Study Report on
Watershed Development
December 2001

C O N T E N T S

ABBREVIATIONS

AP	Andhra Pradesh
APFP	Andhra Pradesh Forestry Project
APHMP	Andhra Pradesh Hazard Mitigation and Emergency Cyclone Recovery Project
APPTDP	Andhra Pradesh Participatory Tribal Development Project
APSRAC	Andhra Pradesh State Remote Sensing Application Centre
BC	Backward Community
CCT	Continuous Contour Trench
CD	Check Dam
DANIDA	Danish International Development Assistance
DDP	Desert Development Programme
DFID	Department for International Development (UK)
DLDB	Dry Land Development Board
DOA	Department of Agriculture
DPAP	Drought Prone Area Programme
DRD	Department of Rural Development
DRDA	District Rural Development Agency
DWSDA	District Watershed Development Authority
DWSDP	District Watershed Development Programme
EAS	Employment Assurance Scheme
FD	Forest Department
GOAP	Government of Andhra Pradesh
GOI	Government of India
GOK	Government of Karnataka
IFAD	International Fund for Agricultural Development
ISPWD	Indo Swiss Participatory Watershed Programme
IWDB	Integrated Wasteland Development Board
JFM	Joint Forest Management
KA	Karnataka
KFW	Kreditanstalt fur Wiederaufbau
NABARD	National Bank for Agricultural and Rural Development
NGO	Non-Governmental Organization

ABBREVIATIONS (Contd..)

NRSA	National Remote Sensing Agency
NTFP	Non Timber Forest Produce
NWDPRA	National Watershed Development Programme in Rainfed Areas
OFD	On Farm Development
PIA	Project Implementing Agency
RD&PR	Rural Development and Panchayat Raj
RDT	Rural Development Trust
RFD	Rock Filled Dam
RIDF	Rural Infrastructure Development Fund
RRS	Random Rubble Stone
SC	Scheduled Caste
SDC	Swiss Development Cooperation
SHG	Self Help Group
ST	Scheduled Tribe
SWC	Soil and Water Conservation
UG	User's Group
VSS	Vana Samrakshana Samithi
WA	Watershed Association
WC	Watershed Committee
WDF	Watershed Development Fund
WDT	Watershed Development Team
WGDP	Western Ghats Development Programme
WSD	Watershed Development
WSDP	Watershed Development Programmes
YVK	Yuvaka Kendra

1.0 BACKGROUND AND RELEVANCE OF THE STUDY

Background

1.01 India is one of the major agricultural countries with more than 70% of the population depending on it. Indian agriculture is dependent on monsoon which is not uniform over the years. Nearly three fourths of the cultivable land in India is dependent on monsoon, which is contributing nearly 42% of the total production from agriculture. The productivity of any crop mainly depends on two natural resources - land and water in addition to management practices. Therefore the conservation of these two natural resources is essential for the sustainability of rainfed agriculture. This could be done using the watershed methods. The concept of watershed for development is gaining importance over the years.

1.02 Watershed Development projects have been taken up under different programmes launched by the Government of India. The Drought Prone Area Programme (DPAP) and the Desert Development programme (DDP) adopted the watershed approach in 1987. The Integrated Wasteland Development Projects scheme (IWDP) taken up by the National Wasteland Development Board in 1989 also aimed at developing wastelands on a watershed basis. This programme has now been brought under the administrative jurisdiction of the Department of Wastelands Development in the Ministry of Rural development. The fourth major programme based on watershed concept is the National Watershed Development Programme in Rainfed Areas (NWDPRA) under the Ministry of Agriculture.

1.03 So far, these programmes have laid down their own separate guidelines, norms, funding pattern and technical components based on their respective and specific aims. While the DDP focussed on reforestation to arrest the growth of hot and cold deserts, DPAP concentrated on non arable lands and drainage lines for in-situ soil and moisture conservation, agro forestry, pasture development, horticulture and alternate land uses. The IWDP on the other hand, made silvipasture, soil and moisture conservation on waste lands under government and community or private control as their predominant activity. The NWDPRA combines the features of all these three programmes with the additional dimension of improving arable lands through better crop management technologies. In addition, watershed programmes have been under implementation through external funding agencies such as the World Bank, SDC, DANIDA, DFIDI and the KFW.

1.04 While the focus of these programmes may have differed, the common theme amongst these programmes has been their basic objective of land and water resource management for sustainable production. The Technical Committee constituted by the Ministry of Rural Development under the chairmanship of Prof. C.H.Hanumantha Rao studied the implementation and impact of the DDP, DPAP and also the IWDP programmes all over the country and recommended that a

common set of operational guidelines, objectives, strategies and expenditure norms for watershed development projects should be evolved integrating the features of the three programmes under the Ministry of Rural Development. These guidelines have been formulated keeping in view the important factors such as Technical Aspects, Human Factor, Funding Resources and Operational flexibility.

1.05 Watershed is an area of internal drainage above a common point of outlet. The size of the watershed is dependent on the topography of the area. It is bound on all sides by a divide or ridge line. The watersheds are classified in to mini watershed and micro watershed depending on the size. The basic components identified in the watershed development are the soil & water conservation, water resources development, agricultural productivity and most important being the people's participation in development of watershed.

1.06 The watershed programmes like the Desert Development Programme (DDP), Drought Prone Area Programme (DPAP) and the Integrated Wasteland Development Programme (IWDP) are implemented by the Zilla Panchayat through watershed associations. A Project Implementing Agency (PIA) which may be a Government Department or an NGO is assigned about 10 micro watersheds, each micro watershed covering about 500 hectares. The PIA forms a watershed development team that interacts with the watershed associations and provides technical assistance to the watershed association in the planning and implementation of the watershed programme. The residents of the area covered by the watersheds are also organised in to self help groups and user groups.

1.07 This approach which was initiated in 1995 was in marked contrast to the earlier approach wherein the watershed development programmes were implemented by the line departments without the involvement of the community. Soil erosion, deforestation and land degradation reduce the productivity of the soil and in turn effect the rainfall pattern. The ground water table also depletes leading to shortage of drinking water. These problems concern and affect the community and therefore involvement of the community in the planning and implementation of the watershed programme is very much essential for the success of the programme.

1.08 The concept of user's groups under the umbrella of Watershed Associations is gaining importance. These associations consists of community members who are directly or indirectly dependent upon the watershed area. These associations will implement and monitor all the activities being proposed under the programme. This include the formation of water user groups/self help groups and carrying out all the activities as mentioned in the by laws of the association. These associations ultimately have to maintain the assets created under the programme for long term sustainability. These associations are already in place in some of the watershed areas in both the states and are in different stages of progress in other places.

Relevance of the Study

1.09 Impact Evaluation Studies play a key role in the policy decisions. Information on the target groups for policy, alternative options available for intervention and impact of new policies, require impact evaluation. This area is gaining much importance in the recent days.

1.10 Recognising the need for a comparative evaluation of the socio-economic impact assessment of the watershed projects implemented by different funding agencies including that under the DPAP/ICDP, the Adviser, Planning Commission, on 14th November 2000, in his discussions with Mr.M.S.S.Varadan, Chairman, Kalpataru Research Foundation and Om Consultants (India) Pvt. Ltd., conveyed the need for such a comparative study to be initiated in Karnataka and a neighboring state. Since this concept is already popular in Andhra Pradesh state, the comparative study has been done in Karnataka and Andhra Pradesh states. In each state a sample of 2 - 3 watershed projects funded by different agencies and one watershed project under DPAP/ICDP which were sanctioned during 1995 - 96 were taken for the study. These covered a spectrum of programmes implemented both under the government and other funding agencies. The information from this study would be utilised for analysing changes in the social and economic levels as a result of implementation of the watershed programme.

1.11 A proposal was submitted to the Planning Commission on 27th November 2000 for consideration by the Planning Commission. A revised proposal was submitted on 15th January 2001 based on the observations made on the earlier proposal submitted to the Planning Commission. The draft report based on the field survey conducted during April - August 2001 was submitted to the Planning Commission on 30th September 2001. This Final Report is prepared based on the feedback and suggestions on the draft report.

Acknowledgements 

1.12 We are thankful to the Adviser, Planning Commission and the Deputy Adviser (SER) for the support extended for the timely completion of the study. We also thank the Director, Directorate of Watershed Department, Government of Karnataka and his personnel at the field level in Bijapur and Kolar districts, Secretary, Rural Development Department, Government of Andhra Pradesh and his personnel at the field level in Anantapur and Mahabubnagar districts for extending all help during the field study. We also thank the community in the sample watersheds visited in Karnataka and Andhra Pradesh for the wholehearted cooperation and support provided during the survey.

2.0 OBJECTIVE AND SCOPE

Objective

2.01 The objective of the assignment is to make a comparative assessment of socio economic impact of the watersheds funded by the government and other funding agencies in the states of Karnataka and Andhra Pradesh.

Hypotheses

2.02 The primary data collected has been analysed considering variables which are relevant for identifying the socio economic impact of the programme on improvement in productivity of crops, income and the role of the water user groups in the sustenance of the programme.

Scope of Work

2.03 The study area covered sample watersheds in the states of Karnataka and Andhra Pradesh. A sample of four watersheds in Karnataka and five in Andhra Pradesh has been covered for the present study. These sample watersheds have been implemented under different funding agency including under the DPAP/ICDP watershed programme. The sample watersheds were selected from the watersheds sanctioned during 1995 - 96.

3.0 APPROACH AND METHODOLOGY

Type and method

3.01 The study has been carried out based on primary data from sample households. Also, all the relevant available secondary data have been utilised.

3.02 The following phase-wise approach and methodology was adopted for the study in a systematic and organised manner.

Planning and Preparatory Phase

- Discussion were held with the concerned nodal agency in the State/District/Taluk.
- Detailed execution of Survey Planning was made in order to complete the study in a systematic manner.
- Selection of sample watersheds was done in consultation with the implementing agency at the field level
- Finalisation of survey tools (Household questionnaire, Watershed Profile)
- Training and Orientation to field staff

Data Collection Phase

- Available secondary data has been collected from different sources
- Primary data collection through sample household survey was done during April to August 2001
- Discussions were held with the beneficiary user groups and local level institutional members such as Panchayat members, officials etc. on the working of the programme.

Data Analysis Phase

- Computerisation of Sample Household data
- Collation and analyses of data collected from Sample Households
- Collation of available secondary data
- Summarization of information

Report Preparation Phase

- Finalisation of report and submission to Planning Commission

Major Variables for data collection, cross-classification and analyses :

- Information on the social status, literacy levels, landholding category, cropping pattern, livestock holding, income, expenditure, involvement in the watershed programme, functioning of the water user groups are some of the major variables on which the information has been collected through household survey.

- Classification of the respondents has been done by different socio- economic status

- Data analysis corresponds to analyses of the changes in the economic parameters over the period, correlating different variables and suitable tests of significance has been carried out.

STATISTICAL DESIGN

Selection of Sample Watersheds

3.03 Discussions were held with the officials at the district levels and sample watersheds were selected based on the available information on the extent of area, year of sanctioning (1995 - 96), progress of work and the funding agencies. Based on this four sample watersheds in Karnataka and five in Andhra Pradesh were selected. The following Table-3.1 gives the list of sample watershed selected for the study.

Table - 3.1 : List of Sample Watersheds selected for the Study

Sl. No.	State	District	Name of the Watershed	Funding Agency
1.	Karnataka	Bijapur	Shivanagi	EAS
2.	Karnataka	Bijapur	Jambagi	NWDPRA
3.	Karnataka	Bijapur	Tidagundi	ISPWD-K
4.	Karnataka	Kolar	Hosurhalla	DPAP
5.	Andhra Pradesh	Anantapur	Singampalli	DDP
6.	Andhra Pradesh	Anantapur	Bukkacharla	DDP
7.	Andhra Pradesh	Anantapur	Adadakulapalli	APHMP
8.	Andhra Pradesh	Mahabubnagar	Kodur	DPAP
9.	Andhra Pradesh	Mahabubnagar	Kishan Nagar	DPAP

Selection of Sample Households

3.04 A varying number of sample households, depending upon the number of habitations in the watershed and the size of the habitations, with a minimum of 50 households in each watershed were surveyed. Sample households were selected by stratifying the members based on the land holding size. Also, other households such as landless, artisan were surveyed.

