

CHAPTER - V

SUMMARY AND CONCLUSION

The present work highlights the pattern of drought proneness and their impact on settlements and on different socio-economic categories of population. The work is based on the nature and intensity of drought defined in the total context of the study area. It derives a geographical insight into man-land relationship in different stages of drought in the region which is primarily concerned with agriculture and allied activities. The most important aspect of the study is to understand the process of human response corresponding to varied intensity of drought. The region taken for analysis and observation is the State of Orissa which remained perpetually backward because of frequent natural calamities such as drought, flood and cyclone along with the high concentration of backward class population including scheduled caste and scheduled tribe population.

The first chapter of the thesis outlines the main issues and organisation of the work with a detail survey of research works done in this field. The concept of drought developed by various researchers are reviewed. An appropriate definition of drought is put forward based on water balance criteria.

The meaning of human response also defined for the purpose of this study. A detail discussion is made on the techniques available for the identification of drought prone areas of any region with critical evaluation and on their applicability. The aims and objectives of this piece of research work are defined properly with a presentation of a set of hypotheses to examine human response towards drought. The necessary justification is given for the selection of the study area (Orissa State). The regional personality and historical incidence of drought of the study area are presented vide Appendix- A and B respectively.

In the second chapter, the study deals with the identification of drought prone areas of the State. Before attempting the delineation a discussion is made on agro-climatic conditions, soil erosion assessment and shifting cultivation which are directly linked and responsible for the occurrence of drought in the State. In Orissa, a step has been taken by the Lift Irrigation Department to identify the drought prone areas of the State based on ground water potential.

After a detail survey of ground water potential in 314 blocks of the State in 1967, 68 blocks were identified as drought prone. But this identification is unable to give a real picture of Orissa due to the fact that only one single criterion is considered. Therefore an attempt has been made at block level to delineate the drought prone areas of Orissa based on multiple criteria i.e., annual rainfall distribution, seasonal distribution (Kharif) and its variability, ground water potential, irrigation facilities, forest area coverage, topographic characteristics, shifting cultivation practices, etc. The linear regression technique has been used for the annual rainfall analysis and seasonality index analysis for a time period of 13 years from 1970 to 1982 to know the trend of rainfall and to estimate the future drought prone area. However, the rainfall alone can not give a real picture of the drought proneness, other criteria like irrigation, topography, soil, forest, shifting cultivation and underground water potential have been taken into consideration and maps have been prepared for individual items. Thus superimposing all the maps the final drought prone areas consisting of 292 blocks of Orissa have been identified cartographically. The composite picture thus formed has regionalised 292 blocks to identify drought proneness of different intensity. Only 22 blocks are found to be occasionally drought prone (non-drought prone).

The spatial distribution of drought prone areas of Orissa reveals that moderately drought prone blocks are spread over the State evenly. The coastal districts of Orissa comprising Baleshwar, Cuttack and Puri districts are covered by less drought prone and moderately drought affected blocks. It is interesting to note that in Puri district compared to Cuttack and Baleshwar district more number of severe and catastrophic drought affected blocks are found. Catastrophic drought prone blocks and severely drought prone blocks are found mainly in western Orissa which forms the core of drought proneness and suffers permanently.

The third chapter gives an inventory of water resources of the State. Water is the most important resource specially for drought prone areas, because of the fact that those areas are characterised by meagre and highly variable rainfall. In such region surface water resources, in terms of riverflow and small surface reservoir are not dependable and highly restricted. Ground water thus becomes the main reliable source of water supply in drought prone areas. On the basis of the geo-hydrological conditions, the State is divided into three important ground water region with distinct features and requiring different types of

treatment in the programme of ground water development. The plateaus and erosional plains covering the central and western part of the State include mostly consolidated or semiconsolidated rock tract whereas in the south eastern part is largely made of unconsolidated river and coastal alluvium. The ground water potential with high yield prospect in coastal tract range from 150 cubic metre/hour to 50 cubic metre/hour and in the western and central districts the large yield prospects 20 cubic metre/ hour and most of the time it is limited to 5 cubic metre/hour. In addition to this a detail discussion is made on the surface water conditions of all the river basins of the State. In this chapter impact assessment of water resources pattern particularly in agriculture is done in the sample blocks as it is not possible to study all the drought prone blocks of Orissa.

