

Chapter 1

Watershed: Concept and Management

The survival on earth essentially depends on two basic resources i.e soil and water being the two valuable gifts of the nature to mankind. Water is a prime, natural, indispensable and vulnerable resource which fulfils a number of significant functions. Despite its preciousness, water has remained as a neglected issue till today. We are faced with the critical question of how to provide stable supply of water for drinking and food production for an estimated population of about eight billion people by 2025. Agriculture is facing enormous problems in food production mainly due to scarcity of water. Though India is a water rich country, it has been reduced to a water insecure nation since half a century. The acuteness is such that there may be a water emergency era by 2025 where less than 1450 cu.m. of precipitation is considered critical for the human survival.

According to “The wrath of Nation”, a publication brought out for members of Parliament, the average annual precipitation in India is the highest in the world except Latin America. Out of total effective annual precipitation of 350 million hectare meters (mhm) of water, around 160 being lost to the sea as river flows. Out of the balance of 190, about 20 get stored in reservoirs, 45 goes to ground water and rest 125 million hectare meters used as soil moisture. Therefore, the use is limited to more or less up to 25% of the rain water for food grain production. Even after full exploitation of irrigated potential, about 50% of the cultivated land continues to depend on rainfall for production. Besides, around 5433 tons

of soils along with 10 million tons of plant nutrients are lost annually in India. So it is said that 'Soil without water is desert and water without soil is useless'.

India's population has already exceeded one billion marks. According to National Commission on Agriculture, we are required to produce 400 million tons of food grain by 2035 AD to feed our burgeoning population. Green revolution has played its part earlier. In order to increase food grain production, we have to look towards the untreated and unseen areas i.e. the monsoon based dry land areas which can tilt the balance of food production in the country. As the practice of water impounding and using for human, crop as well as livestock production are gradually diminishing, mixed farming could make the best use of ecological inputs and ensure against aberrant climate in rainfall areas.

The sustainable agricultural development in this changed context can only be achieved with the conservation of soil and water (basic natural resources) coupled with human resource development to meet the new challenges of the 21st century. It is an established fact that conservation of natural resources and their management holds key to sustainable agriculture. In India, the conservation of soil and rainwater, the two basic resources to mankind have been practiced since ancient times. However, there has been renewed emphasis in the recent past on conservation of these basic resources and their efficient utilisation. Therefore, Government of India accords highest priority to the holistic and sustainable development of rainfed areas through watershed development approach.

Realising the importance of dry land agriculture, planners at National level, many institutions and various state Agricultural Universities have started giving a definite shape to dry land development programmes starting from first to eighth plan period. Several programmes such as; Integrated Wasteland Development Project, Draught Prone Area Programme, Desert Development Programme and Whole Village Development Programme were implemented for management of soil and water. These programmes have laid down their own separate guideline, norms, funding pattern and technical components based on their specific aims and objectives. Desert Development Programme was focused on

afforestation and aims to prevent desertification where as Draught Prone Area Programme laid more emphasis on Soil and Water Conservation and Integrated Wasteland Development Project emphasised on development of wastelands. The attempt for development of dry land areas soon becomes a piecemeal approach with isolated efforts and there was no co-ordination among development departments. The beneficiaries were less enthusiastic about new technology due to lack of involvement. The objective to restore ecological balance became futile.

The Government of India realising this grave concern launched National Watershed Development Projects for Rainfed Areas (NWDPA) during Seventh Five -Year Plan (1986-87) period combining the features of Integrated Wasteland Development Project, Draught Prone Area Programme and Desert Development Programme. The main objective of the project was to restore ecological balance, building of fast deteriorating national resources and prevent the mankind heading towards catastrophe.

Watershed Management is necessary to protect, conserve and improve the land resource for efficient and sustained production, to protect and enhance water resource, moderate floods and reduce silting of tanks, conserve rain water and increase irrigation for crops. Thus the programme aims to mitigate drought as well as utilise the natural resources at optimum level for improving agriculture and allied occupation or industries (small and cottage industries) to improve socio-economic conditions of the local residents. The watershed management implies for the judicious use of all the resources i.e. land, water and vegetation in an area for providing an answer to alleviate drought, moderate floods, prevent soil erosion, improve water availability as well as to increase food, fodder, fuel and fibre on sustained basis. Therefore, Watershed Development Programme aims to achieve maximum production with minimum hazard to the natural resources and for the well being of people.

