



**Dhirubhai Ambani
Institute of Information and Communication Technology**

A STUDY ON

PREPARATION OF DETAILED MICRO PLANNING AND DEVELOP

A VIDEO DOCUMENTARY ON PREPARATION OF DPR

AT

GUJARAT STATE WATERSHED MANAGEMENT AGENCY

WINTER INTERNSHIP PROJECT

SUBMITTED TO

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EXECUTIVE SUMMERY

Gujarat is a state in western India. It has an area of 196,077 sq km with a coastline of 1,600 km, and population in excess of 50 million. The state is bordered by Rajasthan to the north, Maharashtra to the south, Madhya Pradesh to the east and the Arabian Sea as well as the Pakistani province of Sindh on the west. The total geographical area is 1, 96,000 sq. km. Out of it, the total cultivable area of the state is 124 lacks hectors. The state is divided in regions like North Gujarat, Central Gujarat, South Gujarat, Saurashtra and Kutch

Gujarat is dependent on monsoon for agricultural activities. Generally the nineteen percent of the rain falls during June to September months in Gujarat. Out of total geographical area, fifty two percent of area in Gujarat is under cultivation and twenty three percent of land is west land. Saurashtra and Kutch needs more irrigation facility but resources are limited. Per head cultivable area in state of Gujarat is 2.3 percent and twenty three percent of total geographical area is having irrigation facility.

Under the new common guideline the fund for GSWMA is increased from Rs.6000 to Rs.12000 per hector. In the implementation of various watershed development programmes The Use of scientific techniques and emphasis on participatory planning and implementation is a major step towards sustainable development. People's participation in development of their village is not sufficient for desired results, unless the process adequately addresses the interrelated issues of technology, equity and sustainability.

The Integrated Watershed Management Programme has three important features unprecedented devolution of decision-making power backed up by financial allocation directly to the district level and hence to the village organization level; Use of scientific tool like GIS and remote sensing and financial flexibility.

Gujarat State Watershed Management Agency is the State Level Nodal Agency to implement Integrated Watershed Management Programme (IWMP) across the state of Gujarat state. The main aims of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as Water, vegetative cover and soil. The expected outcomes of the project are prevention of soil and water erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. To provide sustainable livelihoods to the people residing in the watershed area is expected by enabling multi cropping and introduction of diverse agro based activities.

Total 21.34 lakh hector area with an outlay of 2769.72 crores has been covered under IWMP for the implementation that includes 3 batches sanctioned from 2009 to 2012. With work of watershed development, first time under IWMP the activities related to livelihood empowerment and Micro Enterprises development undertaken. Allocation of fund for livelihood was 215 crores in 2009-2010; it was 180 crores in 2010-2011 and 185 crores in 2011-2012 for the projects covered in each district of Gujarat.

The multi-functional nature of watershed project need a fair and substantial study to mobilize better involvement of people, institution and various line departments for their success. The main emphasis of the study is to produce a detailed project report for Balethi Project (IWMP XII). DPR will show the unique characteristics and problem of an area under watershed project. The detailed project report is the proposal for the capital cost as well as the various facilities. It includes examination of technological parameters, description of the technology to be used, broad technical specification, evaluation of the existing resources, and schedule plan for various activities to be taken under Integrated Water Management Programme. It includes the action plans for livelihood improvement, water conservation activities and volume of work to be converged under different schemes.

ACKNOWLEDGEMENT

I would like to be thankful of god who is almighty in world. Thereafter I am being grateful to my parents and teachers who are responsible for all of my success for ever.

Diction is not enough to express my sincere gratitude and indebtedness to chairman, GSWMA and principle secretary (Rural Development Dept) Ms. Rita Teotia IAS and Chief Executive Officer, GSWMA, Mr. Ram Kumar IFS Government of Gujarat for giving me an opportunity to work on this project.

I would like to take the opportunity to acknowledge wholeheartedly the special assistance extended to me by Dr. B.N. Hiremath, my local guide for this project work, my friends and entire staff of DA-IICT, Gandhinagar for their constant support and encouragement.

I take this opportunity to extend my heartiest thanks to Shri. N D Chaudhari (Project Director, DWDU Surat) and Shri A G Vasava (DFO, Forest Department Surat), my PIA (Project Implimenting Agency, IWMP XII) for his meticulous guidance, concrete suggestions and constant encouragement throughout the course of the project. Thereafter from the inner sanctum of my heart I am obliged to all the MDTs and WDTs of DWDU Surat for their co-ordination with me during the course of my project. The project work would not been success without pain taking efforts of Watershed Development Team recruited for IWMP XII. The support given by Shri D J Rajput, (Nodal Officer, IWMP XII) was really healped to understand the basics of totally unknown villages in forest area under North Part of Mandavi Range.

Suggestions and guidance given by Mr Binoy Menon (Professional Expert, GSWMA Gandhinagar) and Miss Prajakta Rathod (Technical Expert, DWDU Surat) was really unforgettable and crucial. Without the pain taking role of my friends Pawan Dixit and Pranav Patadiy, the documentary on "Preparation of DPR" would not been possible.

K D Baldaniya

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Chapter 1

PROJECT BACKGROUND

1.1 Introduction of Watershed

India has about 108 million hectares of rain-fed area which constitutes approximately 75 per cent of the total 143 million hectares of arable land of country. The rain fed agro ecosystem in India covers arid, semi arid and sub humid zones which occupies more than 70 per cent of the geographical area. Coarse cereals, pulses, oilseeds and cotton are the major cropping systems in our country. Animal Husbandry is second highest adopted occupation of rural people in India. Rain-fed farmers followed a low intensive sustainable farming system with excellent integration of crops-trees, pastures and livestock. In 70th the introduction of "Green revolution" (GR) Technology has started excessive use of hybrids and high yielding varieties particularly in Wheat, sorghum, pearl millet and oilseeds. In the beginning of this revolution there was peak growth in the production of the crops but in current scenario it has become stagnant. (Government of India, 2008, Watershed Guideline) This situation has further worsened down as the population of India is increasing by exponential rate. The concern for food security has increased the unit pressure of population over the cultivated land. The world is rapidly converting forest, wetlands and other critical habitats into agricultural land to meet the demand of food and fodder. The exploitation of nature is observed everywhere and to stop that exploitation is necessary for further generations.