The fourth chapter is specially designed for micro-level pilot studies through primary survey to derive problem solutions and for planning purposes. The basic purpose of conducting the socio-economic survey of three drought prone villages of different blocks and different districts is to ascertain human response towards drought and how the drought effect creates major problems with regard to standard of living, occupation pattern, income expenditure pattern, credit facilities. The survey has also been conducted to know the conflicts among the people and their aims and aspirations which have impact on agricultural and other practices including investment and credit facilities. So briefly the aims of survey are (i) to obtain general information with regard to the structure of economy (ii) to study the farmer's perception of drought (iii) to ascertain how drought effect varies among various economic groups, (iv) whether they are adopting modern agricultural technology and practices and their attitude towards them (v) to the decision they take at rain failure periods, (vi) to study migrational behaviour of the affected population, (vii) to study or to identify the conflicts among people with the present State of economy, (viii) to study the aspiration of the people for and (ix) to consider the suggestions of the people to mitigate the drought problem.

The assumption taken for the study are examined through survey and analysis in three villages of three different blocks according to varying intensity of drought. A detail survey report of these three villages is presented in this chapter to evaluate the present situation. The results of the hypotheses tested in three villages are presented below under principal findings.

Principal Findings

Based on the drought intensity zones three villages namely Beruhan (Marsaghai Block), Baldha (Bongomunda Block) and Tumandi (Daspalla Block) are selected for intensive field study to examine the selected hypotheses related to human response to drought. The hypotheses related to migration hold good for the case of Beruhan and Baldha villages. In case of Tumandi village the inhabitants are very much attached with the prevailing socio-cultural bondage which prevents them to migrate outside even if they are on the verge of death. The next possible answer in this connection may be due to on-going construction activities of the "Kuanria" Irrigation Project where atleast some of the people of this village are engaged in work hence the urgent need to migrate is ruled out.

By comparing the situations prevailing at Beruhan and Baldha villages during the acute period of drought, it is observed that the people of Beruhan are very much keen to migrate outside temporarily as soon as they get any information or opportunity regarding employment. In case of Baldha village most of villagers are less attached towards their own land by which they prefer permanent migration when they feel that better opportunities are available outside. As a matter of fact, they are on constant search through relatives and friends for any kind of employment opportunity outside-preferably in service sector.

The three important development networks such as transport, power and irrigation are yet to be developed in three villages, thus preventing them from adoption of modern agricultural practices.

There is an acute shortage of water for domestic consumption more particularly drinking water for a period of about six months extending from January to June. In case of Beruhan village, the situation is worst for which most of the villagers are suffering from skin diseases.

Economically, the Baldha village is comparatively better of in relation to Tumandi and Beruhan. However in general more than 60% population remain below the poverty line. As agriculture is the main and sole occupation, the economic condition is very much linked to the inequitable land distribution. More than 50% of agricultural land are owned by a few large farmers in Baldha

and Tumandi villages. In case of Beruhan village though the large farmers occupy 38.28% of agricultural land the distribution within the small and marginal farmers is intricate due to the prevalence of joint family system.

While the extension of irrigation from all sources (surface run-off and ground water) is obvious solution, change in agricultural practices, cropping pattern and land use planning with better land and water management are also necessary. The inhabitants are incapable of fighting against the droughts and are victims of the circumstances because of tradition bound socio-economic beliefs. Apart from educating them towards probable solutions, they need to be motivated and encouraged to stand for such contingencies and should be adaptive. While short-run strategies relate to changing agricultural practices and flexible cropping pattern, long-run ones call for regional land use planning and management, land reform and distribution, provision for irrigation and exploitation of ground water potential, and reduction of dependence on agriculture for livelihood.