Watershed is defined as a geographic area drained by stream or a system of connecting streams in such a manner that all surface run off originating due to the precipitation in the area leaves the area in a concentrated flow through a single outlet (Singh, 2000). Watershed management has been defined as "Rational Utilisation of Land and Water

Resources for optimum and sustain production with a minimum hazard to natural resources” (Osterman, 1988). In fact, watershed development has become the main intervention for natural resource management which means proper land use, protecting land against all forms of degradation, building and maintaining soil fertility, proper management of rainwater, flood protection, draught mitigation and increasing productivity from all land uses. The watershed programme has therefore endeavours to improve and sustain production as well as productivity of all categories of land at higher levels.

Singh, J. P. (2000). *Economic Evaluation of Manchal Watershed*, MANAGE, Hyderabad. Pp-112.

Osterman, D. (1988). Highly erodible land; farmer Perceptions versus actual measurement, *Journal of Soil and Water Conservation*, March- April, 43(2177):182.

The main objective of the watershed approach is to minimize adverse effects of drought on the production of crops, livestock and productivity of land, to promote overall economic development and improve the socio-economic condition of the resource-poor and disadvantaged sections of inhabitants. Therefore, the watershed programme is reckoned as the engine of agricultural growth and development in fragile and marginal rainfed area.

It goes beyond doubt that there has been significant attempt made in watershed activities in terms of research and technology transfer since independence with enormous improvements and great achievements. But, the progress is not yet independent of problems or hazards in the path of watershed development and management, which is of complex and multi dimensional. It has also been observed that wherever the watershed programmes are undertaken by Government agencies, the multi-disciplinary aspect of the activities is the first casualty. Unfortunately, even single practice or earthwork activities are implemented and managed by the personnel who are invariably untrained, un-oriented and therefore uncommitted. At the research level, the scenario is not free from confusion. Each individual perceived the watershed activities in different

way which reflects confusion so far needbased technologies are concerned. Therefore, it not only involves a scientific approach but also a close interface with typical economic fabric in the country.

Active involvement of community in Government sponsored watershed programmes does not come easily and quickly. It is generally observed that, people are only associated with a passive manner in most of the watershed area development programmes. There has been an increased tendency on the part of the staff members not to pay attention to the suggestions of the villagers and they prefer to tell the people than to listen. The Government functionaries neither validate nor upgrade the low cost indigenous technological knowledge, instead advocating complex, costly and sophisticated technologies for which the local people have little interest to adopt. Besides, implementation of Watershed Projects has remained poor because of low capacity of the field machinery and administrative or bureaucratic problems. Poor inter-departmental co-ordination, ineffective supervision and above all improper management of available resources come in the way of smooth functioning of various programmes. Many a times, decision making rests with few inexperienced hands and the planning does not take into account of the felt needs of the people. The project personnel have neither time nor trained to nurture democratic leadership. Hence, a bottom-up, dispersed, participatory and a farmers' driven approach for the development of watershed will have to be adopted to make the farming community self-reliant. An appropriate institutional arrangements, human resource development and creation of awareness at all levels are the need of the hour for effective implementation of watershed development programmes.

The Ministry of Rural Development, Government of India constituted a technical committee under the Chairmanship of Prof. Hanumantha Rao during 1994 to study the implementation and impact of these programmes. The committee in its report viewed that degradation of environment in the dry land areas was basically attributed to the increasing biotic pressure on the fragile ecosystem in the absence of adequate investment and appropriate management practices to augment and conserve the land and water resources. Population growth and

poverty in one hand and presence of rising demand from affluence on the other have been exerting powerful pressure on the ecosystem. The macro-economic policy which provides inducement to the over-exploitation of natural resources that is at a higher rate than the rate of regeneration are also responsible for denudation of environment. The committee recommended that a common set of guidelines, objectives, strategies and expenditure norms should be evolved integrating the features of all these programmes under the Ministry of Rural Development. Thus, the National Watershed Development Programme came into picture during 1995.