The Government of India has given priority to the holistic and sustainable development of rain fed areas in India through integrated watershed development approach. "watershed is defined a geo-hydrological unit from which the runoff drains to a common point" it acts as a developmental activity of the watershed area. The main aim of the watershed approach is to conserve the rain water in different structures, drain them to a common point or at reservoirs, check the soil erosion and use the water in effective way for agriculture and allied activities. Micro planning of the watershed development is management of water in dry and semi arid regions is very necessary. (2002, John Kerr, Watershed Development in India)

1.2 History of Watershed in India

The watershed projects in India were planned for management of rain water and irrigation water by Famine Commission in 1880. Mr. VA Thampane started research on dry farming for the scarcity tracts of erstwhile Bombay state in 1923; Mr. NV Kanitkar continued that work from 1926. Later, financial support for project on dry land farming at five centers in the country was given by Imperial Council of Agricultural Research. That project included mainly soil and moisture conservation measures. Indian Council of Agricultural Research (ICAR) had established eight Soil Conservation Research centers and Demonstration and Training centers in 1954. The Drought Prone Area Programme (DPAP) was one of the area development programmes given by the Government of India in 1972-73. The Central Soil and Water Conservation, Research and Training Institute (CSWCRTI), was reconstituted in April 1974 to attend to soil and water conservation issues on arable and non-arable lands, evolve and

demonstrate conservation technology on watershed basis, and capacity building through training. In 1983, a programme for development of dry land agriculture on watershed basis was initiated and the work began in 47 model watersheds for soil and water conservation measures, crop management and alternate land use systems. After the severe drought experienced in 1987, the Government of India had initiated the National Watershed Development Project for Rain-fed Areas (NWDPR) in 1990-91 during the 8th Five Year Plan. The programmes evolved and the projects designed for using the watershed development approach were the Drought Prone Area Programme (DPAP), the Desert Development Programme (DDP), River Valley Project (RVP), National Watershed Development Project for Rain-fed Areas (NWDPR), and the Integrated Wasteland Development Programme (IWDP) (Government of India, 2008, Watershed Guideline)

1.3 Some Important Watershed Guidelines

Various guidelines have been formulated from time to time to involve village communities in the implementation of watershed projects. An expert level committee was appointed by Government of India under the chairmanship of Prof. C.H. Hanumantha Rao to evaluate the various area development programmes namely, Integrated Wastelands Development Programme (IWDP), Drought Prone Area Programme (DPAP) and Desert Development Programme (DDP). On recommendation of Hanumantha Rao committee report a guidelines for watershed development were adopted in 1995 (GoI 1994) and subsequently revised in 2001. Major important principles of the guidelines were to have an integrated approach for developing the resources of a watershed on a “mini watershed” of 500 ha principle. There should be a proper coordination among various line departments. This development project should be participatory involving the people and local Panchayati Raj Institutions (PRI). Later a new guidelines was formulated has haryali guidelines on April 2003 (DOLR 2003) by the Department of Land Resources, Ministry of Rural Development, Government of India, to further simplify procedures and involve the panchayati raj institutions (PRIs) more meaningfully in planning, implementation and management of economic development activities in rural areas. Dr. Manmohan Singh, Prime Minister of India, on 15th August 2005 declared formation of National Rain-fed Area Authority to emphasize importance of rain-fed agriculture to achieve food security and inclusive growth in India. The NRAA was established in 2007 and new common guidelines for watershed development were released by the Government of India (GoI 2008). Common Guidelines for Watershed Development Projects gave a unified perspective to all ministries. These guidelines are therefore applicable to all watershed development projects in all Departments / Ministries of Government of India concerned with Watershed Development Projects. These Guidelines broadly indicate a fresh framework for the next generation watershed programmes.

The key Features of this newly developed watershed approach was as under (GoI 2008)

1. Delegating Powers to all the States of India for financial and administrative management of the entire Watershed related programme and schemes.
2. Formation of agencies at state, district and taluka level for better planning, implementation and management of watershed programmes.

3. Financial Assistance to agencies at each stage.
4. Duration of the Programme was enhanced to 4 to 7 years depending upon nature of Activities spread over 3 distinct phases viz., preparatory phase, works phase and Consolidation phase.
5. Livelihood activities were introduced for promotion of Agriculture and allied activities.
6. A Cluster Approach with a broader area coverage of average size of 1,000 to 5,000 hectares of area comprising of clusters of micro-watersheds.
7. Scientific Planning with the use of like GIS and GPS technology in planning, monitoring and evaluation of the programme technology.
8. Capacity building programmes were involved with activities of watershed development
9. Multi Tier Approach on base of ridge to valley concept.

1.4 Project Implementing Agency

1.4.1 Introduction

Generally the selection of Project Implementing Agency (PIA) is done by GSWMA, State Level Nodal Agency (SLNA)) using appropriate measures. The main job of PIA is to successfully implementation of the project. These PIAs may include relevant line departments, other organization under state or central Government, reputed government institutes/ research bodies, intermediate panchayats, nongovernmental organizations. The PIA for Balethi Watershed Project is Forest Department, Surat.

1.4.2 Forest Department, Surat

Forest Department, Surat is a district level nodal agency and was established to conserve and develop forest area in Surat district and oversee the smooth implementation of watershed projects in the district. The District Development Officer (DDO) is the chairman of the Forest Department, Surat. The Forest Department, Surat has dedicated and experienced staff comprising one District Forest Officer and Range Forest Officers (RFO) at each range of Surat District. The Project Director at District Watershed Development (DWDU) Surat and staff with Technical Expert and Multidisciplinary Team is looking for concrete guidance and support for developmental work concern to watershed development.