3.05 The coverage of sample households in the sample watersheds is presented in the following Table - 3.2.

Table - 3.2 : Coverage of Sample Households

Sl. No.	Name of the Watershed	No. of Villages covered	No. of Sample Households Surveyed	
			Karnataka	Andhra Pradesh
1.	Shivanagi	1	50	-
2.	Jambagi	3	50	-
3.	Tidagundi	2	60	-
4.	Hosurhalla	3	60	-
5.	Singampalli	2	-	60
6.	Bukkacharla	1	-	50
7.	Adadakulapalli	1	-	40
8.	Kodur	1	-	50
9.	Kishan Nagar	1	-	40
Total		**15**	**220**	**240**

Data Collection

3.06 Data collection was carried out using a combination of the following approaches :

- Participatory Group Discussions were held with the members of the Watershed Associations / Community
- Primary data collection through household questionnaire administered to the sample households
- Data collection from secondary sources

Field Study Processes

3.07 Information was collected systematically by Research Assistants. They stayed in the villages during the data collection stage and this helped in understanding of the dynamics of the groups and the effectiveness in the management of the programme.

3.08 To ensure the quality of information collected, the following strategies was adopted by the senior professionals :

- ☛ They conducted informal discussions with the user groups to get special insights into the perceptions about Programme

- ☛ They periodically monitored the work of investigators.

4.0 WATERSHED DEVELOPMENT IN KARNATAKA AND ANDHRA PRADESH

KARNATAKA

4.01 The geographical area of the state is about 10.05 million hectares with a population of 550 lakhs (2001 census). The economy of the state is predominantly agrarian and rural in nature with little over 70 percent of its population depend on agriculture and allied activities for their livelihood. Out of 19.05 million hectares, the total cultivated area accounts for about 10.6 million hectares in the state. Again, out of 10.6 million hectares about 78 percent fall in the category of rainfed farming. The remaining 22 percent is cultivated through different sources of irrigation viz., canal (8.7%), tanks/ wells (10.1%) and others (3.2%). The ultimate irrigation potential is estimated to about 4.6 million hectares (little more than 40 percent of the total cultivated area), still 60 percent of the total cropped area will be under rainfed farming in the state. Five out of 10 agro-climatic zones are classified as drought-prone areas or dry zones, which are spread over 106 taluks in 14 Districts of the state. The departure from the average annual normal rainfall (i.e., 1200 mm) ranges between 450 mm and 3932 mm across the districts in the state. Therefore, the average crop yield in rainfed farming, normally will be low and varies depending on the fluctuation of rainfall.

4.02 After realizing the importance of watershed approach for rainfed farming, Government of Karnataka initiated Watershed Development Programmes (WSDPs). Since 1983/84 onwards the Dry Land and Development Boards (DLDB) was established by the Government of Karnataka to initiate WSDPs covering all the then 19 districts in the state, under the District Watershed Development Programmes (DWSDPs). This programme was the replication of the integrated development of Kabbalanala (Bangalore Rural District) Watershed Project implemented with the World Bank assistance. This programme provided interesting glimpses of the factors inhibiting the development of integrated approaches. This programme has the explicit objective of planning for conservation and optimal use of totality of land and water resources contained in the watershed from the ridge line to the valleys and covering both arable and non-arable land, to increase and for sustainable crop production. Later on, Government of India intended to replicate the experience of WSDPs elsewhere in the country and started National Watershed Development Programme (NWDP) and the National Watershed Development Programmes for Rainfed Areas (NWDPRA) during 7^{th} and 8^{th} plans respectively. The NWDPRA went a step ahead of DLDBs, WSDPs, in terms of designing and implementation of the programme not only with the help of line departments involvement, but also involved the departments like animal husbandry, fisheries, small scale industries besides participation of NGO's in the watershed area.

4.03 A large number of research studies have been carried out which were implemented upto the year 1993/94. These studies reveal that WSDPs for dry land agriculture has been beneficial to large number of farming community in the rural areas in terms of increasing income and employment opportunities. However, the studies have

shown, that the increase has neither been substantial or sustainable. Issues like, people's participation with WSDPs, their respective, status of assets and maintenance and the like were some of the important issues to be examined to assess the sustainability and impact of WSDPs which are essential.

MAIN WATERSHED DEVELOPMENT PROGRAMMES IN KARNATAKA

4.04 The Watershed Programmes in Karnataka are being implemented under different schemes such as the Centrally Sponsored Schemes (CSS), State Sector Scheme, Externally Aided schemes, District Sector WSD Schemes, NABARD Project and the NDDB Project. These are described in the following paragraphs.

DISTRICT SECTOR WSD SCHEMES

Drought Prone Areas Programme (DPAP) : This programme is implemented in 81 blocks of 15 Revenue districts. 423 watersheds have been taken up for development under this programme. The allocation for the programme is shared in the ration of 75:25 between the State and Centre. Rs.17.48 crores was spent on watershed development works under DPAP during 1998-99. An expenditure of Rs.253.10 crores has been incurred upto March 1999 since the inception of the programme. The percentage of the expenditure to the allocation has been 77% in 1998-99 as against 72% in 1997-98. The details of the Financial progress during the last five years is given below (Table - 4.1).

Table - 4.1 : Yearwise Financial (Rs. in Crores) Progress under DPAP

Year	Target	Achievements
1994-95	20.94	17.19
1995-96	22.65	13.37
1996-97	22.65	11.26
1997-98	22.65	16.30
1998-99	22.65	17.48

Desert Development Programme (DDP) : The DDP is implemented in 22 blocks of 6 districts. The allocation is shared in the ratio of 75:25 between the Centre and the State. 130 watershed have been taken up for development under this programme. In addition, 100 new watershed have been sanctioned by the GOI during the year 1998-99 and a sum of Rs.467.25 lakhs has been released (Central share 350.44 lakhs; State share Rs.116.81 lakhs). An expenditure of Rs.7.11 crores has been incurred during the year 1998-99. The percentage of expenditure to the allocation is 97% (excluding the allocation for 100 new watersheds) during 1998-99 as against 85% during 1997-98 on the development of

ongoing watersheds. The details of financial target and achievement for the last four years is given in Table - 4.2 below.

Table - 4.2 : Yearwise Financial (Rs. in Crores) Progress under DDP

Year	Target	Achievements
1995-96	7.32	2.35
1996-97	7.32	4.51
1997-98	7.32	6.25
1998-99	12.95	7.11

Western Ghats Development Programme : This programme is being implemented in 40 taluks of 11 districts in the State. The main objective of this programme is the development of the Western Ghats region in harmony with the environment and conservation of its fragile eco-system. Till 1998-99, this programme has not been implemented on Watershed basis. Lack of such an approach affected balanced and coordinated development of this region. This necessitated the use of watershed approach for development. Now, this programme is being implemented on an Integrated Watershed approach to improve the management of land and water involving various departments like agriculture, horticulture, fisheries, minor irrigation, etc. The monitoring and supervision of this programme is done by the Zilla Panchayats.

Integrated Wasteland Development Programme : This programme is in operation since 1989-90. It aims at checking land degradation, putting wastelands to sustainable use and increasing the biomass availability, specially fuel, wood and fodder. It also aims at rural employment besides enhancing people's participation in Wasteland Development Programmes at all stages. Under the earlier guidelines, two projects in Tumkur and one project in Mandya districts are completed. Four projects, one each in Bellary, Mandya, Chitradurga and Gulbarga districts were sanctioned during 1997-98. Two new projects, one each in Gulbarga and Belgaum districts were sanctioned during 1999-2000. Under this programme 12000 to 15000 hectares are taken up for development in the selected project areas at an average cost of Rs.5 crores.

EXTERNALLY AIDED SCHEMES

4.05 The watershed programmes with the external funding are in different stages of implementation. The different funding agencies are the Danida, DFIDI and the World Bank. The Danida programme has started in 1997-98 with a total project cost of Rs.21 crores, while the DFIDI programme started in 1998-99 with a total project cost of Rs.83.85 crores. The World Bank assisted watershed programme in Karnataka is yet to start the implementation as this has been approved very recently. The total project cost under this programme is Rs.700 crores. The SDC assistance, which

successfully completed the Phase - I of the programme is in the preliminary stages of Phase - II.

STATE SECTOR SCHEME

4.06 The Government of Karnataka has created a Directorate of Watershed Development Programmes at the state level to bring all watershed programmes under one umbrella. This department is headed by a Director and supported with Additional Directors in the field of Agriculture, Forestry and Animal husbandry. There are District Watershed Development Offices at the district level to implement all Watershed Programme with the assistance of different technical staff. The salaries and other allowances of the staff are met under this scheme. The district sector schemes comes under the administrative control of RD&PR Department. Watershed Development Department is also implementing these schemes under the supervision of Zilla Panchayats.

CENTRALLY SPONSORED SCHEMES (CSS)

4.07 The two CSS are the NWDPRA and the River Valley Project (RVP). The NWDPRA project is in operation since 1991 - 92. So far 9,09,996 hectares of land are treated at a cost of Rs. 19.89 crores. During 2001 - 02, it is programmed to develop an area of 45,280 hectares in 141 watersheds in 26 districts with an outlay of Rs. 21 crores. The RVP scheme was initiated during the Third Five Year Plan to preserve the wealth of surface land, natural resources like soil and water siltation in the reservoirs in the catchments of Tungabhadra, Nijamsagar and Nagarjunasagar. The Tungabhadra catchment 3.232 lakh hectare have been treated since inception of the RVP. The districts of Bellary, Haveri, Chitradurga, Koppal and Davanagere are included in the Thungabhadra Catchment of RVP.

NABARD WATERSHED DEVELOPMENT PROJECT

4.08 The Union Budget for 1999 - 2000 announced the creation of Watershed Development Fund in NABARD. The objective of this fund is to spread message of participatory watershed development and to replicate and consolidate the isolated successful initiatives under different programmes in the government, semi government and NGO sectors. Watershed community, Central and State Government departments, banks, agricultural research institutions, NGOs and NABARD will act in concert to make a breakthrough in participatory watershed development. The present status under this project is that Government of Karnataka has signed an MOU with NABARD for Rs. 10 crore loan. The GoK has cleared 10 districts for implementation of WDF. Further list of 7 districts have been identified and awaiting approval.

NDDB PROJECT

4.09 The GoK has signed a MOU for Rs. 20 crores with NDDB, Anand, Gujarat for implementation of Papagani Watershed project in Kolar district. This project covers 11 sub watershed in 220 villages and is being implemented by the national Tree Growers Cooperative Federation in collaboration with Gram Panchayats of respective taluks at the Watershed level. At the state level, the watershed department will have overall implementation and supervision of the project.

ANDHRA PRADESH

4.10 With a total geographical area of 274,400 km^2, Andhra Pradesh (AP) is the fifth largest state of India. The State consists of 23 districts comprising 1,104 revenue mandals. The economy of Andhra Pradesh is predominantly agriculture oriented. According to the latest population census of 2001, the population of the State is 75.7 million. The population density being 275 persons per km^2. Almost 75% of the population live in rural areas with 70% depending on agriculture as the main source of living. The importance of the agricultural sector is further underlined by the fact that almost 70% of the state's work force is engaged in agriculture and allied activities. Due to the high population growth rate, the share of agricultural labourers shows an increasing trend, indicating that increasing man-land-ratio lead to severe problems of productively absorbing the growing rural population in the agricultural sector. Andhra Pradesh has one of the highest shares of agricultural labourers in the total work force of all Indian States. Landless families constitute up to 60% of total households in certain Districts of the State.

