projections, the investment possibilities were broken up into various district segments.

#### 2.4.4. METHODOLOGY:

In preparing the Regional Development Plan for Thalakatī, a number of alternative approaches would be considered. Firstly, it could be based on demand projections of important commodities for the region which would be very similar to the approach adopted for the national plan. It should be to achieve the development of the region by identifying activities which would provide the maximum regional income within the national policy framework. The second approach possible was by studying the current income distribution and by it, working out the programme for income redistribution is to be brought about mainly through appropriate institutional structure and appropriate techniques of production. The third approach could be to indicate specific objectives of the limits of income that should be reached, then arrive at the investment requirements on the basis of broad investment income ratio and then disaggregate to various sectors, through appropriate strategies adopted for the area.

An initial step in the preparation of the plan is the collection of data and analysis. Analysis of the data was undertaken with a view to

- (a) review the economic and social situation of the region;
- (b) study from the village level itself the activities which have significance at that level in order to appreciate the economy of areas within the district; and (c) Understand certain basic socio economic activities in terms of their location and functioning such as influence zones of secondary classes, trends in population village-wise etc.

An important aspect of the preparation of a regional plan, particularly when the region is small, relates to the delineation of strategy in terms of primary and secondary activities to be developed. Another aspect of regional plan is the preparation of a macro framework. To prepare the macro-framework, there is need for regional input output tables and information on more important projects in the field which is not, however, available. Further, the overall investment employment implications are possible at macro level, if dependable data is available. Therefore, major emphasis would have to be laid on indicating the direction in which development would occur and the activities on which concentration was necessary.

RIVER-BANK EROSION AND FLOODING:

## IMPACT ON RESEARCH:

Jhalakati is one of the newly created districts which is severely affected by river-bank erosion and flooding. The district comprises of 4 upazilas, all of those are affected by river-erosions. In pursuance of the issues concerning the problem, this takes up mainly (3) three, the typical erosion prone upazilas i.e. Jhalakati, Nalchity, Kathalia and a part of the Rajapur upazila.

Starting with problem identification, it focuses on the exploration of the coping mechanism at the individual and household levels, and analysis of the consequences of population displacement. There has to be formulated a new settlement pattern for the displaced due to the erosion and flood.

## 3.1. RATIONALE OF THE STUDY:

The scale of river-bank erosion and floods and their human implications, particularly on population displacement, are enormous. The impact of natural disaster specially flood and river-bank erosion with its catastrophic images is no more in doubt after the floods of 1987 and the century's worst in 1988. Its colossal destructive nature has put the whole nation in distress for future years with its development programmes. At present, the importance to review its consequences are top most priority for the government now, however, in the past the situation was not that much favourable.

Apart from general consequences, the study area with severe riverbank erosion problem, has never been studied for its socio-economic and other related fields, perhaps the remoteness and poor profile of the area, which refer to recent decline of economic activity due to river erosion phenomenon. While there is still dearth of information on channel behaviour and on forecasting techniques for riverbank erosion, floods and related facts, the socio-economic and human aspects of population displacement have not yet received due planning consideration at the national level. Therefore, intensive investigation and research on the aspects of population

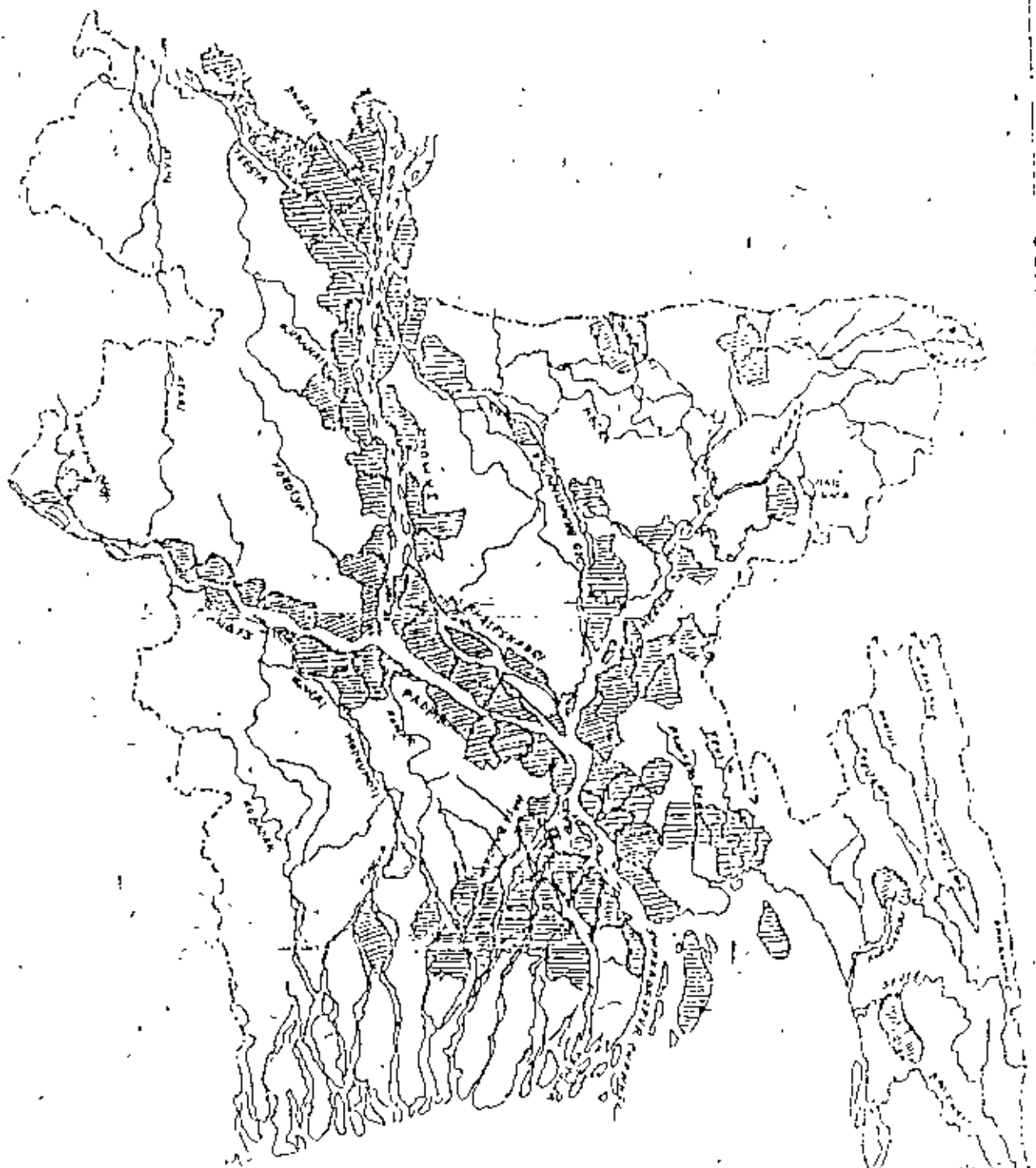
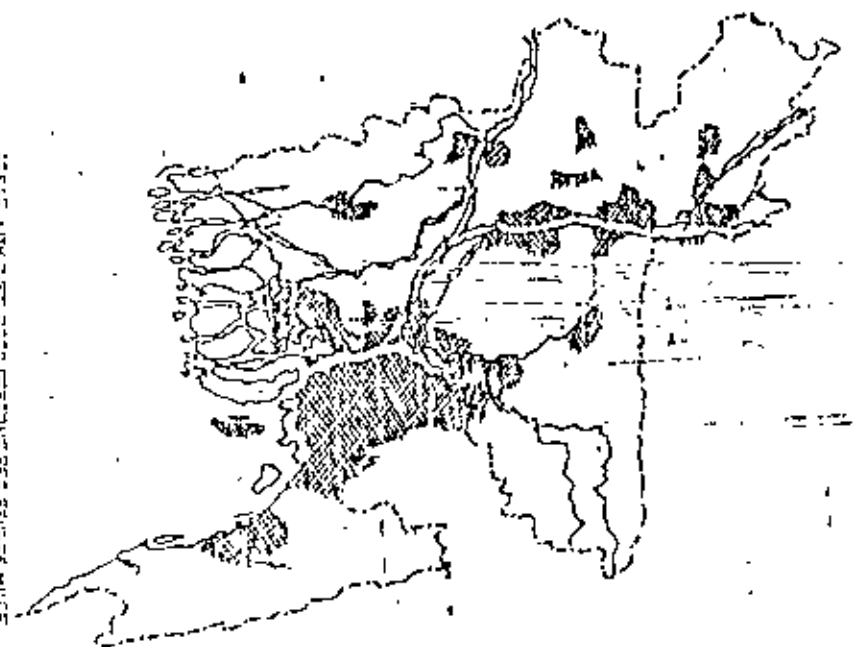