1.4.2.1 Strength

- Dedicated and experienced staff and Range Forest Officers at each range of Surat district
- Independent district level nodal agency.
- Strong linkages with national and state level institutions, agricultural universities, NGOs, other developmental programmes etc
- Scientific planning in watershed projects with the help of Bhaskaracharya Institute of Space Application and Geo informatics (BISAG), Gandhinagar,

- District level monitoring, Watershed Development Team at taluka level, nodal officer at project area for successful implementation of programme, van samiti at each villages.

1.4.2.2 Weakness

- Project is under tribal area.
- Majority of villages of project is in forest area.
- Low income and fewer opportunities for employment

1.4.2.3 Opportunities

- As the project is under tribal area, there are so many other developmental projects and schemes are running so chances of horizontal integration and convergence with other schemes.
- Sufficient financial allotment under Integrated Watershed Management Programme
- Introduction of new technologies like remote sensing tools, satellite data, GIS, and GPS etc.

1.4.2.4 Threats

- Area is hilly and land is undulating so implementation of work is difficult and force of water is higher during rainy season
- Irregularities in fund flow can derail the smooth functioning
- Villagers are not ready to give their contribution in work which are suppose to be beneficiary to them
- Illiteracy in the project area is major problem

1.4.3 Programme / Projects

At present 12 IWMP projects have been sanctioned by Government of India for Surat district. The entry point activities of all thenine IWMP projects have been identified by the respective PIAs in the district. Surat forest division is PIA for two projects (IWMP XI, IWMP XII) and the DWDU Surat and social forestry division Surat is PIA for other ten projects. The Forest Department Surat is also involved in other schemes for development of forest.

1.4.4 District Watershed Development Unit Surat

District watershed development agency is the district level agency which is involved in implementation of projects under the guidance of GSWMA, Gandhinagar. The information about positive and negative sites and available assets are given below.

1.5 Objectives

The major objective of the study was to prepare a Detailed Micro Planning Report for proper implementation of the project with detailed and precise planning. The important part of the project was to collect the secondary data conducting various surveys from villages under project area. The primary data was collected from different stock holders and representatives of different institutions of villages. The data regarding natural gifts to villages and socio-economic status of the villagers was collected precisely. The formation of meaningful tables and analysis was done of these data systematically using computer and related software. This data is then converted into thematic map of the area which represents spatially.

1. To conduct baseline survey of current socio-economic conditions of the households in co-ordination with of WDTs (watershed development team) recruited by DWDU Surat for IWMP XII (Balethi Project)
2. To analyze the information collected during baseline survey using the BAS (Baseline Analysis Tool) software developed by Professionals of GSWMA.
3. To evolve sustainable land use and water management strategies for the watershed on base of analyzed data.
4. To identify various livelihood interventions and microenterprise alternatives this can be helpful to rural people for mitigating their livelihood and increase chances of employment.
5. To capture the attention of the stakeholders in Integrated watershed management Programme.
6. To Prepare a Detailed Micro-Planning Report for two villages of IWMP-XII (Balethi Project).
7. To Develop a Video Documentary on Planning and Preparation of DPR.

Chapter 2

METHODOLOGY AND PROCEDURE

Proper methods and procedures were used for collecting the primary and secondary data from different organizations, stakeholders, farmers, from farmers' fields, and village level people. The standard procedure was used for collection of the data and its analysis. The detailed stepwise procedure followed is as under.

2.1 Baseline Survey

The primary information of the villages and their natural resources, human resources, agro-socio-economic details, infrastructure was been collected at the village levels through baseline survey. Primary information at household level was collected adopting interview method with the help of a detailed pretested questionnaire with co-operation of villagers to enumerators. The entire household in the villages was been covered under this detailed door to door survey. The information about the leader of home, details of individuals, their land holding and animal husbandry ownership, cropping pattern and facilities to them were collected and analyzed.

2.2 Steps in Data Collection

As the data was the main source for the planning and selection of the activities it was collected systematically as per the standard procedure of GSWMA. Collections of primary and secondary data were carried out using well prepared questionnaires from villages. Different activities mentioned below were used for precise data collection.

2.2.1 Preliminary Watershed Meeting

A preliminary watershed meeting was organized in the village at the time of first time entry to the village. Villagers were motivated and given the introduction to the GSWMA and Watershed Development Team. The watershed management techniques were discussed in short with villagers in short for their awareness towards the programme. The people were requested to participate in the integrated way so that the implementation

2.2.2 Data Collection for Household Census Survey

The well prepared questionnaire local language was used for house hold survey. The local people from village were selected as enumerators. The guidance and training for data collection was given to enumerators by watershed development team. Timely supervision on enumerators was carried out at the time of census survey.

2.2.3 Bio- Physical Survey

Bio-physical survey involves the collection of information about land, water and soil with their chemical and physical properties. The five samples of soil from each village were collected and given for testing to soil testing laboratory. The maps prepared by BISAG showing survey numbers and drainage lines in villages were used for reference purpose. Different streams of small sizes draining from fields were visited and forms were filled from each survey number. Different physical structures like check dam, gabion, stone band, farm pond, farm bund, check wall, well repairing etc were chosen for watershed activities. The activities like land leveling, staggered contour trenches and same were selected for conservation of soil and water from erosion.

2.3 PRA Technique

Maps and diagrams are the main tool for planning an activity. In rural development, maps are used for planning, implementation, monitoring and evaluation of a project. The maps prepared during PRA shows the layout of the village infrastructure, status of households and their health, education, and other social and economic conditions. Participation of the villagers during preparation of maps is much important as that maps area useful for understanding the real situation that exists in village. Precisely prepared diagrams during PRA is the strong point of planning activity and plays crucial role in implementation of the scheme.