4.11 Though productivity has increased in the last 25 years, the standard of living has not improved. About 54.2 percent of the land holdings are classified as marginal. The 1991 population census results indicated that Schedules Castes (SC) and Schedules Tribes (ST) accounted for 15.9% and 6.3% of the total population. Recent demographic interpolations estimate that 18% and 4% of AP's population belong to SCs and STs. According to latest estimates, almost one quarter of the total population of AP lives below the poverty line. Poverty - with more than 50% - is more pronounced among SC (Mala, Madiga and others) and ST (Bhils, Gonds, Chenchu, Lambani).

Main Watershed Development Programmes in Andhra Pradesh

Drought Prone Area Programme (DPAP)

4.12 This is centrally sponsored scheme funded by Central and State Government on 50:50 basis aiming at developing the drought prone areas with an objective of drought proofing by taking up of soil and land moisture conservation, water harvesting structures, afforestation and horticulture programmes on a comprehensive micro watershed basis. During 1994-95, the programme was implemented in 69 blocks of 8 Districts. From 1995-96 this programme is extended further in 11 Districts with 94 blocks under the scheme and in Ananthapur district 16 blocks under Desert Development Programme (DDP). The financial and physical achievements under the scheme are given in Table - 4.3 and Table - 4.4.

Table - 4.3 : Progress under DPAP

Item	1996-97	1997-98	2000-01
Allocation (Rs. in mill.)	523,926	465,475	-
Expenditure (Rs. in mill)	431,274	103,090	-
Target (No. of watersheds)	908	908	-
Achievement	587	908	1608

Source : Commissioner of Rural Development, Government of Andhra Pradesh, Hyderabad

Table - 4.4 : Progress under DDP

Item	1996-97	1997-98	2000-01
Allocation (Rs. in mill.)	89,800	59,625	-
Expenditure (Rs. in mill)	59,198	33,262	-
Target (No. of watersheds)	106	106	-
Achievement	96	106	106

Source : Commissioner of Rural Development, Government of Andhra Pradesh, Hyderabad

4.13 Only watersheds of highest priority are treated under the programme. Remote sensing technology of NRSA/APSRAC is utilized for identification and prioritization of watersheds in the DPAP Districts. DPAP has to be seen as a 'successor' project to various attempts and concepts of area development dating back as far as 1971. The concept of developing rainfed areas on a watershed basis was only adopted in 1987 and has since undergone substantial technical reviews, especially with the introduction of the new guidelines and the participatory approach to WSD in 1995. Prior to the implementation of these new guidelines, a total area of 419,000 ha. had been treated under DPAP projects all over the State.

4.14 While DPAP is targeted towards the semi-arid and dry sub-humid areas, DDP designed specifically for improved natural resources management and environmental protection measures in the arid areas of AP State. Besides this delineation of geographical target areas, there are virtually no differences between DPAP and DDP as regard operational guidelines, eligibility of erosion control and SWC measures etc., except that under DDP the cost norms are higher (Rs.4500 to 5000 per ha.) than for DPAP projects (Rs.4000 per ha.).

4.15 As of December 1998, of the total number of 23 districts, 12 were eligible for DPAP and DDP support. The main criterion for inclusion into DPAP is the share of irrigated land at the block level, the current ceiling being 20%. The total number of blocks covered under DPAP is 94, while 16 blocks have been identified for DDP. These 110 blocks represent one third of the total number of 330 blocks in AP state.

Employment Assurance Schemes

4.16 The Employment Assurance Schemes (EAS) rank second in terms of number of watershed and area coverage. There are 2 distinct types of EAS : the 'ordinary' EAS scheme with 40% of overall budget allocation for WSD activities (EAS 40%), and the EAS 50%, which means that under these schemes 50% of the overall budget allocation for employment assurance in public works programmes is reserved for WSD activities. It has to be added that increasing the spending on WSD activities to 50% of overall EAS cost is only possible in projects, which also qualify for DPAP. Both EAS schemes are centrally funded. As of 2000-01, there were 1,280 and 1,040 watersheds under EAS 50% and EAS 40%, respectively, with a total area of almost 1.14 million ha. (652,500 ha. for EAS 50%, and 490,000 ha. for EAS 40%).

Integrated Wasteland Development Programme (IWDP)

4.17 The Integrated Wasteland Development Programme (IWDP) has a more limited geographical distribution in AP State. At present, IWDP cover 20 projects in 6 districts with a total number of 204 watersheds and a total area of 102,712 ha. IWDP has been taken up in 1989 by the National Wasteland Development Board with national funding. Prior to 1995, when the new participatory approach was launched under the new guidelines and IWDP was harmonized with other ongoing DRD programmes, only 56000 ha. had been treated in AP State under IWDP. There is general consensus, that in its early phases, IWDP has performed rather poorly due to the fact that programme measures had been implemented in an isolated manner on wastelands only, without due regard to comprehensive treatments on a watershed basis following a ridge-to-valley approach.

4.18 Projects are undertaken on a 100 percent grant basis received from Wasteland Development Board of Government of India. Table - 4.5 shows allocations, actual expenditure, targets and achievements for the last years.

Table - 4.5 : Expenditure and Targets under IWDP

Item	1996-97	1997-98	2000-01
Allocation (Rs. in mill.)	138,575	93,937	-
Expenditure (Rs. in mill)	118,149	32,155	-
Target (in Hectares)	32,935	37,193	-
Achievement (.do.)	23,187	5,336	102712

Source : Commissioner of Rural Development, Government of Andhra Pradesh, Hyderabad

Andhra Pradesh Hazard Mitigation and Emergency Cyclone Recovery Project (APHMP)

4.19 In July 1997, additional funds have been made available for WSD activities by the World Bank in the frame of the Andhra Pradesh Hazard Mitigation and Emergency Cyclone Recovery Project (APHMP). The APHMP, which can however not be regarded as a single - standing WSD project - is also implemented by DRD. As the project title implies, the APHMP primarily aims at restoring public infrastructure lost due to cyclone hazard and to assist GoAP in preparing and implementing a long term cyclone and flood management system with enhanced community involvement. It also has, however, a rural development component which consists of implementing WSD activities in a total of 100 watersheds (among others, by the construction of 200 checkdams and 100 percolation tanks, afforestation and pasture development on 500 ha. as well as different other SWC measures). To date, 5 districts with 20 watersheds each have been chosen, with a total watershed area of 50000 ha.

Activities under the Department of Agriculture

4.20 Department of Agriculture (DoA) is implementing the National Watershed Development Project in Rainfed Areas (NWDPRA). This is a national programme funded from central resources of the Ministry of Agriculture. NWDPRA started with a pilot phase from 1984 to 1993 in 4 states. The main objectives of the pilot phase of NWDPRA were to develop and experiment with technologies and mechanisms for increasing agricultural production in rainfed areas through improved land and crop management, on-site moisture conservation and the production of fodder and fuel wood in non-cultivated areas. According to the provisions under the last Five Year Plan, NWDPRA is to be implemented by DoA in a total of 185 watersheds of AP State with a total area of 550,000 ha. and an estimated cost of almost Rs.1.83 billion.

4.21 As for previous phases, NWDPRA currently concentrates to a very large extent on SWC measures such as vegetative contour hedges, cut off vegetative filter stripes, introduction of contour cultivation, treatment of drainage lines mainly by construction of loose boulder structures and rock fill dams and nala bank stabilization. In addition, NWDPRA has a dryland horticulture as well as an agro-forestry component, including crop demonstrations and the promotion of organic manuring. Other activities of minor importance are in the areas of livestock development (mainly breed improvement through, improved natural services and promotion of fodder cultivation) and various income generating activities.

4.22 For the implementation of NWDPRA, specific operational guidelines have been elaborated and adopted in 1991, which have not been subject to any major revision since then. There are some substantial differences between the NWDPRA guidelines and the national watershed development guidelines issued by MoRD in 1995. The watersheds under NWDPRA extend from 2,500 to 5,000 ha. NWDPRA is more based on individual action of beneficiaries instead of collective, community based action for improved natural resources management. NWDPRA gives emphasis to extension and individual adoption of biological SWC measures.

Other Initiatives

4.23 Another important project in the wider area of WSD currently under implementation is the 'Andhra Pradesh Participatory Tribal Development Project' (APPTDP) supported by the International Fund for Agricultural Development (IFAD). There is considerable interaction with ongoing DRD programmes (and also with the APFP implemented by FD), since natural resource development and SWC activities are major elements of APPTDP, and planning as well as implementation have a strong emphasis on community and beneficiary participation using approaches similar to the national guidelines. Geographically, APPTDP covers 4 districts with a very high share of ST population which are at the same time also mainly forest areas. The total project cost is estimated at Rs.1.85 billion for a project durations of 6 years (1994/95 to 2000/01).

FORESTRY PROGRAMMES IN WATERSHED DEVELOPMENT

Joint Forest Management Projects

4.24 Following the guidelines of the Government of India and in compliance with the provisions of National Forest Policy, 1988, the Government of Andhra Pradesh has issued a number of Joint Forest Management orders for improvement of degraded forests through the participation of local people. The total legislative framework is very progressive, as AP is one of the few Indian states providing all benefits of the forests under JFM to the villages. The FD forms Forest Protection Committees - Vana Samrakshna Samities (VSS) in the villages adjacent to the concerned forests and establishes an agreement on protection and development of degraded forest areas. Although nominally all profits go to the VSS, the FD has assured that 50% of the net benefits have to be reinvested in forest development. This shall assure a sustainable budget for necessary silvicultural operations. But this condition also means that de facto only 50% of the benefits will be at the free distinction of the villagers. In addition to the timber, bamboo and NTFP revenues, the VSS are entitled to receive 50% of the net benefits of the Beedi leaf sales, a highly profitable means to generate income for the FD and the villages. The entitlement of Beedi leaf sales to villages lead to a new model in VSS funding, as the FD has transformed former APFP projects into self-sustaining JFM models, where the 50% share of the villages provides the funds for the management activities.

Forestry and Watershed Development Projects

4.25 330 blocks of AP have a provision of EAS funds, 94 are DPAP blocks, 16 blocks of Ananthapur are DDP blocks. All these blocks are further divided into 1,104 mandals. The Watershed activities in these mandals are carried out through funds available from NWDPRA, DPAP, IWDP, EAS etc. The Forest Department is taking up development of degraded forest areas under JFM in villages on fringe forest areas through funds channeled from DPAP.

Rural Infrastructure Development Funds (RIDF)

4.26 The AP State Government has proposed to utilize the Rural Infrastructure Development Fund V, a loan from National Government sources, to the tune of Rs.500 Millions during 1999-2000. The fund can be used to take up activities such as soil and water conservation, watershed development with involvement of local NGOs and Panchayati Raj Institutions.

4.27 NABARD has sanctioned 11 Joint Forest Management Projects for assisting 918 Vana Samrakshna Samities in 9 districts under RIDF-V. The details of the sanctioned projects are given in Table - 4.6 below. The Main components of these projects are :

- Assisted natural regeneration by cutting back of the coppice growths and removal of unwanted growth to allow the dormant root stock to regenerate and also allow the best coppice shoot to grow without any competition;
- **Soil and moisture conservation works for effective rain water harvesting to reduce the water run off;**
- Support activities to make available community assets for use by the community

- ♣ Training to the VSS members in alternate employment generation activities to improve their economic status.

Table - 4.6 : RIDF Projects Sanctioned by NABARD

District / Division	Project Cost (Rs. Millions)	No. of VSS
Medak - Dist.	70.6	104
Warangal - Dist.	60.8	95
East Godavari - Dist.	79.0	97
Mahabubnagar - Dn.	37.0	41
Narsipatnam - Dn.	83.5	179
Nizamabad - Dist.	36.0	48
Paderu - Dn.	32.8	65
Ranga Reddy - Dist.	37.7	37
Srikakulam - Dist.	42.5	95
Visakhapatnam - Dn.	45.1	95
Vizianagaram - Dist.	37.2	62
Total	**562.1**	**918**

APFD has submitted two proposals for RIDF-VI for 2000-2001 recently, totaling to Rs.750 Millions out of Rs.1,500 Millions earmarked by the GoAP for watershed development within this credit line.