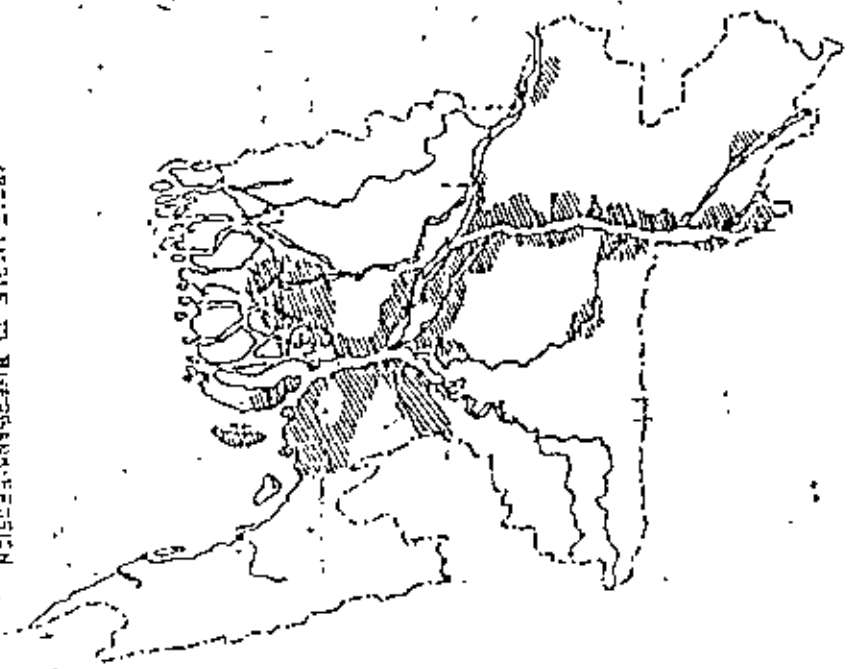
FIG 1. RIVERBANK EROSION PRONE AREAS WITH MAJOR RIVER SYSTEM IN BANGLADESH.

SOURCE: ADAPTED FROM REE, DAF, 1973. AREAS LIABLE TO RIVERBANK EROSION IN BENGAL REFER TO A. SINGH AND RUPREY'S MAP ON BANGLADESH. AREAS LIABLE TO PIRACY UNIVERSITY OF DELHI 1974.