2.3.1 Village Social Mapping

Village social mapping shows the village infrastructure and the location of different institutions in village etc. With help of social mapping we can identify the activities for livelihood empowerment and micro enterprises establishments. The social status of the villagers with their tradition can be figured out easily using this technique. It helped for rapport building exercise in village and it also helped in planning the socio-economic household survey as it gives the details of the social distribution in the village viz., social stratification, and demographics

2.3.2 Resource Map

The Technique, Resource maps was used for figure out the visible and invisible physical features present in the village. It includes resources like Vegetation (forests, trees), land use (cultivated, waste, grazing land, forest land, irrigated land, uncultivable land, unirrigated land, land ownership pattern, land productivity and details of major crops grown. The information like topography, slopes, drainage lines, terrain etc were collected during resource map. These all the information was very important for selection of different water storage and water conservation structures

2.3.3 Transect Walk

After village Resource mapping and social mapping the activity of transect walk was carried out in presence of villagers for ground truthing. The information collected and discussed during survey and other techniques were cross checked in field during Transect Walk. The problems and possible solutions of villagers were discussed and Entry Point Activity was varified by visiting the actual place where EPA works were suggested by people. The cropping pattern of the farmers was visited on their farms and possible suggestions were given to them by agriculture expert of watershed development team.

2.3.4 FGD (Focused Group Discussion)

The Focused group discussion was carried out with man and women groups separately. The group of eight to twelve people was made for FGP. The villagers of Limdha said they have problem of drinking water in Patel faliya. When we asked to different groups of FGD they said about repairing of a well which was full of sweet water but damaged. The work of well repairing was taken as EPA.

Interests of villagers were asked for livelihood activities and for formation of Self Help Group. The interests of females were more than males for SHGs. Activities like creeper vegetable units, kitchen gardening etc were finalized for women and a rice mill unit for man was finalized.

2.3.5 Seasonal Diagram

Activity of seasonal diagrams has been used to explore about the activities of villagers during whole year. The different periods like heavy workload period, food and fodder security period, wage availability period, food and fodder scarcity period, migration period etc were identified. The people of Khatradevi migrate to city area for labor work and the people of limdha do fishing activities in winter and summer. After seasonal diagram we came to know that the month of June and July is work load period as they do sowing and tillage practice if rain comes.

2.3.6 Venn Diagram

We used Venn diagram to show the influence of people towards different village institutions. The importance of the government schemes and NGOs were asked to villagers and on base of their response circles were made on names of institutions. They made a big circle on the MGNREGA and TSP. they made a small circle on watershed development programmes as it was just starting of the project. They had given importance to the sarpanch, scholl teacher, anganvadi worker etc.

2.3.7. Matrix Ranking (Scoring Method)

We did matrix ranking for crops and their uses by local people. They given more preference to the crops like Mango, Paddy, Neem, Teak etc. the importance to mango crop was given highest

as south Gujarat is well known for alfanso variety of mango. The ranks to the plants by matrix ranking were used for choosing the activities of Horticulture plantation and afforestation.

2.3.8 Consultation with Experts

After collection of data and analysis of it a detailed consultation was been carried out with various expert from different local NGO and department which included range forest officer (Mandavi north forest zone), agriculture officer, rural development professional of Mission Mangalam, field officer of GFDP (Gujarat Forest Development Programme), Van Samiti of Limdha and Khatradevi, Professionals of TSP etc. Their expert comments and suggestions were been utilized for preparation of watershed detailed action plan map.

2.4 Use of Technologies

The planning and development of the project is done using different techniques like Global Positioning System, Geographical Information System, satellite based images and data, information and communication technology, softwares for data entry and data analysis etc. these technologies were used for preparation of different maps for planning, and developmental works

2.4.1 Use of GIS and Remote Sensing Data

All the dataset related to watershed were been pulled up together by Bhaskaracharya Institute of Space Applications and Geo Informatics (BISAG) using Geographical information System (GIS). This helped to integrate these collective data into various spatial layers for better observation and analysis of the data. This can help in better decision making with precision and consistency. There are several maps were been used which are the basic need for planning of activities. These maps were developed by Bhaskaracharya Institute of Space Applications and Geo Informatics (BISAG) for official use for GSWMA. These maps were used by us during our study for planning and preparation of DPR

2.4.2 Baseline Map

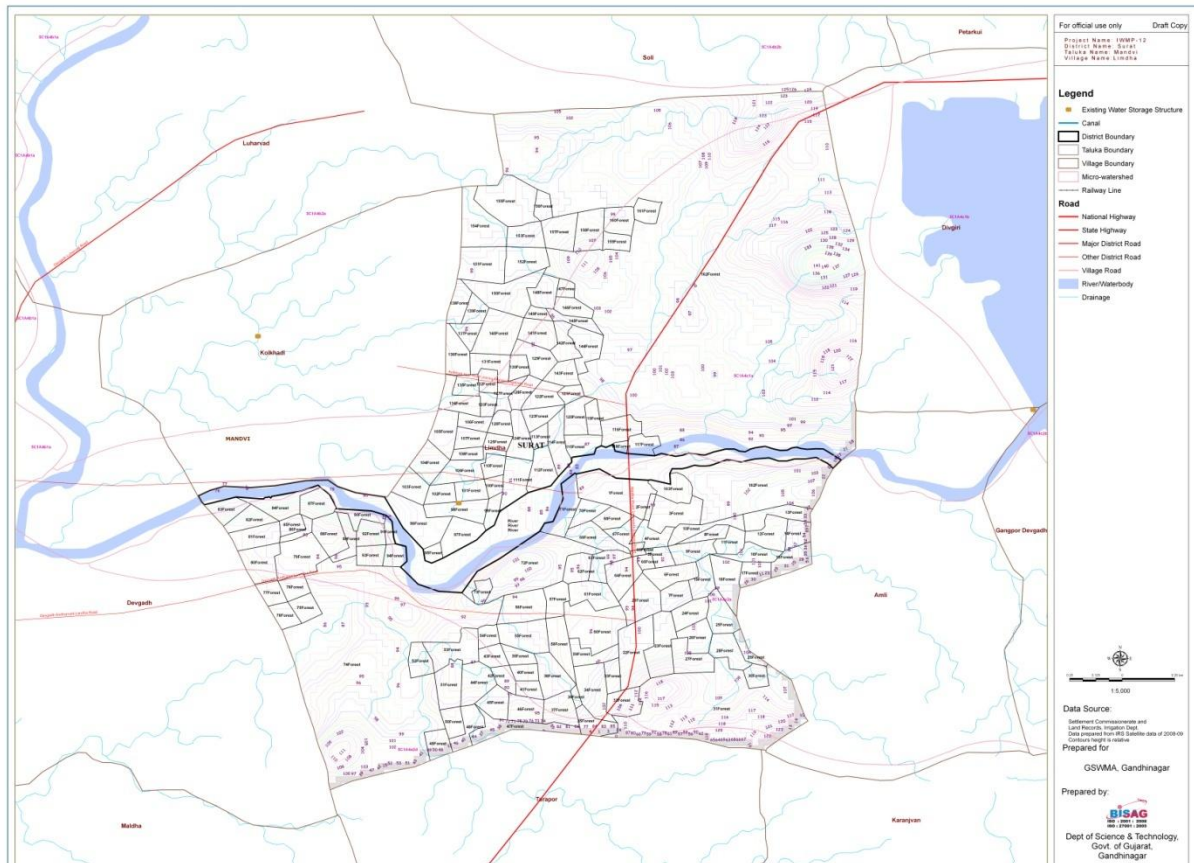
The Baseline maps are developed based on 1:4,000 or 1:8,000 scales cadastral with different ground data. It also has a detailed summary report containing the baseline information regarding the demographic profile of the village, its socio-economic status and land details.