Neeru - Meeru - Campaign

4.28 Neeru - Meeru (Water and You) is a state wide campaign to harvest rain water. It is steered by the Chief Minister and mainly involves earth works. The campaign was supposed to be completed by the beginning of monsoon 2000. The targets for undertaking works are disbursed to various departments at district level (FD, DRDA, and Agriculture Department) and the progress is strictly monitored. The Programme involves digging up deep trenches along the periphery of hills to harvest rain water and facilitate its percolation. Desilting of village tanks and feeder channels of these tanks are also carried out under the programme. The activities are being carried out using machines such as excavators to achieve targets quickly.

5.0 WATERSHED DEVELOPMENT IN SAMPLE DISTRICT

5.01 In this Chapter the profiles of the sample districts covered under this study are discussed. The four sample districts covered are Bijapur & Kolar in Karnataka State and Anantapur & Mahabubnagar in Andhra Pradesh State.

BIJAPUR DISTRICT - Karnataka State

5.02 The undivided Bijapur district, situated in the Northern Plateau, was the largest district in the state. Now it has been divided into two districts viz., Bijapur and Bagalkot on 15 August 1997. The total geographical area of the district is 10,541 sq. km constituting 5.49% of the area of the state. This district falls in Northern Dry Zone – III. All the five taluks in the district have been identified as drought prone by the Irrigation Commission. The occurrence and distribution of rainfall is highly erratic. The normal rainfall of the district is 578.0 mm received over 30-45 days in a year, with intermittent long dry spells during Kharif and Rabi seasons.

5.03 The profile of the district with reference to its geographical area, demographic features, land utilization, animal population, work force etc., are discussed below.

Demographic features

5.04 The district's population (18.09 lakh as per 2001 census) constituted 3.43% of the total population of the state. The population growth during 1991-01 (17.63%) is more than the state average of 17.25%. About 80% (12.34 lakh) of the population lived in rural area as against the state average of 69%. As per 1991 census the Scheduled Castes and Scheduled Tribes account for 20.1% (3.1 lakh) of the population. The density of population as per 2001 census is 172 per sq km as against the state average of 275. Workers as a percentage to total population are 41.1%, which is comparable to the state figure of 41.9%. The literacy rate at 56% stood marginally above the state figure of 55%. The literacy rate among male is 70.5% whereas among female it is only 41%.

Agricultural Sector

5.05 Of the total geographical area of 10.53 lakh ha, 8.00 lakh ha. is available for cultivation, which is 76% of the total area, while area under forest accounts for 9.9% of the total area. Only 13.37% of the net cultivable area is irrigated and balance 86.63% of the area is rainfed. The cropping pattern in the district reveals that food crops like jowar, maize, bajra, wheat among cereals, red gram, bengal gram and green gram among pulses are major crops cultivated in the district. The major oilseed crops are sunflower, groundnut and safflower. Horticulture crops like grapes (Thomson Seedless), pomegranate, ber, guava, sapota, lime, are also grown. Recent trend shows that there is a gradual shift towards fruit crops like Pomegranate and grapes. Of the total area of 6.05 lakh ha. covered during 1997-98, oilseeds occupy about 46% followed by cereals 42%, pulses 11% and other commercial crops like cotton and sugarcane about 1%. The land holding pattern in the district indicates that small and marginal farmers account for 31.8% of total land holdings and 10.7% of total land, semi-medium farmers constitute 32.9% with 21.8% of total land, while 35% of the holdings are above 4 ha. accounting 67.5% of land.

Economic activities prevalent in the district

5.06 The district is predominantly an agricultural belt. Besides this, dairy, poultry, sheep/goat rearing, sericulture, horticulture activities are being pursued by the population. There are more than 10,000 rural artisan oriented units in the district providing employment to a large number of rural people in oil mills, lime processing, carpentry, blacksmith, pottery, etc. The district has places of tourist attraction like Bijapur which is a historical city with monument like famous Golagumbaj and provides ample scope for tourism development which has not received required attention. The district has tremendous market potential for mass consumer goods, semi-durables, durables, industrial raw materials, intermediate products, capital goods, agricultural implements, etc. The undivided Bijapur district finds 12th place in terms of number of registered SSI units in the State.

5.07 The innovative / new areas of economic development in the district are :

(i) Agro-processing: Jowar flakes, Oil (solvent extraction units), sugar mills, khandsari/gur making units, maize flour, starch from maize, chilly powder, masala powder making modern cotton ginning & pressing, turdal and other pulses processing units, bakery units, sooji, rave, vermicelli making units, milk and milk products.

(ii) Export Oriented units: Export of grapes, pomegranate, banana (precooling, packaging, and processing units) – juice, jam, jelly, pickles making units. Dehydration of tomato, mango, and other vegetables for export purposes.

(iii) Horticulture:- Tissue culture for grape, pomegranate seedlings and green hose.

Banking network

5.08 The district is served by 82 branches of Commercial banks (including one Hi-Tech Agrl. Finance branch of Canara Bank), 44 branches of Bijapur Gramin Bank, 23 branches of Bijapur DCCB and 5 PCARs. Besides, the KSFC is also functioning in the district with its branch at Bijapur.

Projects under RIDF

5.09 Government of Karnataka is assisted from the Rural Infrastructure Development Fund set up with NABARD for completion of ongoing/new projects pertaining to minor irrigation, **soil conservation, water management**, rural roads and bridges etc. An aggregate amount of Rs 1.96 crore has been sanctioned by NABARD to enable completion of 4 minor irrigation projects in the district. These projects include construction of MI tanks and bridge-cum-barrages. These projects, when completed will create additional irrigation to the extent of around 560 ha. NABARD has sanctioned an aggregate amount of Rs 8.76 crore to develop 10 rural road projects with a total length of about 153 km and to construct 2 rural bridges in the district to improve infrastructure facilities in rural areas. These projects when completed will help about l11 villages in the district.

Silt application for improving soil fertility

5.10 With more and more areas being brought under horticulture development in hitherto non-traditional areas, the scope for silt application also increases. These silt application work have to be in B.Bagewade, Bijapur, Sindgi and Indi taluks in an area of 4,500 ha.

On Farm Development (OFD) in non-command areas

5.11 The OFD works in non-command areas is necessary for increasing the water use efficiency under new wells and Life Irrigation (LI) commands. It is assumed that land development is essential in at least one third of the well command areas. Since these operations were usually carried out by farmers out of their own resources and hampered the progress, there is a need to make available the institutional credit could be for the purpose.

Reclamation of salt affected / alkali soils

5.12 About 15,000 ha. of land in the undivided Bijapur district is reported to constitute of alkali soils. This could be corrected by (i) provision of drainage, (ii) application of gypsum, (iii) bringing the severely affected lands under Social Forestry and (iv) adopting new package of practices as recommended by the Central Soil Salinity Research Institute.

Dry land farming and Watershed Development

5.13 Watershed Development programmes have special importance in the development of the district as large area under cultivation is rainfed. Stabilization of agriculture production in the district is not possible without stabilizing agriculture in dry land farming areas. The watershed programmes are implemented by 2 Departments of State government viz, District Watershed Development Authority and Agriculture Department under Zilla Panchayat. The National Watershed Development Programme is being implemented by the Agriculture Department of the State Government in 3 watershed areas viz. Aheri in Bijapur taluk, Ingaleshwar in B.Bagewadi taluk and Savalsang in Indi taluk covering 16140 ha. Under the second phase, 3 more watersheds viz., Jambagi in Bijapur taluk, Hunashihalla in B.Bagewadi taluk and Shiradone in Indi taluk covering 1950 ha. have been taken up for development. NABARD has formulated model scheme on integrated watershed development for implementation in Savalangi watershed in Indi taluk with a programme of Rs. 47.647 lakh during 1998-99 in addition to Rs. 10.562 lakh provided for short-term purpose. Term loan includes provision for land development, alternate land use system and NFS activities.

5.14 Bijapur district has the famous "Chandkavate Watershed" in Sindgi taluk with a command area of 29,075 ha. covering 21 villages. Under the programme, 25 check dams, 10,004 contour bunds, 159 nala bunds, and border checks covering 1,685 ha. and road side planting covering 48 kms were undertaken and the project is completed. The District Watershed Development Authority, Bijapur is currently implementing Tidagundi Watershed in Bijapur taluk under Indo-Swiss Participative Watershed Development Project (ISPWEP), Karnataka. Under the first phase, 2 villages viz., Shirnal and Kannur villages covering 17,850 ha. have been undertaken. Departing from the earlier system of 100% participation from State, under this project more stress is given for Peoples Participation. The project receives 60% from Swiss Government, 30% from State Government and balance 10% from individual beneficiaries. The important areas taken for development are: (a) Agriculture: Dry land development, Ground water, Check dams and Nala bunds (b) Horticulture: Orchard development like pomegranate, Lime, Mango, Ber, Pappaya, and Sapota, Curry leaves and Drumsticks, Development of Kitched garden and school garden etc. (c) Forestry: Block Plantation (planting in Government land), farm forestry, road side planting and nala bund planting.

5.15 Apart form above, SHG approach is getting momentum in these watershed areas through an NGO viz., Yuvak Vikas Kendra (YVK). They are participating in motivation and publicity activity and getting funds directly from SDC. There are 33 SHGs functioning in 6 villages of the watershed area. Under the Second Phase remaining villages viz., Dommanal, part of Bommanahalli, Tidagundi, Makanapur and Siddapur covering 5500 ha. will be taken up. Apart from above the Zilla Panchayat, Bijapur is developing 2 watersheds under its Employment Assurance Scheme.

Farm ponds/water Harvesting Structures

5.16 There is need to take up series of low cost structures, i.e. nala bunds, small check dams, etc. at periodical interval. The percolation tanks, nala bunds and check dams along with silt trap plants will reduce the amount of silt reaching down stream reservoirs. These structures can be desilted during summer seasons and the silt can be ploughed back to agricultural fields. The dug out farm ponds are recommended for harnessing the excess runoff and using the same water as life saving/protective irrigation during the intervening dry spell.

Infrastructure Requirement

5.17 Soil conservation unit of Agriculture Department executes soil conservation works under various government programmes. They have not linked institutional credit for any of the schemes. Land Reclamation problem of soils is a highly technical activity requiring the help of soil scientists/chemists and Agriculture Department is supposed to provide the technical know-how to the farmers. Under RIDF assistance, 3 MI tanks have been constructed in Muttagi (B.Bagewadi taluk), Nimbai (Indi taluk) and Bommanajogi (Sindagi taluk) covering 408 ha. Area. One barrage at Hattalli in Indi taluk has been built covering 149 ha. Under RIDF assistance. OFD works under these command areas could be taken up with institutional credit support. The DWSDA may assess the specific credit needs in the project areas and details may be advised to the banks. Banks may report advances made in watershed areas under watershed development code irrespective of activities financed.

Infrastructure available

5.18 The DWSDA has sufficient manpower to implement their programmes. All watershed programmes being implemented by DWSDA/NGOs are being monitored by a District Level Monitoring Committee.

Gaps in infrastructure

5.19 There is lack of coordination between soil conservation wing of Agriculture Department and DWSDA with the banks which are not considering for institutional credit flow. The assets created out of soil conservation works have not been properly maintained. There is a need for utilizing institutional credit for covering the entire watershed areas. Alternate land use system has to be adopted in the watershed areas for increasing the income of the farmers. It has been estimated that about 1.25 lakh ha. of dry land is available for dry land horticulture crops like ber, pomegranate, fig, sapota, mango and custard apple. A dry land Horticulture Farm is to be established in the district for imparting training-cum-demonstration to the farmers on dry land Horticulture crops.