AREAS AROUND RIVERBANKS SHOW HIGH POPULATION PRESSURE



AREAS LIABLE TO RIVERBANK EROSION

FIG 2 : COMPARISON BETWEEN AREAS LIABLE TO RIVERBANK EROSION  
POPULATION PRESSURE

SOURCE : RESEARCH REPORT ON RIVERBANK EROSION, 1962

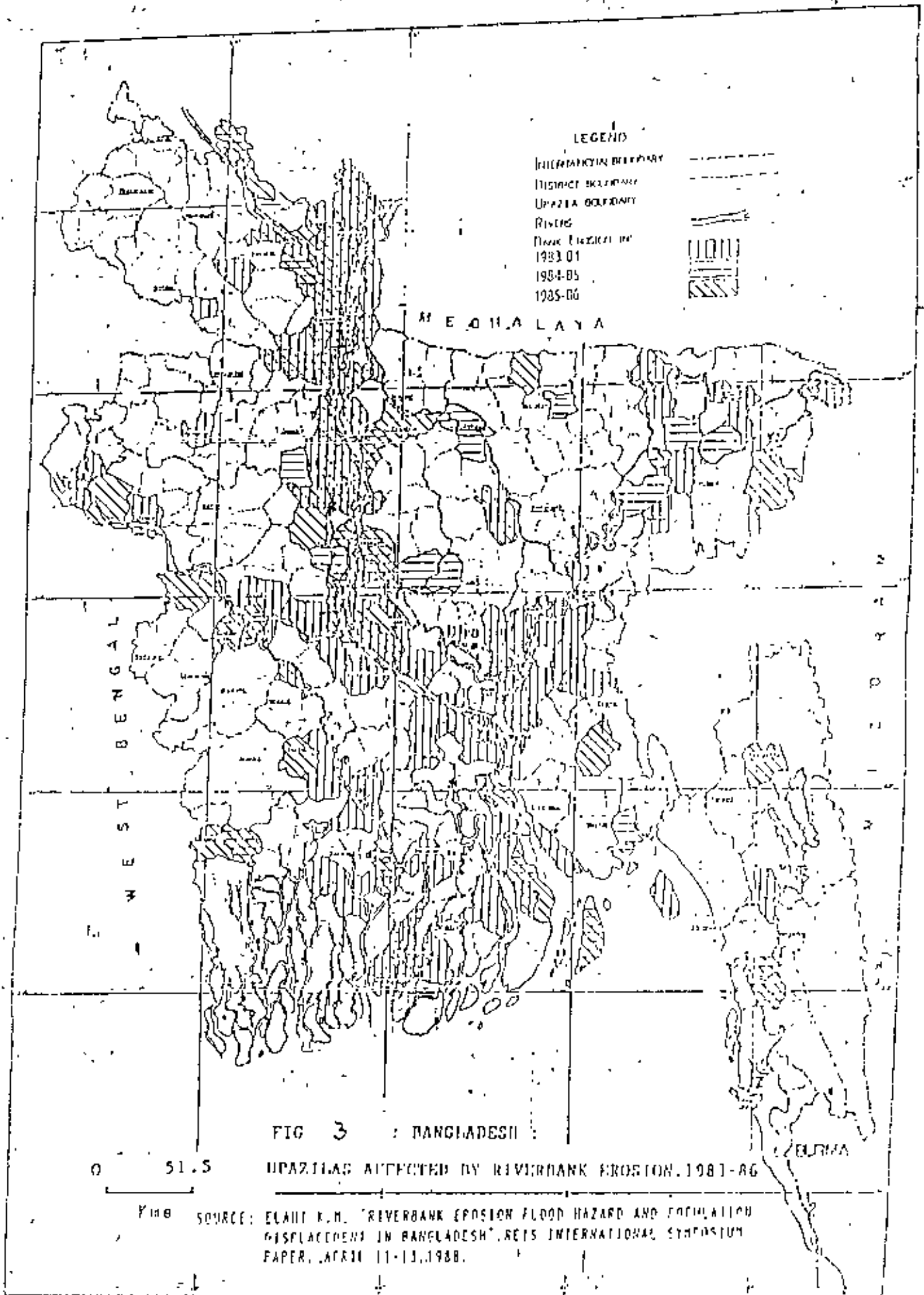

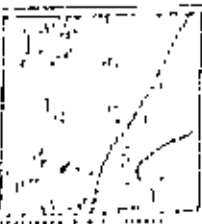



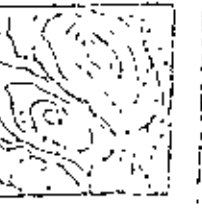


Table 1. Physiographic Characteristics and Settlements Pattern

Settlement Pattern	Geographical Location	Vulnerability to Natural Disasters	Remarks	Settlements Pattern
1. Nucleated settlements in high flat land	North-western part of the country	Safe from the danger of floods	No particular problem for development of present human settlements	
2. Scattered and built on artificially raised lands	Central part of the country	Heavy inundation during rainy season	People hold on to these areas without much risk	
3. Linear settlement along the river lowland	South-west of the country	River course shift & salinity	Human settlements have an uncertain pattern	
4. Dispersed and isolated settlements	Coastal areas and off-shore island	Prone to severe cyclonic hazards	Hardest need of organizing the settlement pattern	
5. Clustered and highly dense homesteads	North-eastern part of the country	Very high rainfall, but rain water does not stagnate	Permanent settlement is not a problem	
6. Sparingly built homesteads in hilly areas	Eastern part of the country	Hilly, merging into the coastal plain to the west; high hills & dense forest occupy the far eastern part	Small area is available for settlement	

SOURCE: Amin, A.T.H.H. "Riverbank Erosion and Human Settlement" 1988.

Table 1.1. Physiographic Characteristics and Settlements Pattern\*

Settlement Pattern*	Geographical Location	Vulnerability to Natural Disasters	Remarks
1. Nucleated settlements in high flat land	North-western part of the country	Safe from the danger of floods	No particular problem for development of present human settlements
2. Scattered and built on artificially raised lands	Central part of the country	Heavy inundation during rainy season	People held on to these areas without much risk
3. Linear settlement along the river levees	South-west of the country	River course shift & salinity	Human settlements face an uncertain pattern
4. Dispersed and isolated settlements	Coastal areas and off-shore island	Prone to severe cyclonic hazards	Manifest need of organizing the settlement pattern
5. Clustered and highly dense homesteads	North-eastern part of the country	Very high rainfall, but rain water does not stagnate	Permanent settlement is not a problem
6. Sparsely built homesteads in hilly areas	Eastern part of the country	Hilly, merging into the coastal plain to the west; high hills & dense forest occupy the far eastern part	Small area is available for settlement

Urban settlement patterns are discussed separately.

Source: Based on HABITAT (1976: 11-15)

## Perception of Most Hazardous Hazard Natural Disaster

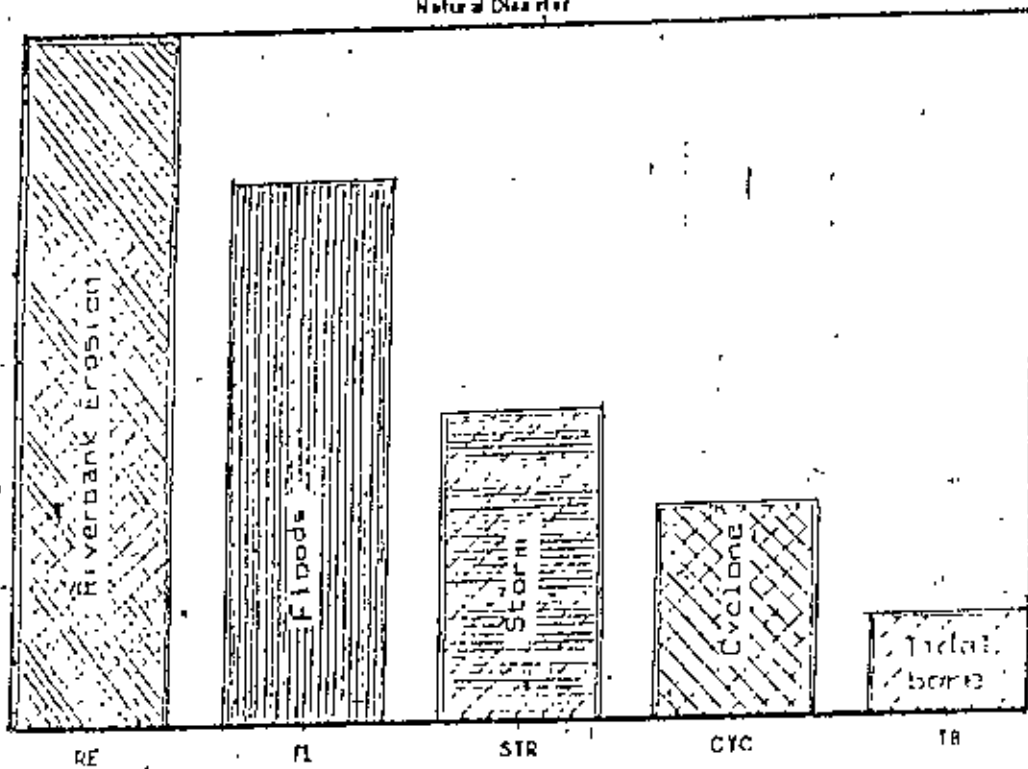


FIG. 4. MOST HAZARDOUS NATURAL DISASTER IN JHALAKATI

rehabilitation, housing, alternative employment strategies, land reallocation and legal systems relating to the riverbank erosion and floods would be highly relevant.

The study area was omitted from the important "riverbank erosion impact study"- (REIS) Project as well as it is yet to be studied under land Reclamation project, inspite of its severity of the problem due to riverbank erosion. This stresses the importance for a research in the area with its utmost problem-riverbank erosion.

### 3.2. OBJECTIVES OF THE STUDY:

The broad objective of the study is to suggest a development strategy for riverbank prone areas based on a case study of severely erosion affected Jhalakati district.

- 1) To conduct a case study in the severely affected upazillas in order to examine the pattern of migration, occupational changes in the pattern of human settlement.
- 2) To ascertain the level of awareness to the river erosion vulnerability among the population in the study area and to trace signs of preparedness among them.
- 3) To review the non-agricultural economic activities in the upazilas and search for further growth and development in this direction with a view to encounter the landlessness arising out of erosion.
- 4) To suggest a possible development model for the upazilas (District) with appropriate physical and economic dimensions.

### 3.3. HYPOTHESIS:

With the mentioned objectives in view, the following hypothesis of the study are formulated :

1. Riverbank-erosion is a major contributor to the landlessness.
2. The consequence of riverbank erosion is usually more devastating than other type of disasters, common in Bangladesh such as floods, tidal bore, draught, cyclone and storm.

