1.1 Introduction:

With the growing importance for decentralised process and practice of planning, it has become necessary to have an innovative approach in applying the modern methods of management science in the area of resource management and planning for development. Management of natural resources is best done at the local levels. To further decentralised development and planning proper emphasis has to be given to a spatial approach and the use of new technologies.

The balanced growth of different regions is a major instrument for improving the levels of living of the underprivileged people. There is a felt need for reviewing the existing strategies and suggesting a suitable alternative framework for designing a strategy for development of the backward areas (districts). The experiences of 'target group' and 'selective area' approaches in this regard suggest that it tend to improve the relatively richer classes and better endowed areas (Refer 9, 118, 149, 186, 198). The current emphasis on 'area planning' and 'nucleus industries' lacks a systems approach and seems to be yet another attempt of trial and error.

To create employment opportunities and to remove poverty it is necessary to assess the development potential of an area by taking into consideration the availability of skills, resources, technology and energy use, quality of life, social infrastructure and accessibility.
Thus it may be noted that:

(a) Standard models of industrialisation based on models of spread which often do not materialise and specifically the target sector(s) do not reap the benefits.

(b) Improvements of other aspects of infrastructure and production (including agricultural production) are not often integrated along with sectoral models of industrial development.

(c) Models in question do not explicitly consider utilisation of local resources, environmental implications and long term distributional effects.

It is necessary to ensure a harmonic growth of the area where all sectors are developed in a systemic (taking care of the inter-relationships of all sub-systems) sense and required benefits flow to the targeted sector of population and backward pockets. An integrated intersectoral model integrating sub-sectors within an overall model framework that encompasses distributional and temporal effects have to be constructed.

In this research study an attempt is made to develop such an integrated model. Within the overall model the above three sectoral models are specifically discussed in detail as case studies illustrating the use and applicability of the framework. However, attempts are made to ensure that these case studies do not present isolated strategies of development but are integrated and inter-related within the systemic model of backward area development.
1.2 Objectives of the study:

The objectives of the study are listed as follows:

a) To analyse the conceptual and theoretical models available in the literature in respect of backward area development and spatial planning. To assess the experience of backward area development in different developing countries.

b) To analyse the experience in a few backward districts in West Bengal.

c) To develop a framework for an alternative strategy if the existing models and empirical experience have failed to develop an implementable strategy.

d) To develop several specific sub-sectoral models on inter-related problem areas on
   (i) energy management and planning
   (ii) micro watershed management system
   (iii) infrastructure planning (health, education and drinking water).

These studies form an integral part of the overall model for prescription of the alternative strategy as spelt out in (c).

e) To extend, generalise and to develop an integrated model for resources management and area planning by taking (a) to (d) into consideration.
1.3 Methodology:

The methodology for each case study differ according to the requirement of the case. A study of the type encompassing the objective as outlined above is by its very nature, inter-disciplinary.

In general the steps followed are as given below:

a. Survey of existing models (Literature Survey) and their applicability in Indian situations.

The study of literature is not confined to the study of management and management science models. Studies of economic, development, sociology and Decision Support System (DSS) models are attempted. Special stress is given to the 'spread effects' and models of 'regional planning'.

In respect of sub-sector models in the area of 'energy', 'watershed' and 'infrastructure' various supply and demand models, simulation, heuristics and DSS models are specifically studied along with the related models of 'technology choice'.

To reinforce the conceptual model regarding applicability, search of management science literature is also made. A critical evaluation of the studies reported in the literature is conducted.
The steps are listed as follows:

In addition to the study of theoretical and conceptual models, attempts are made to review the empirical literature and experiences of various developing countries.