KOLAR DISTRICT - Karnataka State

5.20 Kolar District is located in the southern maidan (plains) and is the eastern most part of the State. The district with an area of 8223 sq.kms is bounded by Andhra Pradesh and Tamil Nadu on the three sides and Bangalore (R) and Tumkur districts of Karnataka state on the Western side. The total population of the district as per the 2001 census is 25.23 lakhs. The population growth during 1991-01 has been 13.83% as against the state's growth of 17.25% during this period. The density of the population in the district is 307 persons per sq.km as compared to the state's average of 275. The literacy rate of the districts is lower than that of the state's average irrespective of the gender.

5.21 Kolar District receives an average rainfall of 744 mm, 70% of which occurs in the south west monsoon season. The distribution of rainfall and intensity is erratic resulting in frequent droughts and scarcity conditions. In the absence of perennial rivers in the district, ground water is the major source of irrigation. The district accounts for maximum number of irrigation tanks in the state. Only 21.2% of the Net Sown Area (NSA) in the District is under irrigation. Of the Net Irrigated Area (NIA) of 79228 ha., the wells and Bore Wells (BWs) account for 88%.

5.22 The district has generally neutral soil with salinity and alkalinity problem in patches. The soil erosion in the district is high due to paucity of vegetative cover coupled with the less content of humus in the soil. Of the net cropped area of 3.63 lakh ha., 3.05 lakh ha., is rainfed. The soils of the district are mainly of three types, viz., red loam, latrite and black. With the above condition, various land development activities which can be taken up in the district are discussed below :

Soil and Water Conservation : The average annual rainfall of the district being 744 mm, land development measures like bunding, stream bank erosion control measures are necessary for successful crop cultivation under rainfed conditions. Harvesting of water can be taken up in undulating terrains, ravenous areas by construction of ponds, checkdams, nalla bunds, etc.

On Farm Development (OFD) : (i) In the absence of any major and medium irrigation commands in the district, OFD works required are in non-Command Area Development Authority (CADA) areas. There is also need for land development in horticulture and plantation crop areas. The land development activities suitable are land leveling, improvement of soil fertility, soil and water management, etc. (ii) Silt application - Almost all tanks in the district are heavily silted and the Zilla Panchayat has made arrangements for desilting the tanks. Already silt has been removed in 10 tanks by using machines. During the year the Zilla Panchayat has programmed for desilting at least 5 tanks, and the farmers in the nearby areas may take up silt application in their fields.

Land Reclamation : It has been estimated that about 5000 ha., of saline and alkali soils in the district require reclamation. Technology for the reclamation is available in the state.

Vermicompost / Organic Farming : Schemes on modified NADEP process with introduction of earth worms for compost production and Vermi compost by utilising crop residues, agricultural wastes which can be financed under land development in order to improve the soil fertility are being introduced in the district. Already UAS, Bangalore has popularised the technology in the district.

Watershed Development : Dry Land Development in the district is being taken up on watershed basis. Watershed Development Programmes have special importance in the development of the district as about 3.05 lakh hectares accounting for 79% of cultivated area are rainfed. Though number of watershed development programmes are being implemented in the district by Department of Agriculture and District Watershed Development Office (then State Dryland Development Board), it has been observed that in most of the cases, the entire area of watersheds has not been covered. It has happened because of the fact that most of the programmes are being implemented with budgetary support and it may not be possible to cover the entire area of watersheds with government funds especially individual farmers field work. The benefit of the community type of work has to come from individual farmers' field in the form of increased production. This cannot be possible unless and until individual farmers' field are also properly developed. The concept of comprehensive dry land development on watershed basis envisages in-situ conservation and harvesting of rain water and minimising soil erosion. Propagating alternate land use systems for improving productivity and income of dry land is important. Water harvesting structures like farm ponds, nala bund, etc., adoption of appropriate agronomic practices, inter-bund land management, adoption of improved implements and taking up allied activities in the watershed area will require financial assistance. In addition to the coverage of entire area of the watershed, coverage of all the population in the watershed is also important so that income of the poorest of the poor can also be increased. The landless labourers, small and marginal farmers, who

cannot depend entirely on the cultivation of small holdings have to be given financial assistance for undertaking non-farm activities.

ANANTAPUR DISTRICT - Andhra Pradesh State

5.23 Anantapur district is a hot arid district and falls in rain shadow zone with a very low estimated annual rainfall of 520mm, which is second lowest in the country after Jaisalmar in Rajasthan. In the district, area is fully undulating with ridges and valleys with black cotton soils in certain areas. Out of the total rainfall received only 10 to 15 percent is utilizable for agriculture the rest is going waste through streams into sea and evaporation. Due to large number of water conservation and water harvesting structures taken up in the district in 1993-94 and 1994-95, 1000 M.cum of additional ground water recharge was made possible. Annex - 3 gives the profile of Anantapur District.

5.24 The entire district is declared as hot arid due to severity of soil erosion, high temperatures, low and erratic and uneven distribution of rainfall resulting in "Soil and moisture stress, excessive evaporational losses and crop losses as the ultimate effect of drought and high aridity index. Trends of desertification are also seen in parts of district. The district unfortunately had skipped from drought prone to hot arid district. Ground water levels are alarmingly receding. Further degeneration of existing marginal and degraded forests had happened in the last 4 decades and acute scarcity of drinking water fodder and fuel is taking place in every alternate year which is a serious drought year. All these factors are creating tremendous concern and awareness regarding the danger that is looming large among the masses of the district.

5.25 Anantapur District mainly depends on South - West and North - East monsoons. Normally South-West monsoon rains useful for rainfed dry crops. Bur failure of two monsoon hits the district drastically leading to drought. The following physical symptoms are indicative for beginning of desertification trends.

- ♣ Hardly 10 percent of land mass available in the district is covered with forest
- ♣ Most of the hillocks and hill ranges are barren without any sort vegetation. The top soils having been washed away due to very strong erosion factor
- ♣ About 30% of the hills are declared to be dead hills where nothing can grow because of the fact that there is not top soil on the hills except granites boulders and weathered rocks
- ♣ Levels of ground water are going down year after year owning to low rainfall and over exploitation and not proper use and wastage of water
- ♣ A remarkable and unique feature of the district is the high intensity of winds after experiencing maximum temperature during summer and at the time of onset of monsoons.

5.26 To combat the recurring drought and to bring comprehensive development, the DPAP programme was introduced in 1975 covering all the blocks in the district. This programme was implemented on area approach basis with watershed development concept. Accordingly, several developmental strategies were implemented with a view to conserve soil, harvest and conserve rain water bringing out change in

cropping pattern, organizing people in the Self-Help Groups, development of dryland horticulture, Sericulture and Promotion of Social forestry and Integrated Rural Development.

5.27 However, with all the developmental strategies carried out under DPAP upto 1994-95 nearly 2.62 lakh hectares out of 19.5 lakh hectares of geographical area could be covered and about 2.07 lakh individual beneficiaries could be assisted. At this stage trends of desertification were noticed in various parts of the district. It is declared as hot arid district and programme of DDP introduced in the year 1995 onwards. In this programme a concerted integrated micro watershed development approach was envisaged under Dr.Hanumantha Rao's new guidelines of Government of India. According to this, area of watershed would be approximately 500 ha. And programmed to spend Rs.22.50 lakhs in each watershed. Out of which Rs.18.00 lakhs will go to for works component and Rs.4.50 lakhs for community organization and administrative cost. It is contemplated to execute the works and implement the programme through suitable N.G.Os. and Govt, Officials as P.I.As.

5.28 An integrated action plan for a project period is prepared for the watersheds programme in the district as detailed below (Table - 5.1). In micro watershed the developmental works are being taken up by watershed committees with the help of self help groups and user groups under the supervision of Watershed Development Team, Project Implementing Agencies, Multi Disciplinary Teams.

Table - 5.1 : Integrated Action Plan for Watershed Programme in Anantapur District

Year	Batch	No. of WS	Funding Agency	Total Watersheds
1995-1996	1st Batch	141	EAS	237
	1st Batch	96	DDP	
1997-1998	3rd Batch	10	DDP	10
		20	World Bank	20
1998-1999	4th Batch	100	DDP	100
1999-2000	5th Batch	96	DDP	96
2000-2001	6th Batch	10	DDP	60
2000-2001		89	RIDF	89
			Total	**612**

Prioritization of Watersheds

5.29 Taking into priority ranking given by APSRAC, SC, ST population percentage of literacy, percentage of agricultural labour, scarcity of drinking water, quality of

drinking water, availability of DWCRA, status of ground water, contiguity with existing watershed, livestock population, community mobilization, etc. 3600 watersheds prioritized into very high, high, medium, low and very low categories.

MAHABUBNAGAR DISTRICT - Andhra Pradesh State

5.30 Mahabubnagar District is a chronically a drought prone district. The average annual rainfall is about 604 mm. Earlier it was 753 mm but due to continuous deficient rainfall in the past so many years, the average is refined as 604 mm. The rainfall is erratic and hardly there will be 25 rainy days during the monsoon period. There are instances that about 200 mm (1/3rd of year's rain) is received in one single day.

5.31 Erratic rainfall, loss of tree cover, hard soil surface, undulating terrain make an ideal setting for surface seen off of rain water and soil erosion. A typical flood and drought syndrome has developed in the district, that is to say, in mid summer a good shower can cause tank breaches and a weeks gap of rain in rainy season can create drought conditions. The soil has lost its texture and moisture retention capacity. Whatever rain occurs it has to run away and very little percolates. With less percolation and more of extraction of ground water through deep bores the water able is going down at an alarming rate - A rough estimate put it about 1.5m annually. The dug wells, which were the main stay for irrigation, have totally dried up and they are replaced by deep bore wells.

5.32 The Mahabubnagar district is spread over an area of 18475 Sq.kms. The area brought under Watershed treatment in the district is 2,67,500 hectares benefiting nearly two lakh people. The Financial investment made so far by the government is Rs.400.3 million and the community contribution is to the tune of Rs.15.3 million. The following Table - 5.2 gives the activities carried out under Watershed programme in the district.

Table - 5.2 : Activities completed under Watershed Programme

Sl. No.	Work Component	Unit	Physical	Financial
1.	Contour Bunding	Ha.	55519	1080.85
2.	Continuous Contour Trenches	Ha.	7703	167.50
3.	Check Dams	No.	576	660.55
4.	Percolation Tanks	No.	378	345.00
5.	Gully Control Works	No.	46590	573.36
6.	Horticulture	No.	13827	290.54
7.	Pasture Development	Ha.	3831	32.34
8.	Smokeless Chullahs	No.	51591	52.44
9.	Sericulture	Ha.	727	19.66
10.	Rehabilitation of Degraded Forest Lands	Ha.	1464	15.18
11.	Agro-Forestry	Ha.	1585	223.91

5.33 The Watershed programme implemented in the district under different programmes of the government is given in Table - 5.3 below.

Table - 5.3 : Number of Watersheds implemented under EAS & DPAP

EAS				DPAP					TOTAL
1995-96	1996-97	1997-98	Total	Batch I	Batch II	Batch III	Batch IV	Batch V	
58	124	30	212	92	40	120	92	35	379

5.34 In the district, 591 Watersheds have been taken up under EAS and DPAP schemes over the last 6 years. It is seen that in 304 Watersheds works have been completed and in other 287, it is in progress. The watershed activities have been implemented as per the new guidelines of the GOI.

5.35 Under Neeru Meeru programme, large scale soil and moisture conservation works were taken up. They include

1. Continuous Contour Trenching (CCT)
2. Rock Filled Dams (RFD)
3. Check Dams (CD)
4. Percolation Tanks (PT)
5. Other water harvesting structures.