3. Those without some education, skill and experience, in some non-agricultural occupation find them in more difficult situation and account for the bulk of the flow of "push" migration.

#### 3.4. SCOPE OF THE STUDY:

The study is expected to reveal the important aspects of the local resources to mitigate such disaster. The study aims to proof its hypotheses which may have some impact in the policy formulation regarding future development programme and budgetary allocation for such type of Upazilas.

The study may be considered exploratory in terms of its efforts to make some recommendations. However, that is expected to generate a wider scope for serious policy discussion and overall the scope of the study is limited to study area's socio-economic condition which stands as one of the most underdeveloped in the south part of Bangladesh.

#### 3.5. LIMITATIONS:

Specific limitations of the study arises from extremely poor accessibility to some parts of the study area. The weather condition of the area, (where eroded severely) at the time of field trips, could not be ignored as the study period was scheduled from May to August, 1989 (which is the rainy season). The non-availability of an accurate map with diluvion and alluvion line for its shifting charlands could be counted as other minor limitations.

Flood hazards may also appear as a major limitation. However, erosion and flood have been selected for the study because of intensity of its effects on affected areas and families.

#### 3.6. IMPACT OF RIVERBANK EROSION AND FLOOD ON RESEARCH:

Riverbank erosion as a form of natural disaster have little recognition in the world forum of research on natural disaster and its impact on human settlements. Although, it is hardly surprising, as it has been now a considerable time that the limelight in the international writing about human settlement planning and its problematic sectors have been focused generally on the problems caused by human to human.

Riverbank erosion which causes each year substantial tracts of land losses and thereby causing immense suffering to the inhabitants on its banks. It is estimated that as many as 1 million population are displaced in each year, is no meagre form of natural disaster whose after effects is even severe than the conventional perceived disasters such as cyclone, floods, storm, volcanic eruption and earthquakes etc.

To understand the natural events on human settlement, few terminologies are essential to clarify. It is evident from recent research that there exists a overlapping confusion between the terminologies "natural disaster" and "natural hazards".

"Hazards is the probability of occurrence, within a specific period of time in a given area, of a potentially damaging natural phenomenon." (UNDRO, GENEVA, 1979).

Where as "disaster" is defined as : "Natural disasters are extreme phenomenon including ground, water, or air motions which affects a certain area" (UNDRO, GENEVA, 1979).

Riverbank erosion as marked by Rogge (1987) in the outcome of direct periodic causes and can be grouped together with tidal surge and cyclones, may well justify its grouping with material disaster rather than "natural hazards" by the UN-official definition.

### 3.6.1. THE PROJECT "RIVERBANK EROSION IMPACT STUDY"(REIS).

In the Project profile of REIS, the current problems were well described pointing out all the vital points to elaborate the magnitude of the problems of river channel migration, rural Population displacement and land relocation system in Bangladesh.

It continues to discuss the sheer scale of the problems with its macro and micro impact upon rural population and rural economics, as well as the volatile political and social forces generated by the claims for ownership of emergent lands.

The research programme was divided into two distinct parts :

- a) A remote sensing and hydrological study.
- b) A socio-economic and demographic impact study.



Due to time constraint it is not possible to go into detail of the studies.

Here it is necessary to relate the arguments by Amin (88) that inspite of gravious consequences of riverbank erosion, the Govt. so far has no explicit settlement strategy to deal with this homelessnes and landlessnes. He also agrees that human resource development could be an effective device for evolving a settlement strategy. Amin continues to pin-point that displacees from riverbank erosion consists of two distinct groups who differ in their personal background and also fair differently in coping with the after effect of displacement. The group with some education, skill and experience in some non-agricultural occupation rather than dependent wholly on farming, have relatively better scope to establish themselves than those with only farming experience and this alone could be a vital lesson for the policy makers to develop a perspective "Human settlement strategy for Riverbank erosion prone areas in Bangladesh".

## CHAPTER-4

### A SURVEY DESIGN FOR RIVER, EROSION AND FLOODING

The nature of the present study is mainly exploratory and comprising two components regarding the focal point of the study. First, the macro level covering the whole district in respect to the the problem and secondly, the micro level to evaluate the socio-economic condition of the target group within group within intensive river erosion and flood prone area.

Although, the level of study is framed within an aggregate level in the selected district, however, it apparently tends to go beyond that level, to analyze the policy matter at national level in context of the district working process, particularly affected by riverbank erosion and flooding.

#### 4.1. CHOICE OF STUDY AREA:

The selection criteria to choose a study area was relatively critical in respect to the orientation of the present on-going research in this field. The first criteria- acquaintance of the researcher with the area and with its problem of riverbank erosion. The second criteria to avoid urban biased research priority in these fields, where the more rural area are deprived of any depth of study to reflect their suffering from this phenomenon, as such the selected study of Jhalakati.

Apart from above consideration, the district stands as one of the most underdeveloped and natural hazard prone areas in Bangladesh.

#### 4.2. SOURCE OF DATA AND INFORMATION:

Realizing the objectives of the study, the data for this study was collected from secondary sources of literature mainly published materials in form of books, journal with reference and from the International symposium papers on the "Impact of Riverbank Erosion, Flood Hazard and problem of population displacement" held in Dhaka on April (10-14), 1988.

In this regard the workshop paper conducted under REIS in March 1985 also served as the other main contributor to secondary datas.

The other sources were from various ministries, departments, autonomous institutions and research papers at the national level and district and upazila centre at the local level.

AN EXTREMELY VULNERABLE DISTRICT : JHALAKATI

5.1. LOCATION AND PHYSICAL CONDITIONS OF SOIL:

Jhalakati belongs to greater Barisal, about 15 miles away from Barisal (greater) district headquarter which was previously a sub-division of greater Barisal. It is bounded by Pirojpur district in the west, Barisal in the north and east, Patuakhali in the south. It comprises of 4-upazilas i.e. Nalchity; Rajapur, Kathalia and Jhalakati Sadar upazila. The river which flows through the region is the continuation of "Kirtonkhola" taking the name "Sugandha" near Nalchity and Jhalakati and then flows by the name "Biskhali".

The riverbank of Sugandha and Biskhali suffers from severe erosion and flood every year. Erosion near Nalchity, Jhalakati and Kathalia is continuous and gravious. The riverbank is made of muds and charlands of non-saline phase.

5.2. CLIMATE

The district is highly damp in nature in all times and has an equitable temperature. The cold season lasts from the month of November to end of February. The winter nights are foggy till sea breeze begins to blow in March.

The average max. temperature during summer months ranges from 30°C to 35°C and the minimum temperature in the winter months from 25°C to 28°C. The average annual humidity is 75% and it remains high in monsoon months. Squalls and cyclonic storms, sometimes pass over the area in the month of May, June, September and October and the worst of the types is accompanied by tidal surges. In the recent years flood caused considerable damage to life and property in the district.

5.3. OCCUPATION:

According to 1981 census, the occupation with agriculture have the majority with 26% of the total population engaged in cultivation, while noncrop class in agriculture is only 2%. A substantial portion of 24.5% are working in household works and another 0.4% in manufacturing occupation. The above estimation were collected from the district statistics department. A probable explanation

nation of the trends could link with riverbank erosion and flooding.