Ministry of Rural Development, Government of India studied different outstanding programmes of success at Ralegan Siddhi and Adgaon in Maharashtra, Kabbanala and Mittemari in Karnataka as well as Jhabua in Madhya Pradesh, all of which show that draught can be beaten. Experiences and knowledge gained through these success stories motivated the ministry to provide a nation-wide guideline for implementation of watershed programme. These guidelines had been finalised after extensive consultations with NGOs, State Government professionals and research institutions. These guidelines provide best opportunities for systematic and effective implementation of area development programmes and poverty alleviation schemes in the resource poor and poverty dominant areas. The guideline emphasised active participation of people in watershed areas for assessing needs, analysing production problems, choice of appropriate programme, preparation of action plan, implementation as well as fund utilisation.

The primary responsibility for implementation of watershed development programmes rests with the State Government. The Central Government may provide coordination, technical guidance, training and research inputs in addition to monitoring the progress of implementation and evaluation of the impact of major programmes. The outcome of watershed management programme much depends how effectively they are planned, implemented and involves local people. So, the success of the programme depends on how effectively it is being implemented at state level. The National Watershed Development Programme guideline was implemented in the country during 1995 and subsequently revised in

August 2001. The guideline was further simplified in its procedures and involved the Panchayati Raj institutions more meaningfully in planning, implementation and management of economic activities in rural areas.

The concept of watershed was first introduced in Odisha during the 2nd Five-Year Plan [1955-61] and refined during the 5th Plan through the Directorate of Soil Conservation. In the beginning of the 8th Plan, three major projects namely, Integrated Watershed Development Project [IWDP], National Watershed Development Project for Rainfed Areas [NWDPR] and Indo-Danish Comprehensive Watershed Development Project [IDCWDP] were launched in the State with the primary objectives to Prevent land degradation, Promote and balance the ecosystem, enhance capacity to retain moisture and increase the fertility and productivity of the soil. Apart from this, watershed development projects were also implemented under other schemes including the Employment Assurance Scheme [EAS], Drought Prone Area Programmes [DPAP] and Integrated Wastelands Development Programme [IWDP] on a watershed basis. However, all these projects primarily focused on water harvesting structures. Early indication of participatory watershed development projects in Odisha can be found in the IFAD supported OTDP Project and Indo-German Watershed Development (IGWD).

Participatory watershed development programmes in Odisha began after the introduction of the revised watershed guidelines of 2001 developed by the Ministry of Rural Development, Government of India and “JANASAHABHAGITA” guidelines of the Ministry of Agriculture, Government of India. New and broader perspectives have started emerging with the experimentation of externally aided Western Odisha Rural Livelihoods Project [WORLP]. Watersheds are now viewed as a suitable medium to improve the quality of life of poor people by means of creating sustainable opportunities for livelihood promotion in different areas. With the inclusion of a holistic and integrated approach, the expected beneficial results will be of a higher order leading to improvement in the quality of life for poor people in the State.

The guideline envisages a clear-cut institutional arrangement. Watershed mission at the state level, headed by Mission Director ,

coordinates all activities for effective implementation of the programme with the support of Panchayati Raj department. At the district level, District Rural Development Agency (DRDA) is the nodal authority for implementation of all the area development programmes under the supervision and guidance of the state and central government. The District Rural Development Agency approves the selection of watersheds, appointment of Project Implementation Agencies (PIA), approves the action plan/treatment plan of the projects etc.

At the field level, Watershed Association formed by the beneficiaries of the watershed implement all the programmes under the overall supervision and guidance of Project Implementation Agencies (PIA). The District Rural Development Agency appoint suitable officers of the department of Agriculture, Horticulture, Soil Conservation, Animal Husbandry, Forestry, Panchayati Raj institutions or any agency of the state government, NGOs etc as the Project Implementation Agency. The Project Implementation Agency provide necessary technical guidance to the Watershed Association for preparation of development plans for the watershed through participatory rural appraisal (PRA) exercise, undertake community organisation and training for the village communities, supervise all watershed development activities, inspect and authenticate project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation, setup institutional arrangements for post-project operation and maintenance as well as further development of the assets created during the project period.