Strategies

Keeping in view the major problems the strategies to be adopted in order of priority are:

1. Irrigation and Water Management:

Where there is no irrigation facilities, atleast the available surface water should be properly managed for optimum utilization. For example, in Tumandi village of Daspalla Block, no irrigation facilities are available. But a natural water pond namely Barigunda Jhara is available, which can at present irrigate about 10 acres of land during the time of need and to raise rabi crop also, if it will provided with lift irrigation facility. So during monsoon time, a slope can be arranged upto the pond to store more water to irrigate more land. In irrigated areas also, the proper water management is required. As quite a substantial portion of the irrigated area consists of undulating land, land shaping within ayacuts will ensure more intensive cultivation and better water management technique to be applied. Priority should be given to those lands which are having slopes of 1 to 4%. The field channel systems are to be intergrated with the canal system for proper management of water in the irrigated area.

In the areas of uncertain rainfall in drought prone areas agriculture is entirely dependent on irrigation. The irrigation facilities should be provided to all of the drought prone areas specially in the catastrophic and severe drought prone areas at first hand. For this purpose both the surface and ground water must be tapped. This strategy will aim at specifying the different sources of irrigation facilities like M.I.Ps, Canal, Tank, Riverlift, Dugwell, Open well and Bamboo-bores in accordance with the availability of water.

Corrolary to the above, the rural electrification covering each and individual villages to use electric pumps and machineries for the operation of irrigation need to be expanded. Apart from technical and economic feasibility social cost-benefit analysis be applied to ascertain the demand for rural power supply.

2. Agricultural Practices:

To increase the agricultural production is an uphill task particularly in the drought year. New practices such as mechanisation or modernisation may be the answer. Changing of cropping pattern introducing double and multiple cropping etc. though very risky are very much required. But these aspects must be based on the attitude of the people of that particular area. For example the people of Tumandi village of Daspalla Block in general are against cultivating any crop except paddy. So in that place, mixed farming intercultue in stead of changing of cropping pattern must be introduced and steps should be taken to change the attitude of the people slowly through demonstration schemes to go for changing of cropping pattern, to use the modern means of agricultural techniques, etc. But in those areas like Baldha village of Bongamunda Block and Beruhan village of Marsaghai Block where the people's response are condusive the measures should be taken accordingly.

The second trial is to bring all the culturable wastes and fallow lands under cultivation, i.e., extensive agricultuare.

On the otherhand intensive cultivation, soil treatment, land development, use of better seed and exact amount of fertilizer application, crop rotation and crop selection are dependent on the available water and irrigation facilities.

Hence planning for increasing yield rate for crops will be dependent upon the integrated use of water resources from all sources.

3. Diversification of the Rural Economy:

The integration of agriculture with the allied activities such as the development of livestock, poultry, fishing and forestry are required simultaneously to develop backward linkages in the rural agrarian economy.

Measures to improve livestock population will include: introduction of improved and high breeding variety of cattle and buffalows, provision of feeders for them, their health facility to reduce the premature death. As livestock is the most important asset for every individual family in drought prone areas, it is essential to plan carefully for livestock development alongwith agriculture putting equal emphasis on both.

4. Land Use Planning:

The forest and other vegetative coverage is the most important drought mitigating factor, hence deforestation is to be controlled and afforestation should be augmented.

Improving the forest wealth by rehabilitation of degraded forests and afforestation according to the suitability of the soil in the areas left bare due to shifting cultivation which is subjected to soil erosion require technical solution apart from social approach. Socialization of the forest resources and imposition of public control in 1960's and 1970's have detached the people from the maintenance and development of these resources. There is a need for rethinking on the forest policies as without people's involvement and such resource development programme will be extremely difficult to carry out.