#### 5.4. SERVICES AND FACILITIES :

Transport and communication: The district is connected with the upazila headquarters by water ways and roads. The basic means of transport of the district is launch and boat. There is a regular motor-launch service with Barisal and other places. The upazila Rajapur is connected by road transport while other upazilas i.e. Nalchity and Kathalia are connected by water ways. Country boat plays a vital role in communication in all seasons.

Telephone, Telegraph and Post office : All the 4 upazilas are connected through telephone lines. The upazila headquarters have telegraph offices. There are 4 sub-post offices and many branch offices in the district.

Water supply and Electricity: The district headquarter Jhalakati has got general water supply or tap water. But the upazilas have got no water supply. The only means for drinking water is tube-well, (both deep and shallows). All the upazila's headquarters are connected with power supply including some village areas. The supply is extremely limited.

Besides these, health facilities, free primary education are provided to the people.

#### 5.5. INDUSTRY AND OTHER NON-AGRICULTURAL ACTIVITIES:

There is infact, no industry in the district other than, salt mills, ice factory, saw mills etc. There are some small scale industrial units established at private scales. They face resource constraints very often. There are a few college industries-predominantly handlooms establishments.

There is another profitable business in the district with shrimps, which is available in the local areas.

Other non-agricultural activities are mostly through retailing in the markets.

## CHAPTER-6

### THE CONSEQUENCE OF RIVERBANK EROSION & FLOODING:

The summary of the project findings with an emphasis on CHAPTER-3 and 4 are presented hereunder.

#### 6.1. STUDY AREA AND HOUSEHOLD CHARACTERISTICS:

The district under study was found to be one of the densely populated area. Most of the upazilas are covered by flood plains in the form of river erosion hazard prone silty clay loams.

Historical evidence could be found for enormous changes occurred in formation of its charlands on the riverbank.

Health facilities are confined to the upazila hospitals and most of the educational institutions along with the college are located at the upazila centres. A concentration of small scale entrepreneurship, is one of the developed area at the district headquarter. On the other hand, Kathalia and Rajapur belong to most undeveloped areas with a very little infrastructural support.

The district household size of 6.5 differs with the corresponding figure of national level. This is due to the fact that about 20% of the area are lost by erosion. This probably explains the densification of the populations and the relatively higher household size.

#### 6.2. MIGRATION PATTERN OF THE DISPLACEDS:

Within the district, there prevailed mainly two types of migration patterns, inter-upazila and intra-upazila migrations. In general, there is a tendency of the landless displaceds to settle in growth centres as a temporary or permanent settlement. It was found that inter-upazila migration is more prominent than intra-upazila migration.

#### 6.3. HAZARD COPING MECHANISM FOR RIVERBANK EROSION:

The type of adjustment strategies was found to be based on three main categories (a) acceptance of loss; (b) reduction of loss, and (c) change use/location. Among them as assumable, reduction of loss was adopted by the majority in the threat of imminent erosion, dismantling the houses was common than remaining in homestead until affected by erosion, as in the case of acceptance of loss.

32

Table 2. Landlessness in Bangladesh by District

Geographic Area (Country/Region)	Percentage of landless
Bangladesh	28.2
Bandarban.	11.2
Chittagong	27.8
Chittagong H.T.	19.0
Comilla	35.6
Noakhali	41.5
Sylhet	30.8
Dhaka	28.6
Faridpur	<u>33.0</u>
Jamulpur	27.1
Mymensing	26.8
Tangail	29.9
Verinal	<u>37.3</u>
Jessore	34.4
Khulna	31.4
Kushtia	24.8
Patuakhali	35.3
Hogra	23.7
Hinajpur	15.3
Palpa	24.5
Sajshahi	18.8
Rangpur	21.2

Source: BBS (1986: 232)

Table 2-1 Trends in Increase of Landless

Village type	Landless 1980 (%)		Landless 1970 (%)		Rate & Change from 1970 to 1980	
	Landless(1)	Landless(2)	Landless(1)	Landless(2)	Landless(1)	Landless(2)
Under Integrated Rural Development Programme	50	26	15	5	123%	150%
Under Special Arier Programme	60	25	38	10	158%	110%
Under Self Sufficient Programme	48	23	28	5	171%	118%
Under Conventional type	48	18	45	10	172%	185%

Landless(1) : Landholding including homestead upto 0.5 acre

Landless(2) : No landholding and no homestead

Sources: Dr. Jhansir Alam, 9105, 1983.



Table 3. Three Catastrophic Climatic Features and Their Implications for Human Settlements in Bangladesh

Type of Hazards	Vulnerability	Implications for Human Settlements
1. Cyclones with storm surges	Extending 60/70 miles enters the coastal zone upto 10/15 miles inland	High risk in settlements
2. Flood-havoc	On average one-fifth of the total area of Bangladesh goes under water annually	High flood cause extensive damage to human settlements

The poor socio-economic profile of the entire district, displacees from riverbank erosion do not have the economic strength to purchase a small piece of land after being landless by erosion.

Coping mechanism through indigeneous responses were mostly based on some moveable and resaleable assets. Housing material like corrugated iron sheets, wooden truss which can be restructured in a new site or sale in the face of extreme hardship emerge to be an adjustment strategy, which somehow compensate a small portion of loss. Secondary occupation specially with fishing, or a change of occupation was vivid as a coping mechanism in the district with the surrounding water bodies, which are bestowed with abundant fishes.

#### 6.4. CONCLUSION:

The following conclusions may be made on the findings of the study.

##### 6.4.1. THE DISTRICT RIVERBANK EROSION AND DEVELOPMENT:

- 1) Jhalakati was found to be one of the extremely vulnerable area by riverbank erosion.
- 2) An enormous land has been eroded since last 25 years, specially affecting Nalchity, Jhalakati, Rajapur and Kathalia.
- 3) The district with its poor infrastructural development, ranks one of the most backward areas in the south part of Bangladesh.
- 4) Apart from Jhalakati and Nalchity, the transport and communication facilities in other 2 upazilas are far from minimum satisfactory level.
- 5) All the infrastructural developments are concentrated within the vicinity of the upazila head-quarters.
- 6) With a prevailing underdeveloped profile of the area, Rajapur upazila and Kathalia and the south part of Nalchity are the poor prevailing ones.
- 7) The district leadership have some serious political conflicts among them, which hinders the development works.

#### 6.4.2. HOUSEHOLD CHARACTERISTICS, OCCUPATION, INCOME AND LAND-HOLDING.

- 1) There is a direct proportionate ratio with the household size and severity of erosion in the specific area.
- 2) Relativity large family size with less children within 10 years of age was a general characteristic of the area.
- 3) Agriculture is a dominant primary occupation in the area followed by small/petty business and daily labourer while fishing as a secondary occupation is fairly common with a majority in the severely erosion hit areas.
- 4) In general, those who have agriculture as primary occupation, working as a tenant farmers, invariably have a secondary occupation mostly fishing for earning support in this river erosion prone area.
- 5) All types of vocational training is non-existence in the district.
- 6) Present land-holding size was inversely proportional to the secondary occupation, that is with the increase of land holding size, a decline of secondary occupation was observed.
- 7) A considerable proportion of landless category and higher income category, mostly engaged in business as their primary occupations. This proves that landlessness does not necessarily means low income group.
- 8) The trends have a dominance that decrease of secondary occupation occurs with increase of income level.