5.36 Neeru Meeru is not a separate programme and do not have budgetary support separately. It is the convergence of works of various departmental works mentioned above. In Mahabubnagar District the following works were taken up under Phase - I of Neeru Meeru (i.e., May 2000 to October 2000)

Sl. No.	Department	Activity	Works Completed		
			Phy.	Fin.	Vol.
1.	Rural Development (DPAP)	CCT (Ha.)	8293	163.160	6.364
		WHS (No.s)	10588	466.910	26.701
		Total		630.070	33.065
2.	Forest Department	CCT (Ha.)	10743	190.944	8.057
		WHS (No.s)	8097	192.828	7.889
		Total		383.772	15.946
3.	Minor Irrigation (TANK)	Desilting	213	77.680	3.869
		Percolation Tanks (No.s)	87	190.000	6.900
		Breach closing	198	231.200	23.820
		Total		498.880	34.589
4.	Panchayat Raj (TANK)	Desilting	289	42.350	1.932
		Breach closing	188	139.500	4.630
		Total		181.850	6.562
5.	Rural Water Supply	WHS (No.s)	4180	33.080	0.188
		Total		33.080	0.188
6.	Agriculture Department	CCT (Ha.)	9938	163.070	8.944
		WHS (No.s)	966	13.000	0.483
		Total		176.070	9.427
7.	Other Departments	WHS (Nos.)	2748	90.600	0.437
		Total		90.600	0.437
	Total	(CCT (Ha.))	28974	517.174	23.365
		(Others (No.s))	27554	1477.148	76.849
	Grand Total	(Ha.)	28974	1994.322	100.214
		(No.)	27554		

6.0 PROFILE OF THE SAMPLE WATERSHEDS

6.01 The profile of the sample Watersheds studied in Karnataka and Andhra Pradesh are outlined below.

KARNATAKA STATE

Name of the selected Watershed	Villages Covered	Project Period	Works Executed	Funded by
Bijapur District, Bijapur Taluk				
Shivanagi	Shivanagi	1994-95 to 2000-01	CB, NB, RRS, CD, BC farm pond	E.A.S
Tidagundi	• Shirnal • Kannur • Domnal • Bommanahalli • Tidagundi • Makanapur • Siddapur	1995-96 to 1998-99 1st phase was completed	Land Development Activities CB, NB, RRS, CD, BC, farm pond, agro-forestry, road/block plantation, orchard horticulture	ISPWD-K
Jambagi	• Aheri • Madhabavi • Hadagali	1997-2001 (Watershed works are to be completed)	Land Development Activities arable / non-arable / drainage line treatment, agro-forestry, dry land, horticulture, crop demonstration etc.	NWDPRA
Kolar District, Gauribidanur Taluk				
Hosurhalla	• Sonaganahalli • Gundavalahalli • Somasettyhalli • Hunasekunte • Rangappanpalya	1995-96 to 2000-01	Checkdams, Nursery, Forestry, Nala Bund	DPAP

Shivanagi Watershed

This watershed area was identified during the year 1996/97. The area covers one village namely Shivanagi is located at 35 kilometers away from Bijapur on Bijapur-Sindagi road. The watershed area consists of 1561.60 hectares, of which 1512.60 ha. is cultivated land. Area under irrigation is only 40 ha. (2.6%). There are 392 land holdings, of which marginal holdings are 52 (36.78 ha.), 260 are small holdings on (445.60 ha) and 80 are large holdings (1029.62 ha). There are about 90 SC/STs among land holding class, having an area of 272 hectares of agriculture land. There were 68 wells (open wells 66, borewells 2).

Tidagundi Watershed (1st Phase)

The watershed area is located in Bijapur Taluk of Bijapur district and is situated about 27 kms. From Bijapur. It covers seven villages. And in the 1st phase of the project two villages namely Kannur and Shirnal are covered. This programme has been implemented by then Dry Land Development Board, Bijapur with involvement of farmers of the area and Yuvakvikas Kendra (YVK) an NGO. This programme is assisted by Swiss Development Co-operation (SDC) on the basis of terms of co-operation. The programmes consisted of activities relating to agricultural, forest and horticulture sectors with the involvement of NGO and people.

a) Formation of groups and sanghas
b) Conducting awareness campaigns
c) Participatory approach
d) To develop and try new or alternative approaches for participative watershed development and sustained resource management through people organization and
e) Organizing training programmes, farmers meetings with the assistance of DLDB field staff

The two villages (Kannur and Shirnal) covered during 1st phase of the project consisted 1500 hectares of land of which 135.04 ha. was arable and 442.92 ha. was non-arable. There are 478 land holding families of which 234 numbers belong to marginal and small farmers and large farmers are 144 in number. There are 35 landless families in the two villages.

Jambagi Watershed

This area is located at distance of 20 kms. From Bijapur. The total area of watershed is 924 ha., consisted of 705 ha. arable and 219 ha. of non-arable land. The watershed area consisted of 765 land holding families, 205 landless families and 55 families belonged to artisan group. The categorisation of landholding families reveals that 475 belong to small farmer category, 105 large farmers and 185 marginal farmers. The programme is being implemented by the then DLDB with the technical assistance of agriculture and horticulture departments.

Hosurhalla Watershed

The catchment area of the Hosurhalla Watershed is situated in the South West direction of Hosurhalla and at a distance of 15 Kms from the Taluk Headquarters. This Watershed is covering 5 villages over an area of 1457.88 Ha. The project was started in 1995-96 and completed during 2000-01. The total arable land under this Watershed is 1064.74 Ha. of which the net arable land available for treatment is 861.09 Ha. There are 1139 families in the habitations covered under this Watershed. The large farming community constitute 216 families while the small and marginal group are 588 and 196 respectively. There are 139 landless families coming under this Watershed.

ANDHRA PRADESH STATE

Name of the selected Watershed	Villages Covered	Project Period	Works Executed	Funded by
Anantapur District				
Singampalli (A) and Singampalli (B)	Singampalli (A) And Singampalli (B)	1995-96 to 1998-1999	CB, RFD, Stone Terracing, Percolation Tank, Checkdams, CCT, Nurseries, Afforestation, Horticulture, Rural Energy, SHG, Animal Husbandry	DDP
Bukkacharla (A)	Bukkacharla (A)	1995-96 to 1998-99	CB, RFD, Stone Terracing, Percolation Tank, Checkdams, CCT, Nurseries, Afforestation, Horticulture, Rural Energy, SHG, Animal Husbandry	EAS
Adadakulapalli	Adadakulapalli	1997-98 to 1999-2000	CB, RFD, Checkdams, Percolation Tank, Afforestation, Horticulture	World Bank
Mahabubnagar District				
Kodur	Kodur	1995-96 to 1999-2000	CB, RFD, Stone Terracing, Percolation Tank, Checkdams, CCT, Nurseries, Afforestation, Horticulture, Rural Energy, SHG, Animal Husbandry	DPAP
Kishan Nagar	Kishan Nagar	1995-96 to 1999-2000	CB, RFD, Stone Terracing, Percolation Tank, Checkdams, CCT, Nurseries, Afforestation, Horticulture, Rural Energy, SHG, Animal Husbandry	EAS

Singampalli (A) & (B) Watershed

Singampalli is located at a distance of 28 Km from the district headquarters - Anantapur. This is attached to the Atmakur Mandal which is located at a distance of 7 Kms. The watershed area covers 500 ha. each in Singampalli (A) and (B) villages. In Singampalli (A) village, there are 210 families residing. The social structure indicates Boyas, Madigas and Kammar's are in majority. The number of landless families in Singampalli (A) village is 55, while 75 families are small farmers. Medium farming families constitute 25 as compared to 30 big farming families. The marginal farming families are 25. In case of Singampalli (B) village, around 120 families with ST in majority are living. The land holding pattern in this village is mostly small and marginal groups. Rural Development Trust, an NGO is actively working in these villages. There are about 150 members each in Singampalli (A) & (B) Watershed Committees.

Bukkacherla (A) Watershed

Bukkacherla is located in Rapthadu Mandal of Anantapur District. The total habitats in this village is 340 comprising of Reddy's in majority. The landholding pattern shows that 85 families are medium farmers and 55 are big farmers. There are few (15) landless families. There are 800 members in the Watershed Committee. The watershed area covers 500 ha. Here also, the Rural Development Trust is actively involved in the WSD programme.

Adadakulapalli Watershed

Adadakulapalle is in Penakonda Mandal of Anantapur District. SC's and ST's are the major community in the 270 families living in this village. Small and marginal farmers constitute more than one third of the families while the landless families is slightly more than the small and marginal farmers. The Watershed area covers 500 ha. and there are 150 members in the Association. Young India, an NGO is actively working in this village.

Koduru Watershed

Koduru village is in Mahabubnagar Mandal of the same District. It is situated at a distance of 14 Kms from the district headquarters. This village is a Gram Panchayat headquarter. The social structure of the Koduru village is dominated by Backward Communities (75%). The landless families is very negligible (5) while most of the families have small and marginal holding (88%). There are about 130 members in the Association. The Watershed area covers 500 ha. There are 10 water user groups in this village.

Kishan Nagar Watershed

Kishan Nagar is in Farooq Nagar Mandal of Mahabubnagar District. This village is located at a distance of about 25 Kms from the Andhra Pradesh State Capital, Hyderabad city. The social composition in this village is distributed among SC's, ST's and BC's, with BC's in majority. The small and marginal farming communities comprise of 66%, while medium farmers are 21% and big farmers 10%. There are about 200 members in the Association. There are 6 water user groups in this village.

7.0 SOCIO-ECONOMIC ANALYSIS OF SAMPLE HOUSEHOLDS

7.01 A description of the Socio Economic and cultural profile of the beneficiaries and its general awareness of the Watershed programme is essential to understand interaction among decision making bodies, implementing agencies and their personnel on the one hand and beneficiary households on the other. The degree of impact of the Watershed Programme depends to a great extent on the nature of interaction. In this section the salient features of the Socio-Economic status of the sample households are described and their influence on the implementation of the programme are analyzed.

Characteristics of Sample Households

7.02 The distribution of sample households surveyed in the selected Watershed of Karnataka and Andhra Pradesh is given below in Table - 7.1.

Table - 7.1 : Number of Sample Households Surveyed in the Sample Watersheds

Sl. No.	District	Name of the Watershed	No. of Villages Covered	No. of Sample Households Surveyed	
				Karnataka	Andhra Pradesh
1.	Bijapur	Shivanagi	1	50	-
2.	Bijapur	Jambagi	3	50	-
3.	Bijapur	Tidagundi	2	60	-
4.	Kolar	Hosurhalla	3	60	-
5.	Anantapur	Singampalli	2	-	60
6.	Anantapur	Bukkacharla	1	-	50
7.	Anantapur	Adadakulapalli	1	-	40
8.	Mahabubnagar	Kodur	1	-	50
9.	Mahabubnagar	Kishan Nagar	1	-	40
Total			15	220	240

Community Composition

7.03 The composition of the major community groups among the sample households is presented in Table - 7.2 below.

Table - 7.2 : Communitywise number of Sample Households in the Sample Watersheds of Karnataka and Andhra Pradesh

Community	Karnataka		Andhra Pradesh	
	A	B	A	B
SC	63	29	47	20
ST	6	3	40	17
Other Hindus	133	60	146	60
Muslim	17	8	7	3
Christians	1	Neg.	-	-
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed; B - Percentage of Sample households to Total
C - Neg: Negligible

7.04 As seen from the above Table - 7.2, the composition of SC/ST sample households constitutes 32% in Karnataka and 37% in Andhra Pradesh. The other Hindu community groups consisting of Lingayat, Kumba, Vokkaliga in Karnataka and BC's and OC's in Andhra Pradesh comprises 60% of the sample households surveyed in each state. The muslim community covered in the sample constitutes 8% in Karnataka and 3% in Andhra Pradesh respectively.

Demographic Features

7.05 In the following Table - 7.3, genderwise sample population of the households surveyed is given.

Table - 7.3 : Distribution of Sample Population by Gender

Sex	Karnataka		Andhra Pradesh	
	A	B	A	B
Male	739	55	708	53
Female	601	45	621	47
Total	**1340**	**100**	**1329**	**100**

Note : A - Number of Persons in the Sample Households Surveyed ;
B - Percentage Distribution ;

7.06 The population of the sample households surveyed as seen from the above Table - 7.3, reveals that in both the states, the gender bias is towards the Male. The sex ratio's being 1230 in Karnataka and 1140 in Andhra Pradesh. The average household size in Karnataka is 6 as compared to 5.5 in Andhra Pradesh.