5. Rural Infrastructure and Institutional Framework:

Apart from irrigation and power supply, the development of transport and communication net work to rural drought prone villages especially upto block head quarters in order to make it easy and time bound for supplying inputs like improved seeds, fertilizer and pesticide and marketing of rural products in organized manner has to be planned. It will be required to provide more number

of input distribution centres, one for every cluster of nine or ten drought prone villages, so that the farmers will be able to transact all important necessities by their own effort (bullock cart or so) to reduce the transport cost. Aggregate track distance in terms of cost and time need to be minimised. Uncertainty in the success of agriculture makes agricultural investments risky and small and marginal farmers can not take such risk. Hence rural credit and crop insurance need to be introduced. The initial stage of cultivation requires investment. The agricultural upliftment calls for a regular supply of agricultural requisities. For that, there should be sound credit facility to ward small and marginal farmers. Rural Banks, and State Banks (Agricultural Branch) should be located to cater to the needs of rural masses by providing long term low interest loans to make them free from the burden of village 'Majajan' (Money Lender). Specially steps should be taken on the part of the co-operative societies to be active in every place and the credits should be given in time so as to establish the credibilities of the institutional credit system and to free the farmers from the bonded loans/credits from high interest private source. During drought when income of the poor farmers goes down his purchasing power is reduced and price of consumables go up, the poor income groups of people are worst affected. Hence regulated market facilities for the sale of food products should be provided for the benefit of the poor agricultural farmers. Weekly, biweekly and triweekly market facilities should be provided depending on the demand survey of the area atleast in Panchayat Head quarters. Regular market centres with fair price shops, should be provided atleast in Block Head quarters.

6. Non-agricultural Employment Opportunity:

Based on the available local resource, steps should be taken to install agro-based, agro oriented and social skill based industries and priority must be given to employ the persons of the nearby areas based on their capacity and skill. This step will check the seasonal migration due to utter poverty during drought and to save the nearby areas and urban centres from the heavy pressure of acute unemployment problem. Such non-agricultural employment generation is not only supplementary but complimentary measures against crop failure, due to drought. For example, Tumandi village of Daspalla Block is surrounded by forest. If a small scale industry based on forest products can be established there, people may find alternative way out to drought effect.

7. Social Upliftment:

Illiterate rural poor agricultural labour has no motivation to fight against drought. Social Education, Health (Medical) facilities etc. are the basic needs of the people. These facilities have to be planned on a long term basis. To make a quick and active response of the people to various developmental programme, the necessary institutional frame work and organization structure with a view to take up the development schemes as parts of contingency and both long and short term plans.

Policy Guidelines

- 1) Instead of forcing and imposing any change in agricultural practices, the response of the people to accept the change is of first priority. Patient waiting for voluntary acceptance of the changes may be necessary but if social development policy is formulated, such acceptance of planned effort may be expedited.
- 2) The inequitable distribution of land in the drought prone areas makes small holding vulnerable. The large single land holding exploits the small and marginal holding by appropriating them at distress sale and hence at the time of drought, small and marginal farmers are reduced to landless agricultural labour by such sale proceeds.
- 3) Hence, land reform policy including stoppage of land transaction by the small and marginal holding has to be enforced; simultaneously the poorer section of the people should be provided with soft loans or food money to tide over the seasonal droughts.
- 4) The chronically drought affected areas should be converted to forest lands followed by the steps to rehabilitate the displaced population in nearby prospective areas. Such afforestation policy has to be simultaneously supported by the measures of soil conservation and selection of plant species suiting the soil condition, and land characteristics.

In this study, the drought prone areas in humid and sub-humid condition have been identified based on water balance criteria for different crops, evapotranspiration rates, soil moisture condition and its retentivity. The sub-areas have also been identified based on micro-climatic condition, resource inventory and socio-economic factors. Analysis of such sub-areas has dealt with the human response of various kinds relating to economic status of the people and it has been proved that although drought is area based and varies over space its impact is intensive on poorer section of the society.

The droughts followed by crop failure generate tendency among the people to migrate seasonally or on permanent basis. However seasonal migration is more dominant and the middle class people have greater propensity to migrate, while lower income group particularly land less agricultural labourer, small and marginal farmers have less propensity, because of financial, social and skill constraints.

The major constraints to Drought Prone Area Development are primarily lack of water supply; hence there is a need for integrated development for use of water from all sources (ground water, rain and surface water). Such technological solutions are necessary but not sufficient condition for area development. An integrated area development approach including social motivation, skill formation, resource development etc. is to be introduced in which special emphasis should be given to the section of people socially and economically deprived.