2.4.3 Land Use and Land Cover Map

It is a combination of impacts of human and nature on land. The detailed land use maps are prepared using satellite images. The satellite images of different seasons were used to classify the land accordingly to agricultural land (on the basis of Kharif, Rabi and Fallow) and wasteland, residential land and water bodies. The land use / land cover mapping helps to know the status of cropping pattern of the waste lands, area, irrigated or unirrigated, fallow lands, forest etc. This

information helps to estimate the present utilization of land, help to estimate the water utilization and balance.

Figure: 2.1 Map Showing Available Natural Resources and Survey No of Farms



2.4.4 Drainage Map

The drainage pattern in village is showed in map and such maps are prepared using the satellite images of the area. This is being then overlaid over the cadastral map. These maps involve all types of streams, rivers, ponds and other water bodies which are identified from the satellite data.

2.4.5 Geology / Gydro-Geomorphology

The geology or hydro geomorphology maps are used for illustration of land surface structures, composition of soil particles. These types of maps are also used for identifying the rock components or lithology. The details of rock type, geomorphic units, fractures and lineaments etc can be identified from maps. Ground water prospects (good, moderate, poor) is helps in identification of suitable location for check dams, check walls, farm ponds, lacks wells etc

2.4.6 Slope / Contour Map

Generally the preparation of contour maps is done by BISAG using CARTOSAT 1 stereo pairs using GEOMATIC. The contour of a vertical interval of 1 meter has been formulated accordingly using Spatial Analyst extension of ARCGis9.2. The slope map can be reclassified from these contours by interpolating the distance.

2.4.7 Soil Maps

Soil Maps helps estimating the land under forest, land capability and irritability, eroded land etc. it is used for identifying the saline and alkaline soil. The structure of soil, texture, soil PH, soil erosion and its intensity, fertility of soil can also be classified using such maps.

2.4.8 Watershed Modeling

The model helped in indentifying the location of various water conservation structures and its catchment area specifically. Software was being utilized for orthorectification of the satellite image and then formulating a digital elevation model which was used for systematically drawing a stream network from it. This was later used to drawing catchment and the drainage point for proposing the exact sites.

2.5 Information, Education and Communication Activities

For the encouragement to project by villagers different activities for Information, Education and Communication were carried out by Watershed Development Team. Information about the programme and its working pattern is described to villagers for promotion of the project. Rural people are taught the lesson of watershed and its need in this era. The efforts for awareness regarding water, its use, storage of rain water, conservation of the soil and vegetation from erosion are done for effective and systematic use of water. Seminars, meetings and awareness programmes, Bhavai and Drama, Video shows etc are arranged in project area.

Pamphlets, Banners, folders, leaflets regarding modern agriculture techniques are distributed to the beneficiaries of the project. The guidance from Krishi Vigyan Kendra, Agriculture Technology Information Centre, Agriculture University, Sardar smriti Kendra, NGOs and other institutions is taken for precise information. Boards at entry point of the villages under project area are fixed containing information of project, village, fund and area proposed to treat. The wall slogans in each village regarding the water conservation and its benefits are painted for promotion of the programme.

The training to the Watershed Development team was given from reputed organization regarding watershed development and its rules, agriculture intervention, ideal livelihood improvement practices and community mobilization. The beneficiaries of the projects are given training as per the units of benefits given to them. If vermicompost unit is given to a person, training for vermicompost development is given to him.

For technical guidance different manuals like technical manual, capacity building manual, human resource manual, livelihood manual, and operational guideline are used. The implementation of the whole programme is carried out following the rules and regulations as per these manuals and guideline

2.6 Entry Point Activities

Out of total fund of the project, four per cent of the fund is used as entry point activity. Generally the works which are needed immediately to carry out in villages is given the priority. During the gram meeting, transect walk and focused group discussion the EPA is discussed with villagers. The priority is given to the works for drinking water facility to the village. Guidance of village watershed committee, van samiti, sarpanch, local leaders, and villagers are taken while selection of the EPA. The purpose of the EPA is to earn the trust of villagers on project and make people participate in watershed development activities with co-operation of Watershed Development Team and villagers.

The activities like social developmental activities, drinking water supply, natural energy utilization, plantation in forest land, farm pond development and other water conservation structures, livestock development works, agriculture demonstration plots, development of pasture land, etc can be taken under entry point activity as per the need of rural people in participatory way.

The estimates for EPA and cost of that activity are prepared by WDT Civil and WDT Agriculture. List of expected beneficiaries of particular entry point activity are prepared and cost benefit ratio is calculated to know about the effect after EPA implementation. The changes after EPA are also figured out for learning and pre planning of it for other villages.