7.07 The distribution of sample population by age and gender is given in Table - 7.4 below.

Table - 7.4 : Distribution of Sample Population by Age and Gender

Age Group (Years)	Karnataka			Andhra Pradesh		
	M	F	T	M	F	T
<5	56 (8)	56 (9)	112 (8)	33 (5)	26 (4)	59 (4)
6-10	80 (11)	72 (12)	152 (11)	60 (8)	64 (10)	124 (9)
11-15	96 (13)	71 (12)	167 (12)	99 (14)	90 (14)	189 (14)
16-25	180 (24)	122 (20)	302 (23)	167 (24)	128 (21)	295 (22)
26-50	233 (32)	195 (32)	428 (32)	266 (38)	244 (39)	510 (38)
>50	94 (13)	85 (14)	179 (13)	83 (12)	69 (11)	152 (11)
Total	**739 (100)**	**601 (100)**	**1340 (100)**	**708 (100)**	**621 (100)**	**1329 (100)**

Note : Figures in brackets are percentages to Total ;

7.08 The distribution of the sample population as seen from the above Table - 7.4 indicates, in Karnataka, 8% of the sample population are below the age group of 5 years, 23% in the 6-15 years age group, 55% are in the 16-50 year age group and 13% are more than 50 years. In the case of Andhra Pradesh, the distribution of sample population shows that 4% of the sample population are below 5 years age, while 23% are in the 6-15 age group followed by 60% in 16-50 age group and 11% are more than 50 years of age.

7.09 The genderwise distribution of sample population across different age groups reveals that 8% of the sample male population in Karnataka are below 5 years as compared to 5% in Andhra Pradesh. In case of female population it is 9% in Karnataka and 4% in Andhra Pradesh. In the 6-15 years age group, the sample male population in Karnataka is 24%, while it is 22% in Andhra Pradesh. The female population in this age group are evenly distributed at 24% in both the States. The age group of 16-50 years shows that in Andhra Pradesh the male population is 62% as against 56% in Karnataka. So also, the female population in this age group.

Literacy

7.10 The distribution of sample population by gender across the different educational levels is given in Table - 7.5 below.

Table - 7.5 : Distribution of Sample Population by Educational Level and Gender

Educational Level	Karnataka			Andhra Pradesh		
	M	F	T	M	F	T
Illiterate	267 (36)	358 (60)	625 (47)	194 (27)	295 (48)	486 (137)
Literates	37 (5)	7 (1)	44 (3)	32 (4)	54 (9)	86 (6)
Primary	174 (24)	125 (21)	299 (22)	91 (13)	80 (13)	171 (13)
Middle	65 (9)	47 (8)	112 (8)	102 914)	80 (13)	182 (14)
Secondary	48 (6)	31 (5)	79 (6)	84 (12)	46 (7)	130 (10)
SSLC	70 (9)	25 (4)	95 (7)	119 (17)	39 (6)	158 (12)
PUC	50 (7)	7 (1)	57 (4)	55 (8)	14 (2)	69 (5)
Graduate	24 (3)	1 (Neg.)	25 (2)	25 (4)	13 (2)	38 (3)
Post Graduate	2 (Neg.)	-	2 (Neg.)	7 (1)	-	7 (Neg.)
Vocational	2 (Neg.)	-	2 (Neg.)	2 (Neg.)	-	2 (Neg.)
Total	**739 (100)**	**601 (100)**	**1340 (100)**	**708 (100)**	**621 (100)**	**1329 (100)**

Note : 1. Figures in brackets are percentages to Total ;
2. Neg. - Negligible

7.11 The percentage of literates as seen from Table - 7.5, reveals that, in Karnataka the literacy level among the sample population is 53% as compared to 63% in Andhra Pradesh. The literacy levels by gender also indicates that in Andhra Pradesh the literacy levels is high among both males and females as compared to Karnataka. The male literacy in Andhra Pradesh being 73% as compared to 64% in Karnataka, while the female literacy is 52% in Andhra Pradesh and 40% in Karnataka.

7.12 The formal literacy level considering only the school educated literates shows that 50% of the sample population in Karnataka have school education as against 57% in Andhra Pradesh. Among the male population the school educated literates are 59% in Karnataka and 69% in Andhra Pradesh. While that of female school educated literates are only 39% in Karnataka as compared to 43% in Andhra Pradesh.

7.13 It is seen from Table - 7.5 that as the level of education increases, the accessibility to higher education levels is more in Andhra Pradesh than in Karnataka. This significant difference is observed across the gender also. One of the reasons for the higher educational levels in AP is the importance that the Government of AP is giving towards the education sector. Also, the sample villages are more accessible to the urban towns and cities as compared to Karnataka.

7.14 The school going population is higher in Andhra Pradesh as compared to Karnataka irrespective of the gender. The relevant data is presented in the following Table - 7.6.

Table - 7.6 : School Going Population by Gender

Gender	Karnataka			Andhra Pradesh		
	A	B	C	A	B	C
Male	739	187	25	708	200	28
Female	601	123	20	621	141	23
Total	**1340**	**310**	**23**	**1329**	**341**	**26**

Note : A. Total Sample Population; B. No. of School going Sample Population;
C. % of School going Population.

Occupational Pattern

7.15 The occupational pattern of the sample households surveyed by their primary occupation is given in Table - 7.7 below.

Table - 7.7 : Occupational Patterns of the Sample Population by Primary Occupation and Gender

Primary Occupation	Karnataka			Andhra Pradesh		
	M	F	T	M	F	T
Agriculture	267 (36)	79 (13)	346 (26)	349 (49)	313 (50)	662 (50)
Agriculture Labour	62 (8)	48 (8)	110 (8)	57 (8)	64 (10)	121 (9)
Livestock	25 (3)	4 (1)	29 (2)	10 (1)	10 (2)	20 (2)
Artisan	10 (1)	3 (Neg.)	13 (1)	12 (2)	5 (1)	17 (1)
Private Service	16 (2)	1 (Neg.)	17 (1)	10 (1)	1 (Neg.)	11 (1)
Govt. Service	13 (2)	5 (1)	18 (1)	5 (1)	-	5 (Neg.)
Student	187 (25)	123 (20)	310 (23)	200 (28)	141 (23)	341 (26)
Household work	5 (1)	247 (41)	252 (19)	-	20 (3)	20 (2)
Dependants	87 (12)	84 (14)	171 (13)	54 (8)	66 (11)	120 (9)
Others	67 (9)	7 (1)	74 (6)	11 (2)	1 (Neg.)	12 (1)
Total	**739 (100)**	**601 (100)**	**1340 (100)**	**708 (100)**	**621 (100)**	**1329 (100)**

Note : 1. Figures in brackets are percentages to Total ; 2. Neg. - Negligible

7.16 As seen from Table - 7.7, the workforce constitutes 45% in Karnataka and 63% in Andhra Pradesh. Agriculture is the main occupation of 50% of the sample population

in Andhra Pradesh as compared to 26% in Karnataka. The next category of main occupation engaged by the sample population is the agricultural labour. This is absorbing 8% in Karnataka and 9% in Andhra Pradesh. Sample population who are persuing livestock grazing as the main occupation is 2% each in both the states, so also in the service sector (including both Private and Government Services).

7.17 The genderwise workforce among the sample households reveals that 62% of the male population are engaged in different occupational activities as compared to 64% in Andhra Pradesh. While, the female workforce are 25% in Karnataka as against 63% in Andhra Pradesh. There is a high incidence of dependent female population in Karnataka (55%) as compared to Andhra Pradesh (14%). The female workforce is 50% in the agriculture sector in Andhra Pradesh and it is only 13% in Karnataka.

Housing and Living Condition

Ownership of House

7.18 The ownership of house among the sample households surveyed is presented in Table - 7.8 below. It is seen that in both states, the majority of sample households are living in owned houses. It is 97% in Karnataka and 99% in Andhra Pradesh.

Table - 7.8 : Distribution of Ownership of Housing among the Sample Households Surveyed

Ownership	Karnataka		Andhra Pradesh	
	A	B	A	B
Owned	213	97	238	99
Rented	7	3	2	1
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households to Total;

Type of Dwelling

7.19 The type of houses as seen from Table - 7.9 below, reveals that in Karnataka three fourths of the sample households surveyed are living in semi pucca houses, 20% in Pucca houses and 5% in Katcha houses. In case of Andhra Pradesh, the situation is quite opposite - 85% of the sample households are living in pucca houses and 15% in semi pucca houses.

Table - 7.9 : Distribution of Sample Households Surveyed by type of Dwelling

Type	Karnataka		Andhra Pradesh	
	A	B	A	B
Pucca	45	20	205	85
Semi Pucca	164	75	35	15
Katcha	11	5	-	-
Total	**220**		**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households Surveyed to Total;

Electricity

7.20 The percentage of electrified houses among the sample households surveyed is 73% in Karnataka and 79% in Andhra Pradesh. Here the rural electrification has benefited most of the households in both the states. The relevant data is presented in Table - 7.10 below.

Table - 7.10 : Distribution of Sample Households by Availability of Electricity.

Availability of Electricity	Karnataka		Andhra Pradesh	
	A	B	A	B
Yes	161	73	190	79
No	59	27	50	21
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households Surveyed to Total;

Sanitation

7.21 The percentage of sample households reported having latrines in their houses is 21% in Andhra Pradesh and 9% in Karnataka. There is a wide gap between the two states in this regard. The distribution of sample households having latrine is given in Table - 7.11 below.

Table - 7.11 : Distribution of Sample Households having Household Latrine.

Ownership	Karnataka		Andhra Pradesh	
	A	B	A	B
Yes	19	9	50	21
No	201	91	190	79
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households to Total;

Biogas

7.22 The rural energy programmes of the state governments is emphasizing on the energy conservation measures through one of the component - biogas implementation. In the sample households surveyed it is seen that in Karnataka the biogas usage is least (4%) as compared to Andhra Pradesh (45%). Though nearly 75% of the sample households in Karnataka has some type of livestock, the awareness of biogas in the study area is very low. In case of Andhra Pradesh 62% of the sample households have some type of livestock but the usage of biogas is significantly higher as compared to Karnataka. The following Table - 7.12 gives the relevant information collected during the survey.

Table - 7.12 : Distribution of Sample Households Surveyed having Biogas Facility

Biogas	Karnataka		Andhra Pradesh	
	A	B	A	B
Yes	8	4	108	45
No	212	96	132	55
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households to Total;

Livestock

7.23 The number of sample households of Karnataka reported possession of livestock is 162 constituting 74% of the total sample households. In Andhra Pradesh, it is 150 constituting 62%. Among these livestock owning sample households, it is seen that in Karnataka, 50% have cattleshed facilities as against 77% in Andhra Pradesh.

7.24 The number of sample households having different types of livestocks and the change in the livestock pattern over the last six years is given in Table - 7.13 below.

Table - 7.13 Number of Sample Households having Livestock over the last six years.

Type of Livestock	2000-2001		1999-00		1998-99		1997-98		1996-97		1995-96	
	K	AP	K	AP	K	AP	K	AP	K	AP	K	AP
Bullock	64	134	68	134	69	133	69	132	69	131	67	130
Buffaloe (Milching)	66	37	67	37	63	37	58	37	50	37	45	36
Buffaloe (Non-Milching)	54	23	45	23	28	20	23	20	14	17	9	17
Cow (Milching)	60	101	65	101	63	101	51	99	42	99	34	99
Cow (Non-Milching)	61	80	51	80	37	79	31	76	33	75	32	74
Sheep / Goats	65	36	50	36	35	35	33	36	29	36	28	36
Poultry	12	95	9	95	9	94	7	92	4	92	4	92

Note : K - Karnataka; AP- Andhra Pradesh;

7.25 As seen from Table - 7.13, in Andhra Pradesh there is no significant change in the number of sample households possessing livestock over the last six years. However, in Karnataka, a significant gradual change is observed in having milching buffaloes, cows, and sheep/goats. It can be derived from Table - 7.13 that the percentage of sample households owning particular livestock to total sample households owning livestock. It is observed that in Andhra Pradesh 89% of the sample households owning livestock have bullocks as against 42% in Karnataka. In case of milching buffaloe it is otherwise (37% - Karnataka, 25% - Andhra Pradesh). The ownership of milching cows reveals that 67% of the sample households owning livestock in AP have milching cows as compared to 33% in Karnataka.