Each Project Implementation Agencies (PIA) carry out its duties through a multidisciplinary team designated as the Watershed Development Team (WDT) in the disciplines of plant science, animal science, civil / agricultural engineering and social science. Each individual in the watershed area formulate his own programme guided by Watershed Development Team members. The Watershed Association has to prepare a consolidated action plan / treatment plan for the integrated development of the watershed area under the guidance of Watershed Development Team and submit the same to the Project Implementation Agencies. The

action plan are prepared for all the arable and non-arable land including degraded forest lands, government and community lands as well as the private lands.

The Watershed Development Team members, while drawing up the action plan or watershed treatment plan ensure only low cost and locally available technologies and materials which are simple, easy to operate and maintain with emphasis on vegetative measure. Hence, a well planned, need based and sustainable programme have been designed for the development of watershed area and people. The Watershed Association submit the action plan to the Project Implementation Agency who thoroughly examined with the assistance of watershed Development Team members. If required; necessary corrections/modifications are made in consultation with the watershed people. The Project Implementation Agencies recommend the consolidated watershed plan to the District Watershed Committee. The members of the committee thoroughly examined the plan, made modifications/corrections, if required and approve after which DRDA released funds in instalments to the Watershed Association being deposited in the watershed accounts. Each Individual beneficiaries of the watershed take funds and implement various activities as per the approved programme.

The Watershed Development Programme is therefore purely based on the concept of bottom-up planning with single window, integrated, participatory as well as sustainable area development programme. The District Rural Development Agency release funds to the watershed which are deposited by the Watershed Association in their account either at Nationalised or Co-operative banks. Each family living in the same watershed area will receive money from the Watershed Association and implement various approved programmes. Hence, the people at the watershed area develop their own programme and utilise funds in implementation of their approved programme. Moreover, tribal people have past experience of watershed activities due to geographical locations and implementation of soil and water conservation activities by the Department of Soil Conservation through National Watershed Development Programmes for rainfed areas. It is, therefore, presumed

that watershed development programme will definitely bring an impact on the socio-economic development of the people.

With this assumption, an attempt has been made to study the **“IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON SOCIO-ECONOMIC UPLIFTMENT OF TRIBAL PEOPLE IN WESTERN UNDULATING ZONE, ODISHA”** in general with the following specific objectives.

Specific Objectives

- To study the personal, social and economic characteristics of the respondents living in the watershed areas
- To assess the knowledge and perception level of the tribal people about functioning of Watershed Development Programme
- To analyse the extent of involvement of the tribal people in the process of implementation of Watershed Development Programme
- To study the role of stakeholders associated with Watershed Development Programme extending support towards upliftment of tribal people
- To study the change in terms of materials possession, technological adoption, cropping pattern, income and above all socio-economic status of the people due to implementation of the programme
- To analyse the constraints impending successful implementation of the programme and the remedial measures suggested to combat them
- To suggest some ameliorative measures based on the findings for effective implementation of the programme and development of the tribal people.

Significance of the study

Significance refers to the effect of something is likely to have on other things. The significance of the research presented in this chapter explains the effectiveness of implementation process of the National Watershed Development Programmes. It also provides the perception and involvement of watershed people in different aspects of implementation

of the programmes particularly the guideline, objective and goal of the programme. Since Watershed Development Programme is a new approach, knowledge of each individuals on different aspects of watershed development programme is essentially required to design effective programme in order to make them conscious, develop interest for their involvement and implementation of various activities. Similarly, the watershed beneficiaries need to be fully exposed to the objectives and guidelines of the project including operational procedure and benefit extended from the project for their clear understanding towards effective implementation of the programme.

The watershed beneficiaries are much empowered in implementation of all programmes. Each individual will plan his programme; arrange inputs and resource as per his choice, utilising funds by himself and implement planned programmes. This will definitely bring an improvement for which attempt was made to study the various development of the people in relation to social, economical, infrastructural, technological, input use efficiency and environmental conditions. The constraints experienced by the watershed people will be assessed which may help the planners at the state level and district administration at the implementation level for necessary remedial measures. Hence, the study has its own significance from the current scenario and tribal people perspective.