#### 6.4.3. HAZARD PERCEPTION, EXPERIENCE AND COPING MECHANISM:

- 1) To mitigate erosion, government can help in constructing embankment.
- 2) Whether severe floods or riverbank erosion, so far there was no adequate relief and help in the district.

- 3) The years of severe floods-followed by devastating erosion.
- 4) A lion-share among the displacees do not have economic strength to buy any land if subjected to erosion and becomes landless.
- 5) Coping mechanism differs in post erosion period according to the social states and affluency of the displace in pre-erosion period.
- 6) An occupation other than agriculture is an imperative necessity in areas where river erosion is devastating form as such Jhalakati for future generation, to be on the safe side of the danger.
- 7) Although the urban educated unemployment have proliferation characteristic in present days, even though it is a general consensus that still education will pave the way for their words to some better situation.

## CHAPTER -7

### A PROGRAM STRATEGY TO COPE WITH RIVERBANK EROSION AND FLOOD

The recommendations that follow are formulated by a blend of secondary data base "literature review" and interviews with the local officials. The scope was limited within local level although an attempt was made to focus on macro level.

The programme for recommendation is framed within a broad conceptual frame-work of "Disaster preparedness" and evaluated measures, within a guideline of modern disaster preparedness schemes, under the scheme of preventions, mitigation preparedness, rehabilitation and recovery (Ressler, 1988:4).

#### 7.1. PREVENTION OF RIVERBANK EROSION:

The term applied specifically preventing an incident. Within the scope of this study it will be premature to make any comments on prevention of riverbank erosion, as such the topic is more inclined to structural and technological fields.

The problem roles on the international regional fields, involving neighbouring India, Shutan, Nepal and China. Riverbank erosion and intensive hazards like floods, which have a catastrophic image in national scale along with draught, are usually important aspects in international scale. Thereby the international issues are not concerned with a specific hazard like riverbank erosion rather a whole auxiliary hazard groups. Therefore, the level of present research and its orientation does not permit to make any comments on prevention of riverbank erosion.

#### 7.2. MITIGATION FOR RIVERBANK EROSION:

In respect of riverbank erosion, mitigation have a more positive impact. It includes, both long term structural and non-structural measures, which minimize the negative impacts of hazard incidents, possible measures for mitigation are focussed hereunder macro as well as microlevels.

Recommendation No.1 : Through utilization of the river statistics and organization concerned, a master plan could be prepared, predicting the scale of risk with areas according to vulnerability of erosion and thereby preparation of schemes and programme for long term mitigation by non-structural measures.

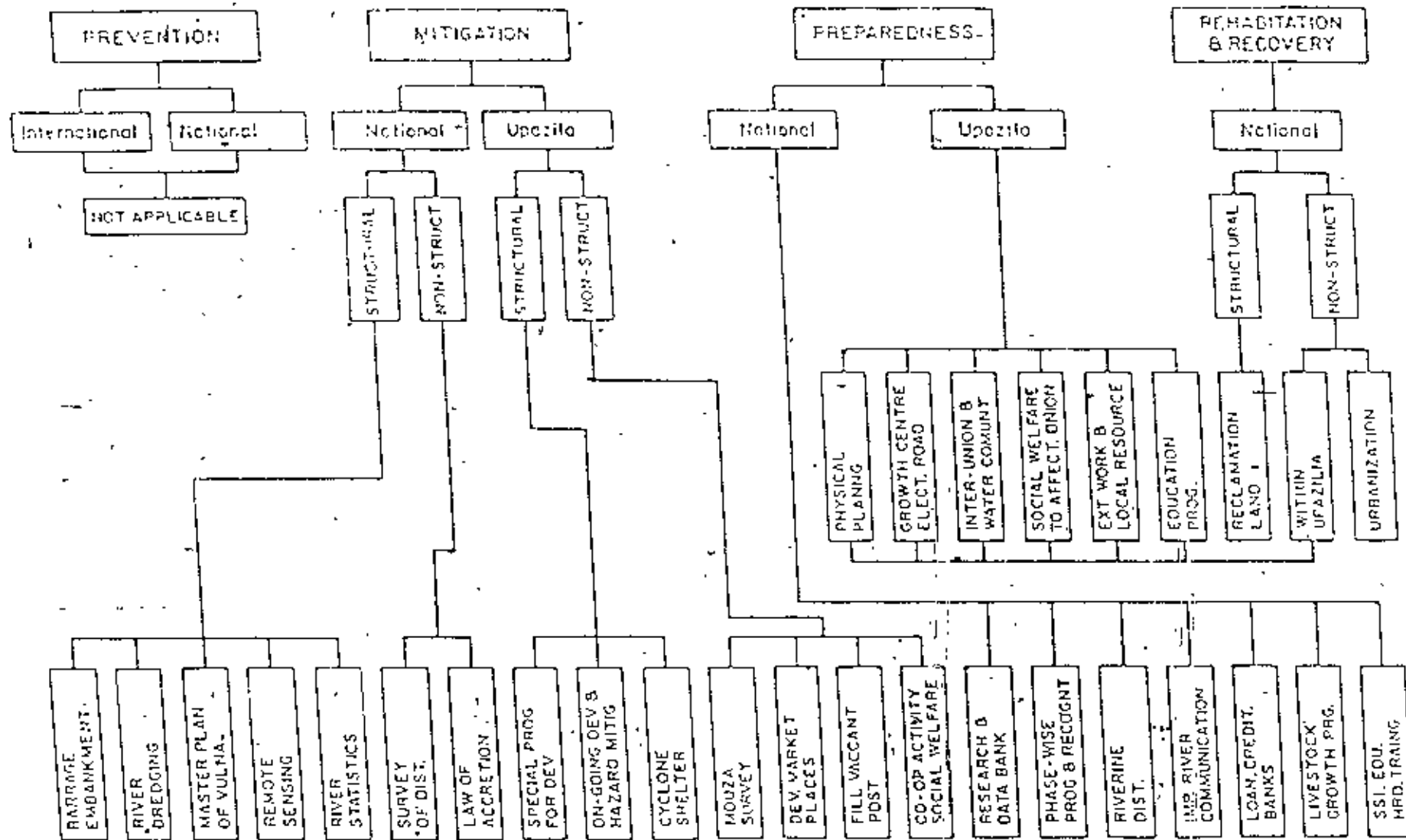


FIG 5. PROPOSED DISASTER PREPAREDNESS MEASURES FOR RIVER BANK EROSION.

Recommendation No.2. Government survey department could demarcate inter district boundaries of the severely eroded ones. The conflict between ownership of charland have been a great dispute over the district boundaries.

Recommendation No. 3. Special emphasis should be given to mitigate the impact of riverbank erosion through special project. Feasibility of building embankment in proper places to mitigate the loss of property should be given top priority in such programmes.

### 7.3. PREPAREDNESS AGAINST THE RIVERBANK EROSION AND LOSS OF LIVELIHOODS:

A long term preparedness strategy is vital for the people living in the erosion prone areas. The scale of problems, the areas of problem, in suffering and losses of livelihood are indirectly addressed by the measures so far suggested in prevention and mitigation on impact of the riverbank erosion. As policy goes, preparedness are mostly in nonstructural and long term involved in both the levels.

The concluding remarks of the study has emphasized on fields, which could be the contributing agents in a greater scheme of preparedness to facilitate the income-opportunities for the erosion stricken people. Some of the potential fields were analyzed and observed by the researcher, are formulated in recommendation list.