Having evaluated the models and empirical experiences, efforts are made to formulate a development strategy. The evolution of a framework consists of the following steps:

- data collection
- evaluation of the strategies
- assessment of development potential
- formulation of a framework
- design of a strategy for two backward districts
- conducting a few case studies
- development of an integrated model.

b. Sub-sectoral models:

The sectoral studies are based on empirical data collected from selected backward districts of West Bengal in the Bankura-Purulia region. A Linear Programming model is developed for the energy management and planning for a block in Bankura. Alternative scenarios are generated for relevant future environment and different management strategies are discussed for its effectiveness.

Mathematical models based on Decision Support Systems and Simulation are extensively used for the purpose.
For the watershed model the commonly used principles of irrigation engineering (Refer 117) is followed and crop production simulation is conducted for the major crops in a watershed in one production year on fortnightly basis. This model takes into consideration the soil type, cropping pattern, farm practices, humidity, temperature, sunshine hours, solar radiation and a host of other soil properties.

For the infrastructure planning three modules were developed on Health Planning and Location, Primary Education and Drinking Water Management at the problem villages. The unit of planning in these studies are a 'block' in the Bankura and Purulia districts. Decision Support Systems methodologies are extensively used (Refer 31, 81) to generate alternative scenarios for different inputs so as to assess the financial and physical implications of the options.

The flow chart given in Figure 1.1 brings all the steps of the methodology in an integrated fashion.

1.4 Validation:

As already explained in the previous section, before the model formulation prima facie applicability of the models are decided on the basis of the data collected.

However, since the model strategy is futuristic, it was necessary to validate both the alternative scenarios generated and the feasibility of the strategy in respect of resource requirements and expected benefits.
FIGURE 1.1
STUDY METHODOLOGY

- SELECTION OF A DISTRICT
  - DATA COLLECTION
  - RESOURCE SURVEY
    - ESTIMATE DEV. POTENTIAL
    - CASE STUDIES:
      - ENERGY
      - WATER
      - INFRASTRUCTURE
  - LITERATURE SURVEY
    - BACKWARD AREA DEVELOPMENT
    - MANAGEMENT SCIENCE MODELS

- DEVELOP A FRAMEWORK FOR AN ALTERNATIVE STRATEGY FOR LOCAL AREA DEV.
- DEVELOPMENT OF AN INTEGRATIVE GENERALISED MODEL
- DISCUSSIONS WITH THE LOCAL LEVEL DECISION MAKERS
- VALIDATION
- MODIFIED MODEL AFTER PROPER VALIDATION
- DISSERTATION
- PROGRAMME FOR ACTION

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Local level decision makers were consulted wherever possible regarding these aspects and model results are discussed with them. On the basis of the availability of data and discussions with the local level decision makers the model results were tested and subjectively validated.

1.5 Contribution to research:

The research study attempts to provide a methodology for strategy formulation for resource management and area planning specifically for the backward areas. Though the models were tested in respect of one or two blocks of Bankura/ Purulia districts the methodology has generic applicability in backward area development in any other developing economies. It also provides a framework for micro-level planning and decentralised system of such planning in micro-computer based systems available at the district level. The case studies open up possibilities of local participation in planning without losing the rigour and quality in the planning process.
1.6 Organisation of the thesis:

The thesis is presented in seven Chapters. The problem, objectives and methodology is given in Chapter 1. The review of the literature on regional planning and management science models are presented in Chapter 2. Chapter 3 presents the selected country studies on Nigeria, Brazil, China and India. Based on the experiences of these countries on backward area development a framework for resources management and area planning is outlined in Chapter 4. Chapter 5 presents the translation of the above framework to workable strategies for Bankura and Purulia districts. In Chapter 6 a few case studies are presented from the districts of Bankura and Purulia of West Bengal state on energy management, watershed management and health planning and location etc. to demonstrate the usefulness of the DSS methodology in planning. The DSS models developed in Chapter 6 has been extensively used in the light of the framework developed in Chapter 4 to prepare a programme for action for the development of the backward gram panchayat, Teghari. Finally, in Chapter 7 the summary and conclusions as well as the future research directions are presented.