Scope of the study

The term 'scope' refers to breadth or opportunity to function. Scope of the research pertains to the opportunities to be created by these findings with reference to the implementation of National Watershed Development Programme.

Out of total cultivated area of 145 million hectares in our country, 67% of the land (97.15mha) is under rainfed condition. Rainfed agriculture is characterised by low levels of productivity and low input usage. Variability in rainfall results in wide variation and instability in yields. The bulk of the rural poor and mostly tribal live in the rainfed regions. It is noteworthy that dry land has considerable production potential which has not being fully tapped. The major abiotic constraint that cause unsustaining rainfed

agriculture include low and variable rainfall, declining soil fertility and extension of cultivation to marginal lands, accelerated soil degradation followed by decrease in soil quality and low farm productivity. Sustainability in dry land area can be achieved by designing programmes to maintain the synergistic relationships between land and water cycle, raise productivity and restore, reclaim as well as rehabilitate the degraded land.

National Watershed Development Programme aimed at the total development of the watershed as a whole. The findings of the study will be a base for discussion in the field of development as well as research in technology generation. The information made available for the study will add to the knowledge and understanding of watershed development programmes. The data generated will enable the District Watershed Review Committee in refinement of the operational procedure for better implementation. The constraints identified will serve the purpose to build up the Watershed Association and its functioning.

It is hoped that the findings of the study will be very useful to the planners, executors and field functionaries in appropriate designing and effective implementation of the programme as well as making the project stable and sustainable.

Limitation of the study

A Study of this nature involved analyses of the entire process i.e. from policy framing of programmes, implementation as well as developments of the watershed people. It therefore sets number of limitations for the researcher covering two important rainfed districts of Odisha in a short period of time. In spite of these limitations, the researchers have made best possible approach to overcome some of these limitations by successfully covering respondents from all levels.

The data collected were based on the expressed opinions of the respondents. The study therefore may not be free from usual biasness particularly from social investigation. As the study used the ex-post-facto as well as participant observation techniques, all the disadvantages and short comings that are associated with the techniques and effects of several factors themselves set limitations to the study. Moreover, the

study was restricted to twelve Watersheds in two districts only out of 30 districts in Odisha.

Most of the farmer respondents were less educated and mostly from weaker communities. Hence; results may not be applicable for all the districts of Odisha. However; efforts were made through appropriate statistical analyses to achieve the objectives set for the study so that the essential process involved in Watershed Development Project could be assessed effectively.

Lay out of the dissertation

The dissertation is organised in seven chapters. The introduction chapter dealt with the background of the study along with research problem. This chapter also outlined the objectives of the study together with the significance, contributions, scope and structure of the study. The contents are arranged in a logical manner to help readers to understand the research work in a systematic way.

A review of past research work undertaken in this direction have been presented objective wise in chapter two which has direct relevance to the result and discussion .

The third chapter dealt with the theoretical frame work where the concept of watershed are reflected emphasising the participatory approach with institutional arrangements, operational procedure, fund utilisation and other post-management activities have been discussed for a clear understanding of the National Watershed Development Programme

Research setting has been incorporated in the fourth chapter which elaborates the physiography, demography, socio-economic, infrastructure and other resources of the study area.

The methodologies adopted in the study are being elaborated in chapter five. It presents brief account of the research design, sampling procedure, techniques used to collect the facts and required analyses of raw data to draw the conclusion.

The result and discussions were in the chapter six which explains in details about the socio- economic status of the respondents, knowledge and

involvement of the people in various watershed activities, reaction towards prescribed guidelines and support of the stakeholders associated with the programme. It also included the extent of developments and constraints experienced by the beneficiaries in successful implementation of the programme. Attempt was also made for developing a strategy based on the findings for effective implementation of the programme. Chapter seven, the last chapter presents the summary and conclusion followed by references made in the dissertation.

Appendices had their place at the end of the thesis.