National level preparednes to encounter the consequences of erosion and flooding:- The intervention from national level has always been very limited. When asked in the interviews with the displaced what they thought government should do, the overwhelming response was that more embankment and concreting of existing ones.

Recommendation No. 4. Encourage more study and research to build up a data bank on problem identification by erosion and flood. The data bank on river statistics could be utilized for long term preparedness to mitigate the problem in a phase wise programme.

Recommendation No.5. Introduce zoning of riverain area, to identify the scale of problem in comparison with other areas. A more specific measure can be formulated through formation of Riverain District covering such area prone to riverbank erosion and floods hazards like the one in this study.

Table 4. Basic Coping Mechanism by Farmers' Category in Post-Erosion Period

Language Pattern by Eroser	Shelter in Post-Erosion	Occupation and Earning Sources
<p>1. <u>Useless</u></p> <p>Usually do not abandon land till the erosion occurs</p>	<p>Take shelter on <del>homestead</del> or nearby land and wait till for erosion</p>	<p>Mostly same occupation as in the pre-erosion period. Fishing, Daily Labourer, Ration Petty Business etc.</p>
<p>2. <u>Spill-Overers</u></p> <p>Tries to acquire a land on lease or sharecropping from relatives or landlords for whom he worked in the past. Tries to get maximum benefit from harvest and thereby, saving for <u>shuji</u> or temporary shelter</p>	<p>Migrates to urban centres, temporary shelter at <u>chhut</u> and tries to buy a small piece of land for homestead on installment or exchange of valuable <u>tit</u> (if any remained) often shelter for fishing is provided by landlord, to whom he becomes a fulltime worker</p>	<p>Change of occupation occurs through migration Agricultural paid labour, Fishing self in small scale Trading in Bazar with potato and dried chili, <u>frutalind</u> Growing vegetables and fruits Lease uncultured <u>sherind</u> Sell <u>Hogla</u> leaves.</p>
<p>3. <u>Region Leavers</u></p> <p>Tries to buy a land for bear-lead Tries to sell all land on lower price. Tries to get mortgaged and collect money Looks for other sources of earning. Tries to lease a shop/place in nearby Bazar.</p>	<p>Shelter in father-in-law's house or relatives house Tries to replace the share of his wife in father-in-law's priorities. Tries to buy a land for reconstruction the dismantled house.</p>	<p>Start petty business Small resident bonded labourer First secretly than openly. Sharecropping Small sub-contract in construction. Share in fishing net Lease land and <u>mandal/charned</u>, wholesale business, fish, dried chili, <u>Hogla</u>, etc.</p>
<p>4. <u>Rich Farmers</u></p> <p>Tries to activate already existing linkage with business and urban connections Depends upon <u>wardya</u> relatives who are educated/employed in urban centres Shifts <u>shikantle</u> house to new place acquired by purchase.</p>	<p>Move to new place through purchase or already owned Migrate to urban places if existing support provided through relatives or <u>wardya</u></p>	<p>Start full scale business Get hold of contracts for construction &amp; supply in local offices Influence power and assistance when land <u>shikantle</u> is auctioned</p>



Table 5 Types of Human Response Strategies to Cope with the Riverbank Erosion Problem

Response Strategy	Purpose	Type of Response
Use of iron sheets, wood, bamboo and thatch on housing walls	To provide easy and rapid means for salvaging housing structure and to keep their reasonable value	Incidental/Purposeful
Country loads (dingis), bullock carts, bicycles	To provide means of transportation during abnormal flood and rapid river encroachment and extra earning opportunity	Incidental
Planting different crops in different zones of the floodplain	To adapt crops to different soil characteristics	Incidental
Winterization of close social ties among SAMAD and GUSMI members	To mobilize necessary manpower and assistance in emergency situations	Incidental/Purposeful
Investing in livestock and other movable assets	To provide easy means of transferring or selling assets in emergency situations	Incidental/Purposeful
Building bamboo fences (CHRYAT) on the water front	To protect land and house from physical impact of erosion	Purposeful
Building bamboo crates and platform them on the water front filled with bricks	To protect land from subaqueous erosion	Purposeful
Building embankments with earth	To protect settlements from river encroachment	Purposeful

Source: Harje, C.R. "Human Responses to Riverbank Erosion Hazard in Bangladesh" paper presented at the International Symposium on the Impact of Riverbank Erosion, Flood Hazard and the Problem of Population Displacement, April 11-13 Dhaka, 1988.

Table 6. Plight of poor migrants from villages: A View from Major District of Origin.

Major District of Origin (Greater district)	Plight of Migrants from Rural Locations to Urban Areas (mostly Dhaka City)*									
	Bastees 1 of Dhaka	Damra Camp 2	Mirpur Stupa 3	Plight of Poor women to Dhaka city 4	Squatters in Dhaka City 5	Vagrants of Dhaka Male 6	Stums in Dhaka City 7	Stums and Squatters in Dhaka City 8	Poor in Bangladesh Cities 9	Squatters in Bangladesh Cities 10
Faridpur	27	25	22	34	39	20	15	21	20	20
Dhaka	12	19	9	32	22	16	13	11	37	17
Comilla	20	21	17	20	14	10	1	14	13	26
Rajshahi	24	26	9	9	9	15	18	23		26
Noakhali	5				7					
Hyametsingh						19	39			

\* All figures within each column indicate % of total cases in respective studies.

1. Quadiri: 1975
2. Centre for Urban Studies(CUS): 1977
3. Quoted from UNDP Report, 1979, p. 72
4. Begum, Jasma: 1979
5. Hossain, A.Z.M.Wahidul: 1972
6. Faruk et. al. 1978
7. CUS: 1983
8. CUS: forth Coming
9. CUS: 1979
10. CUS: 1976

Recommendation No. 6. Long term schemes and policies for financial support to provide soft term loans in specialized fields like reconstructing houses, buying country boats, livestock, poultry, fishing etc. Petty business is one of the alternatives with small capital to survive in the post erosion period. Therefore, loans and credit on soft-term basis would be greatly beneficial for the displacees to rehabilitate in other occupations not affiliated with erosion and flood.

Recommendation No. 7, Encourage human resource development through vocational training programmes. Priority programmes such as UNICEF training programme for the destitute women of the district should be emphasized.

Recommendation No. 8. Training on erosion and floods related disaster preparedness programme for upazila and district officials and the upazila and union parishad chairman.

#### 7.4. REHABILITATION AND RECOVERY:

The scope for such measures are limited and needs to be based on further investigation.

The probability to recover land through artificial active accretion, as observed by the researcher in Naichity upazila, is under engineering investigations, the scrutiny of the scope of the present study. However, through observation survey and informal interviews, it has been set out with many long term plan on land reclamation and to try accelerate the accretion of land. Among other objectives, outlines to implement experimental test schemes in newly accreted area in order to ascertain the appropriate technology for increasing the agricultural production by improving water management and to promote a quicker and more productive use of newly accreted lands by the planned settlement of landless people.

Besides these, academics search for social measures. Amin (1988) goes on to emphasize that investment on human resource development along the river erosion-prone zones, will reduce the dependency on land and in adverse situation, when people are thrown as destitute through erosion, education and skills would facilitate individually initiated settlements.