2.7 Participatory Net Planning

Information was collected from project villages by village survey, house hold survey and bio physical survey. Data entry was done in software named baseline analysis tool with help of computer and that software generates different tables with meaningful information. That information was analyzed and used for planning of the project. Success of the project is dependent upon the information generated by BAS.

4.7.1 Watershed Development Works

On base of bio physical survey, construction of physical structures like check dam, check wall, stone bunding, gabion, well repairing, west weir, farm outlet, plantation, afforestation etc are selected for watershed development activities. Fund needed for planned activities were calculated and covered with 56 per cent of fund of total fund. If fund is less the convergence of fund is done with other schemes or developmental programmes. (NABARD. 2008, Net Planning)

Figure: 2.2 Marking of Different Works on GIS Based Map, Check Wall on Survey No 7, Gabion on Survey No 29.



Priority is given to the works which are not covered by other developmental programmes. The five year planning was done of the selected activities as per the Ridge to Valley Approach. Work with more importance and more benefits were planned to implement during first and second years of project. Other works were planned in next three years. Convergence from other departments was made mandatory and 283.02 crores of rupees were conversed from other departments in year of 2009-10.

2.7.2 Livelihood and Micro Enterprise Development Work

Under these activities works for Agriculture related activities, Animal Husbandary related activities, Forest development activities and development of peoples Traditional work based activities are selected. Fund of 215 crore in 2009-10, 180 crore in 2010-11 and 185 crore in 2011-12 were allotted for livelihood activities in Gujarat.

2.7.2.1 Agriculture Related Activities

The agriculture related activities are selected by such a way so that local people can earn and know about the modern agricultural techniques. Planning of such activities was done in such a manner so the land less people can be covered with land holders. The benefits to the small farmers, marginal farmers are given as per their land holdings and economic condition. The increase in productivity and minimum use of water in agriculture activities are kept in mind while selection of activities. For each activity detailed annual action planes are prepared and care for

forward and backward linkages are taken with market availability. The User Group was made of the beneficiaries.

2.7.2.2 Animal Husbandry Related Activities

Activities like animal health camp, measures for supply of fodder and care for their health are taken under these activities. At village watershed committee level, training is given to the para worker and development of livestock is carried out. Animal Health cam in Khatradevi and distribution chaff cutter units In Limdha and Khatradevi is selected for animal husbandry development. Milk collection vassal distribution is also planned for land less HH with occupation of animal husbandry.

2.7.2.3 Forest Related Activities

Forest developmental activities are generally taken as livelihood activities if the project villages are come in forest area. In case of Balethi Project (IWMP XII), majority of the villages are in forest land and selected villages Limdha and Khatradevi is pure forest area. Promotion of collection of sub forest products, its value addition, plantation of forest trees etc activities are mainly carried out for development of forest and people living in forest area.

Chapter 3 Findings

3.1 Project Area

Balethi (IWMP-XII) project is located in Mandvi Taluka, Surat district of Gujarat State. The project area covers ten micro watersheds and the codes of those watersheds are 5C1A4a1g, 5C1A4a1f, 5C1A4a1e, 5C1A4a1h, 5C1A4a1d, 5C1A4a3b, 5C1A4a3a, 5C1A4b1g, 5C1A4b1e, 5C1A4a1b. The total geographical area under project is 6351.5 hectors, out of which 3557.8 hectors of area is under forest and 2270.7 hectors of area is under land under agriculture use. 5127.57 hectors of area is suppose to be treated under Balethi Project (IWMP XII) in duration of four to seven years. (GSWMA Gujarat, DPR IWMP-III)

The nearest town (city) is Mandavi, which is Taluka place approximately 15 km away from the project area. Most of the villages are connected with pacca roads. There are 14 villages cluster of project but for my study two villages named Limdha and Khatradevi were selected for Survey, Data analysis and detailed micro planning of fund allotted for that both the villages. The major casts living in villages are Chaudhari and Vasava and 99 percent population is Schedule Tribe Population. The livelihood of villagers is depends upon Agriculture, Animal Husbandry and labor wages. As the project area is under forest, people depend upon the forest products for earning their livelihood.

3.2 Need of Watershed Development Programme

Watershed Development Programme is selected on the basis of 13 parameters namely poverty index, actual wages, small & marginal farmers, percentage of ST population, area under rain fed agriculture, , ground water status, drinking water situation in the area, productivity potentials of the land, cluster approach etc. The cumulative score is 88. The rains in this area are comparatively very good but due to geo-hydrological situation, the moisture index is comparatively low. Drinking problem during summer season is a big problem in some of the villages.

Table: 3.1 Criteria for Selection of Project Area

District	Name Of The Project	No. Of Micro-Watersheds Proposed To Be Covered	Proposed Project Area (Ha)	Type Of Project (Hilly/ Desert/ Others)	Proposed Cost (Rs. In Lakh)	Weightage Under The Criteria												
						i	ii	iii	iv	v	vi	vii	ix	x	xi	xii	Total	
Surat	Balet hi	10	5128	Others	615.3	5	10	5	5	3	-	15	5	10	10	10	10	88

3.3 Physical Dimensions

After analysis of the collected data, the physical dimensions of the project area were figured out. Different factors like topography, natural resources, rainfall properties, soil type etc in villages of project area is discussed below.

3.3.1 Land Use Pattern

The net geographical area of Balethi Project is about 6351.5, and the total geographical area of both the selected villages Limdha and Khatradevi is 779.3 which is totally covered by Forest Area. There is not any revenue land in these villages but local range forest department; Mandavi north has given forest land to farmers for cultivation. The area is dependent on rain, other sources of irrigation water in winter and summer is very less.