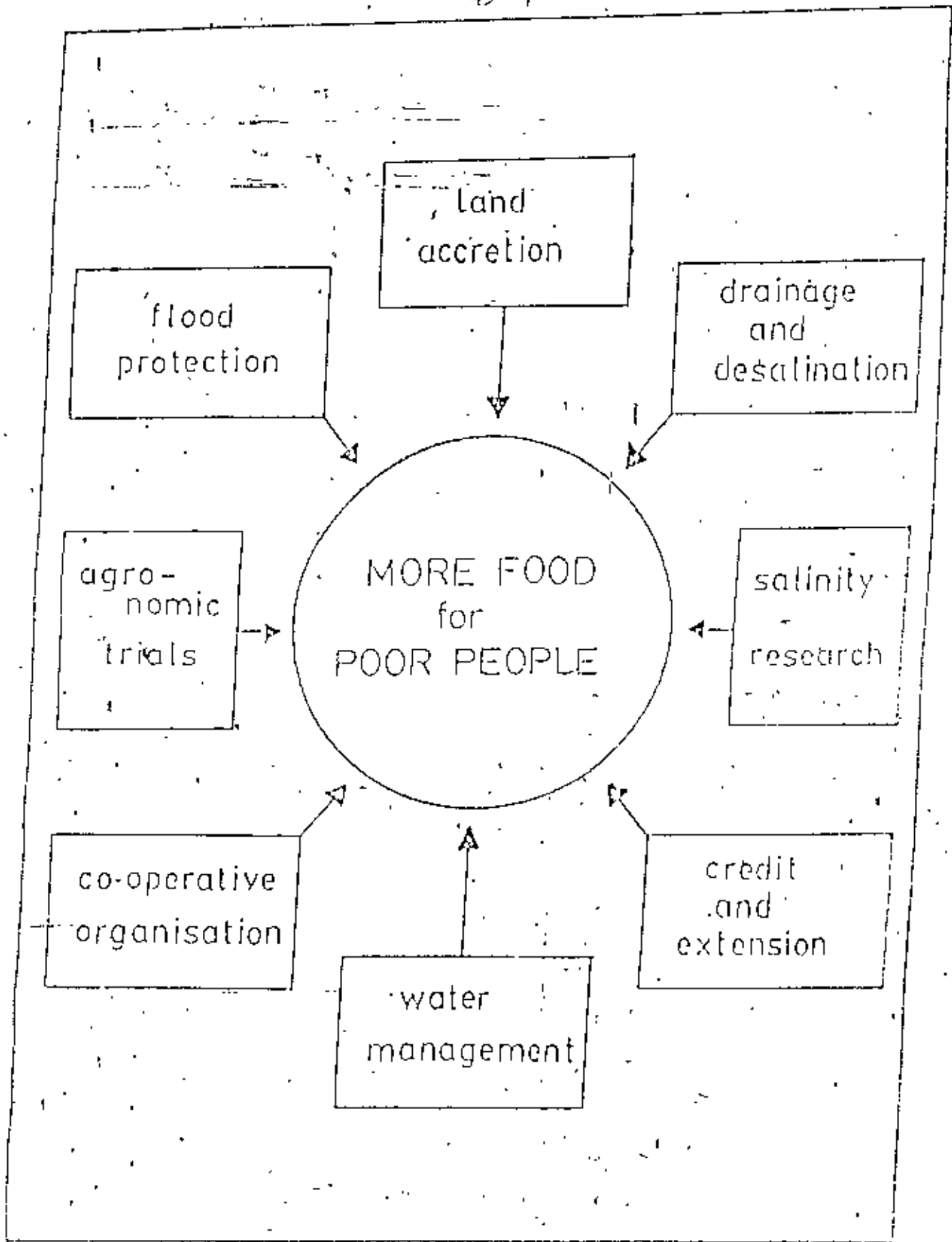


FIG. 6. MAIN FEATURES LAND RECLAMATION PROJECT.

SOURCE: Land Reclamation Project.

## BIBLIOGRAPHICAL REFERENCE

- AKTER, G.M.  
GHANI, N. "Riverbank erosion Impact study: Response Strategies to the problem of landlessness, rural impoverization and Marginalization." April, 1988.
- AMIN A.T.M.N. "Settlement strategy for Riverbank erosion Displaces in Bangladesh : A Human Resource Development Approach". Dhaka, April 1988.
- AHMED, N. An Economic Geography of East Pakistan, Oxford University Press, London, 1988.
- AHMED A. "Floods, their socio-economic and human consequences A case study of Yamuna at Delhi : Dhaka, April 1988.
- AHMED Q.K. "Employment creation in Rural Bangladesh, Policies and Programmes". Research Report BIDS, DHAKA, MAY 1987.  
"Bangladesh Bureau of statistics (BBS), Barisal District Statistics 1983, DHAKA, 1988.
- BRONGER, DIRK The Relevance of the Central place theory and the Development Center strategy for Regional Development Planning : The case of Andhra Pradesh, India.
- CURREY R. Mapping Areas liable to famine in Bangladesh Ph.D.-dissertation (Unpublished) University of Hawaii, Honolulu, 1979.
- ELAHI, K.M. "Riverbank erosion and floods in Bangladesh: Need for Inventory and Planning". REIS Newsletter No.2, Dhaka 1985.
- ELAHI K.M. "Riverbank Erosion, Flood Hazard and population Displacement in Bangladesh: An overview, Dhaka, April 1988.
- GLASSON, JOHN An introduction to Regional Planning, London 1975.
- HAQUE C.E. "Survey Method and sampling design for the survey on Impact of riverbank Erosion in Rural Bangladesh," REIS-  
ELAHI K.M. & AHMED K.S. & "JU, : DHAKA 1985
- KABIR M. "Water Resources Planning for Regional Development, of Bangladesh, MURP- Thesis (Unpublished) Dhaka 1978.  
HOSSAIN,  
LIAKOT

- ISLAM M.S. & ISLAM A.M.Z. "A brief Account on bank Erosing, Model studies and Bank protective works in Bangladesh", Newsletter No. 2, REIS, Dhaka 1985.
- ISLAM, W. & RAHMAN, M.A. "Riverbank Erosion in Bangladesh: An overview of field observation". Newsletter No. 3, REIS, Dhaka 1987
- ILO Poverty and landlessness in Rural Asia, ILO, Geneva 1977.
- JAHAN, SARWAR - "Strategy for integrated Rural development in Bangladesh: A growth point Approach: MURP Thesis, Dhaka 1978.
- KORI, NIJERA: A proposal to combat the suffering of flood affected people, Bangladesh, 1984.
- McLOUGHLIN J. BRIAN. Urban & Regional Planning A system Approach, U.K. 1969
- MISRA, R.P. & OTHERS Regional Development Planning in India, Delhi 1978.
- RAHMAN, S. River-Bank Erosion and population displacement in Bangladesh: A case study of RIZLA UPAZILLA. AIT, BANGKOK, December 1988.
- SALEHEEN, M. "Displacees of Riverbank Erosion, "Some Theoretical issues", Newsletter, No. 3, REIS, Dhaka 1987.
- SERAJ. T.M. The role of small towns in rural Development (A case study in Bangladesh) NILG, 1989.
- ZAMAN. M.Q. "Endemic land conflict and violence in Charvillage of Bangladesh", Newsletter No. 3, REIS, Dhaka 1987.