Table: 3.2 Land Use Patterns of Project Villages

Sr. No.	Name of watersheds	Names of villages	Geographical Area of the village	Forest Area	Land under agricultural use	Rainf ed area	Permane nt pastures
1	IWMP-12 Balethi Project in Mandvi Block	Balethi	839.8	334.1	470	458.0	27.5
2		Luharvad	559.3	309.0	202.3	152.3	26.2
3		Soli	418.5	114.0	192.6	155.6	56.2
4		Petarkui	475.1	469.2	5.8	5.8	17.2
5		Devgiri	193.9	0	42.3	32.3	162.1
6		Limdha	620.7	620.7	0.0	0.0	14.9
7		Kolkhadi	167.2	27.2	116.9	90.6	31.7
8		Isar	486.2	135.1	269.7	59.7	65.1
9		Devgadh	579.6	141.0	333.6	317.4	53.6
10		Junvan	247.5	85.7	206.0	190.0	46.3
11		Khatradevi	158.6	158.6	0.0	0.0	14.9
12		Jamkui	368.2	345.0	23.2	21.2	13.6
13		Bundha	450.8	450.8	0.0	0.0	14.7
14		Picharvan	786.1	367.4	408.3	405.3	15.5
		TOTAL	6351.5	3558	2270.7	1889	559.5

3.3.2 Soil and Topography

Balethi Watershed Project (IWMP XII) falls under South Gujarat Agro climatic zone. The soil is mainly deep black clayey soils. The reddish colour of soil is observed in hilly area of forest. The soil depth is moderate to deep about 25 to 75 cm. The predominant texture of soil is heavily dominated by clay particles. The order of soil is mainly Inceptisols, Vertisols, and Entisols. The topography of the area is moderate with 10 to 15 per cent slope and land is undulating.

3.3.3. Rainfall

The rainfall in the project area is Normal as it falls under south Gujarat heavy rainfall zone. The area is dependent on rain fall. The average rain fall of this area is about 1488 mm (from past five year data). This uneven distribution is leading to runoff of soil every year to the stream and rivulets. The data of rainfall fo last five years are given in table below.

Table: 3.3 Average Rainfalls in Last Five Years

Sr No	Project Name	Year	Rainfall (mm)	Average
1	IWMP XII, Balethi Project	2005	2002	1488.4
2		2006	1989	
3		2007	1271	
4		2008	1267	
5		2009	913	

3.3.4. Land and Agriculture

Project Villages have "Goradu" Soil, Which need more water for agriculture activities. The area is dependent on rain fall. After analyzing the results of soil health card me come to know that, the fertility of the soil is poor, low level of nitrogen and moderate level of phosphorus and potash is observed. There is a vast scope of organic farming in the area, need of proper IEC (information, education and Communication) activity between farmers for awareness of farmers regarding organic farming and other such practices.

Table: 3.4 Occupation Distributions of House Holds in Study Area

Occupational Distribution		
Village	Limdha	Khatradevi
Agriculture	66	5
Animal Husbandry	2	2
Agr+AH	31	36
Migration pattern (%)	11.48%	11.70%
Dependence on forest resources	136 (92%)	47 (76%)

Lack of surface water source and high salinity of ground water has limited the sufficient base for irrigation as well as for drinking purpose. The average land holding is about 2.98 hector in Limdha while 2.01 Hector in Khatradevi. Major crops taken in the area are Paddy and Pigeon Pea in kharif season, wheat and sugarcane in Rabi season and Summer Groundnut in during summer season. Generally crop growing for commercial is very small scale. Farmers' beleave in traditional methods of cultivation so problem of less production and lower market rates of produce is a big issue

Figure: 3.1 Agriculture Activities Chart

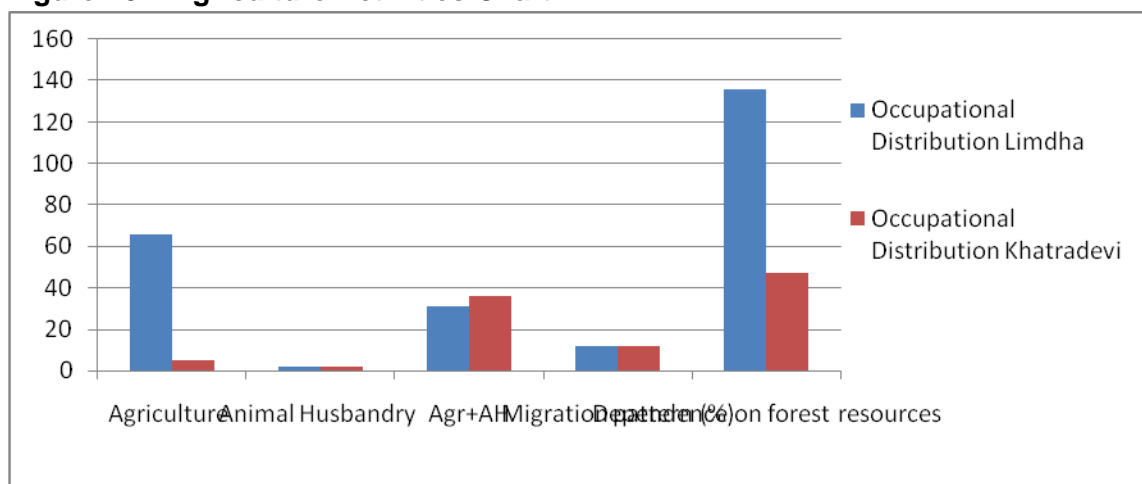


Table: 3.5 Cropping Pattern in Project Area

1	2	3	
Sr. No.	Name of the Crop	Current status	
		Area (ha)	Productivity (kg/ ha)
1	Kharif Season		
	Paddy	1026	850
	Pigeon pea (Tuver)	581	580
2	Rabi Season		
	Wheat	812	400
	Sugarcane	346	2000
3	Summer Season		
	Groundnut	278	560

3.3.5. Livestock

The population of project area is involved in occupation of Agriculture and Animal Husbandry both. Because wide of availability of fodder from forest and Gauchar land in villages, Animal Husbandry is observed very popular. Using data analysis of House Hold survey we came to know that, total 165 animals in Limdha and 213 Animals in Khatradevi is available which include cows, Buffalos, Bullock, Goat etc. some of the families are involved in small scaled poultry farming. The village Khatradevi has 62 House Holds and there are 213 animals. That Village is totally under forest land and hilly area so agricultural practices is difficult. Animal husbandry is observed as main occupation villagers of of Khatradevi.

Table: 3.6 Livestock Population in Study Villages

Sr. No	Particulars	Limdha		Khatradevi	
		Numbers	Percent	Numbers	Percent
1	Cow	53	32.12	101	47.42
2	Buffalo	60	36.36	64	30.05
3	Bullock	24	14.55	23	10.80
4	Goat	28	16.97	25	11.74
Total		165	100	32.12	100

3.4. Socio-Economic Dimension

Different factors responsible for Socio-Economic condition of the villagers were figured out using the information collected during surveys, PRA and meetings. The factors like demographic status, migration patterns in project villages, sources to meet livelihood and infrastructures available in villages are discussed below.

3.4.1 Demographic Status

There are total 148 households in Limdha out of them 19 HH is land less labor, 39 are small farmers, 49 are marginal farmers and 41 HHs are Big Farmers. The numbers of total BPL HH are 46 and 102 HHs are APL House Holds. The sex ratio in Limdha is 900 female per 1000 male.

There are total 62 households in Khatradevi village of Balethi Project. Out of total HH 22 are LL, 13 HH are Small Farmers, 17 HH are marginal farmers, 8 HH are Big Farmers and 2 HH are occupied in other artisan kind of occupation. The 40 HH are APL and 22 HH are under BPL category in Khatradevi village. The sex ratio in Khatradevi is 930 female per 1000 male.

3.4.2. Migration Pattern

The area is undeveloped and backward so modern agricultural techniques are not available there. Generally people used to migrate after mid winter and during summer season. As collected data during baseline survey, generally male members of village go for migration in Surat city or somewhere els for labor work. The diamond work and textile work is the main centre of their migration.

3.4.3. Infrastructure Facilities

Both the villages Limdha and Khatradevi is connected with pacca road which join Mandavi to Umarpada. The facility of bus station, anganwadi, primary school, community hall, Small Dairy, Panchayat Office etc were observed. The facility of health centre and big hospital, Bank, High school, collage, Post office etc is available at Mandavi which is 20 km away.

3.4.4. Livelihood Pattern

The villagers earn their livelihood from agriculture and animal husbandry. Some of them migrate during off season for labor work. Some of the families are making the value added products like bamboo arts and other such products from forest trees.

There is a big dame named Aamli dam near village Limdha. The fishing activity is the sub occupation of some of the families of Limdha. Fisheries department is helping to rural people by providing them fishing net and other necessary tools for fishing.

Chapter 4

CONCLUSION

Whole the period of study for preparation of Detailed Micro Planning, it was sure that the implementation of the programme using the knowledge of agriculture, technology and social sciences with combination of watershed development with livelihood improvement will result in paradigm shift. The village people had shown their maximum support to watershed development team for planning of watershed activities in their villages. The new watershed approach with scientific and participatory approach is tool to strengthen the villagers rather than their earlier socio-economic condition.

During the Net planning exercise, I observed that the farmers are really involving their selves for finalizing the activities and beneficiaries. The decision making ability of the villagers are appreciable. Villagers had supported to us while conducting different surveys in their villages and provided the information about their local culture and tradition. The satellite images and maps prepared from it were used for cross checking with information from Participatory Rural Appraisal. People were not aware of PRA although they had participated in it and provided the precise and exact information in each activity of PRA.

When we discussed about Self Help Groups, livelihood activities, micro enterprise development etc, women leader had supported us by gathering the women of villages and make them all aware about it. They said this concept might help them for their community building and strengthen their skill, business potential, decision making etc. the interest of women in agricultural activities like vermicompost, creeper vegetable growing, horticultural plantation was tremendous. (NABARD, Hand Book of forming SHGs)

Information about earlier projects and schemes in project villages were collected from the Gram Panchayat and Talati-cum mantri of each village. This information was useful for selecting the activities which are not taken in earlier projects and programmes.

The farming interventions like bio farming technique was used for combine use of ground water and optimizing the use of available surface water with suitable cropping pattern. The watershed intervention was used for conserving and storing the ground water, to stop the soil and water erosion, control the loss to forest because of erosion. Water drained at common point was planned to use for different agriculture related activities for its systematic use.

The concept of formation of different community institutes like village watershed committee, User Groups, and SHG will provide financial support to villagers even after completion of the project. Convergence of fund from the planned activities from different schemes is really strength of project as it minimizes the limitation of the project by providing extra funds.

Common Guideline 2008 for Integrated Watershed Management Programme have envisaged a new holistic for management of Natural Resources. Blending of scientific procedure and

traditional knowledge of villagers for preparation of detailed micro planning is really a holistic approach.

ACRONYMS

BRGF	Backward Regions Grant Fund
CEO	Chief Executive Officer
DDP	Desert Development Programme
DoLR	Department of Land Resources
DPR	Detailed Project Report
DRDA	District Rural Development Agency
DWDU	District Watershed Development Unit
GIS	Geographical Information System
GP	Gram Panchayat
GPS	Global Positioning System
GS	Gram Sabha
IEC	Information, Education and Communication
IWDP	Integrated Wastelands Development Programme
MoRD	Ministry of Rural Development
NABARD	National Bank for Agriculture & Rural Development
NGO	Non-Governmental Organization
NIRD	National Institute of Rural Development
NRAA	National Rainfed Area Authority
NREGA	National Rural Employment Guarantee Act
NREGS	National Rural Employment Guarantee Scheme
NWDPRA	National Watershed Development Project for Rainfed Areas
PIAs	Project Implementing Agencies
PRA	Participatory Rural Appraisal
SGRY	Sampoorna Grameen Rojgar Yojana
SHGs	Self Help Groups
SGSY	Swarnjayanti Gram Swarozgar Yojan
SOR	Standard Schedule of Rates
ST	Scheduled Tribe
SLNA	State Level Nodal Agency
UGs	User Groups
UGs	User Groups
WC	Watershed Committee
WCs	Watershed Committees
WDF	Watershed Development Fund
WDT	Watershed Development Team

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