7.26 The average holding of livestock per sample households owning livestock shows that on an average 3 bullocks per household is reported in both the states. In case of milching buffaloes it is one in Karnataka and two in Andhra Pradesh. The average holding of Milching cows in Karnataka is about 2 as against 3 in Andhra Pradesh, while that of sheep/goat holding in Andhra Pradesh it is 14 as compared to 7 in Karnataka.

Landholding

7.27 The number of sample households owning land in Karnataka is 206 constituting 94% and in AP it is 83%. The distribution of sample households by different landholding categories reveals that in Karnataka, 31% of the sample households have more than 10 acres as against 19% in AP. In other categories of landholding there is a marginal difference between the sample households of Karnataka and AP. The details of the landholding categories is given in Table - 7.14 below.

Table - 7.14 : Distribution of Sample Households by Landholding Category.

Landholding Category (Acres)	Karnataka		Andhra Pradesh	
	A	B	A	B
Landless	14	6	41	17
<2.5	23	10	34	14
2.5-5.00	67	31	70	29
5.0-10.0	47	22	49	20
>10.0	69	31	46	19
Total	**220**	**100**	**240**	**100**

Note : A - Number of Sample Households Surveyed ;
B - Percentage of Sample Households to Total;

7.28 The total area owned by the land owning households within the watershed and outside the watershed area is presented in Table - 7.15 below.

Table - 7.15 : Total Area (Acres) owned by the Landowning Sample Households

Type of Land	Karnataka			Andhra Pradesh		
	WWS	OWS	TOTAL	WWS	OWS	TOTAL
Dry	940.87 (46)	563.56 (28)	1504.43 (74)	937.00 (54)	115.00 (7)	1052.00 (61)
Irrigated	397.38 (20)	112.65 (5)	510.03 (25)	627.00 (36)	52.50 (3)	679.50 (39)
Garden / Others	13.20 (1)	-	13.20 (1)	-	-	-
Total	**1351.45 (67)**	**676.21 (33)**	**2027.66 (100)**	**1564.00 (90)**	**167.50 (10)**	**1731.50 (100)**

Note : 1. WWS - With in Watershed Area ;
2. OWS - Outside Watershed Area
3. Figures in brackets are percentage to total ;

7.29 As seen from the above Table - 7.15, two thirds of the area held by the land owning sample households of Karnataka are in the Watershed area, while it is 90% in the case of AP sample households. Inside the watershed area, irrigation through wells and tanks have been practiced on 20% of the area in Karnataka and 36% in AP. Most of the lands lying outside the watershed area is rainfed. The average land per land owning sample households in both the states in 9 acres. Inside the watershed area it is seen that average holding is 6.6 acres in Karnataka and 8 acres in AP.

7.30 The different sources of irrigation practiced by the landowning sample households is given in Table - 7.16 below. It is seen that irrigation through wells is maximum in both the states with in watershed area and outside watershed area. It is to be noted that irrigation through wells have increased over the period in the watershed area due to increase in water table. This has been the perception of the community who have all praise for the watershed programme.

Table - 7.16 : Sourcewise Area (Acre) Irrigated

Source	Karnataka			Andhra Pradesh		
	WWS	OWS	TOTAL	WWS	OWS	TOTAL
Tank	8.00 (2)	4.00 (1)	12.00 (3)	83.00 (12)	-	83.00 (12)
Wells	389.38 (76)	108.65 (21)	498.03 (97)	544.00 (80)	52.50 (8)	596.50 (88)
Total	**397.38 (78)**	**112.65 (22)**	**510.03 (100)**	**627.00 (92)**	**52.50 (8)**	**679.50 (100)**

Note : 1. WWS - With in Watershed Area ;
2. OWS - Outside Watershed Area
3. Figures in brackets are percentage to total ;

Cropping Intensity

7.31 The cropping intensity in both the states is given in the following Table - 7.17.

Table - 7.17 : Cropping Intensity (%)

States	Watershed Area						Outside Watershed Area					
	1	2	3	4	5	6	1	2	3	4	5	6
Karnataka	90	90	91	90	91	90	94	92	94	90	92	93
Andhra Pradesh	102	102	105	102	105	110	100	100	100	100	100	100

Note : (1) Cropping Intensity - Total Cropped Area
---------- x 100
Total Area
(2) 1=2000-01; 2=1999-00; 3=1998-99; 4=1997-98; 5=1996-97; 6=1995-96.

7.32 It is seen from the above Table - 7.17, the intensity of cropping by the sample households of Andhra Pradesh a higher than that of Karnataka. It is to be noted that the sample households of AP have optimally utilized the watershed area right from its inception. It is seen that the cropping intensity during the first year of the watershed programme is 110% indicating the initial involvement of the community.

This tempo is maintained over the period. However, due to lack of rainfall, during the last two years, the intensity of cropping has declined. In case of sample households of Karnataka, the cropping intensity is stagnant at 90% since the last six years.

Cropping Pattern

7.33 The cropping pattern practiced by the landholding sample households of Karnataka and Andhra Pradesh in the watershed area and outside the watershed area during the last six years is given in Table - 7.18A and Table - 7.18B below.

Table - 7.18A : Cropping Pattern (Acres) in the Watershed and Outside the Watershed Area - Karnataka

Major Crops	Within Watershed Area						Outside Watershed Area					
	1	2	3	4	5	6	1	2	3	4	5	6
Bajra	247.87 (20)	187.20 (15)	160.32 (13)	209.24 (17)	172.24 (14)	199.52 (16)	23.30 (4)	12.00 (2)	17.30 (3)	27.00 (4)	19.30 (3)	28.30 (4)
Jowar	271.57 (22)	267.71 (22)	273.20 (22)	246.35 (20)	327.36 (27)	290.00 (24)	184.00 (29)	231.60 (38)	190.30 (30)	204.30 (34)	201.30 (32)	192.00 (31)
Maize	86.33 (7)	80.50 (7)	79.90 (6)	85.43 (7)	78.40 (6)	76.40 (6)	29.00 (5)	25.20 (4)	28.00 (4)	27.20 (4)	25.50 (4)	27.50 (4)
Wheat	50.44 (4)	47.16 (4)	59.34 (4)	64.34 (5)	54.00 (4)	65.00 (5)	17.00 (3)	22.00 (4)	14.00 (2)	17.00 (3)	21.20 (3)	18.20 (3)
Ragi	36.80 (3)	34.40 (3)	37.10 (3)	40.10 (3)	37.60 (3)	38.60 (3)	11.40 (2)	13.00 (2)	12.40 (2)	13.00 (2)	15.20 (2)	9.40 (1)
Millet	67.00 (5)	44.70 (4)	53.00 (4)	62.10 (5)	68.00 (6)	71.60 (6)	109.00 (17)	94.30 (15)	129.00 (20)	89.00 (15)	109.30 (18)	98.00 (16)
Groundnut	128.05 (10)	168.55 (14)	158.00 (13)	148.00 (12)	172.65 (14)	185.44 (15)	67.00 (11)	80.20 (13)	76.30 (12)	64.20 (11)	83.70 (13)	90.50 (14)
Cotton	31.60 (3)	34.10 (3)	46.20 (4)	38.00 (3)	42.00 (3)	48.00 (4)	25.00 (4)	18.00 (3)	20.00 (3)	18.00 (3)	17.00 (3)	22.00 (3)
Onion	34.40 (3)	30.43 (3)	37.43 (3)	32.40 (3)	41.43 (3)	34.43 (3)	14.20 (2)	14.20 (2)	11.20 (2)	19.20 (3)	11.20 (2)	12.20 (2)
Sunflower	18.20 (1)	33.00 (3)	39.37 (3)	23.00 (2)	24.00 (2)	24.37 (2)	16.30 (3)	18.00 (3)	18.00 (3)	13.00 (2)	23.00 (4)	21.30 (3)
Pulses and Oilseeds	72.40 (6)	70.60 (6)	86.40 (7)	97.15 (8)	94.60 (8)	95.90 (8)	54.70 (9)	24.40 (4)	40.40 (6)	54.70 (9)	31.50 (5)	53.40 (8)
Fruits & Vegetables	93.40 (8)	85.64 (7)	88.41 (7)	77.06 (6)	28.00 (2)	11.81 (1)	11.20 (1)	11.20 (2)	12.20 (2)	11.20 (2)	12.20 (2)	8.00 (1)
Other Minor & Mixed Crops	86.20 (7)	129.07 (11)	118.10 (10)	99.40 (8)	92.07 (7)	73.20 (6)	72.20 (11)	53.20 (9)	61.90 (10)	48.90 (8)	50.80 (8)	46.20 (7)
Total	**1224.26 (100)**	**1213.06 (100)**	**1226.77 (100)**	**1222.57 (100)**	**1232.35 (100)**	**1214.27 (100)**	**634.30 (100)**	**617.30 (100)**	**631.00 (100)**	**606.70 (100)**	**621.20 (100)**	**627.00 (100)**

Note : (1) 2000-01-1; 1999-00-2; 1998-99-3; 1997-98-4; 1996-97-5; 1995-96-6
(2) Figures in brackets are percentage to total ;
(3) Percentages do not add to 100 due to rounding off;

Table - 7.18B : Cropping Pattern (Acres) in the Watershed and Outside the Watershed Area - Andhra Pradesh

Major Crops	Within Watershed Area						Outside Watershed Area					
	1	2	3	4	5	6	1	2	3	4	5	6
Jowar	117.50 (7)	118.50 (7)	119.50 (7)	119.50 (7)	118.50 (7)	118.50 (7)	-	-	-	-	-	-
Maize	112.00 (7)	112.00 (7)	112.00 (7)	112.00 (7)	112.00 (7)	112.00 (7)	-	-	-	-	-	-
Paddy	279.00 (17)	286.00 (18)	325.50 (20)	330.50 (21)	359.50 (22)	346.50 (20)	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)	4.00 (2)
Ragi	124.50 (8)	124.50 (8)	140.00 (8)	87.50 (5)	76.50 (5)	87.50 (5)	3.00 (2)	3.00 (2)	3.00 (2)	3.00 (2)	3.00 (2)	3.00 (2)
Groundnut	782.00 (49)	771.00 (48)	769.00 (47)	766.50 (48)	793.00 (48)	869.50 (51)	132.00 (79)	132.00 (79)	132.00 (79)	132.00 (79)	132.00 (79)	132.00 (79)
Pulses and Seeds	142.00 (9)	147.00 (9)	143.00 (9)	145.00 (9)	144.00 (9)	146.00 (8)	9.00 (5)	9.00 (5)	9.00 (5)	9.00 (5)	9.00 (5)	9.00 (5)
Fruits & Vegetables	20.00 (1)	20.00 (1)	20.00 (1)	20.00 (1)	20.00 (1)	20.00 (1)	-	-	-	-	-	-
Other minor & mixed crops	22.00 (1)	21.50 (1)	21.00 (1)	21.00 (1)	21.00 (1)	21.00 (1)	19.00 (11)	19.00 (11)	19.00 (11)	19.00 (11)	19.00 (11)	19.00 (11)
Total	**1599.00 (100)**	**1600.50 (100)**	**1650.00 (100)**	**1602.00 (100)**	**1644.50 (100)**	**1720.00 (100)**	**167.00 (100)**	**167.00 (100)**	**167.00 (100)**	**167.00 (100)**	**167.00 (100)**	**167.00 (100)**

Note : (1) 2000-01-1; 1999-00-2; 1998-99-3; 1997-98-4; 1996-97-5; 1995-96-6
(2) Figures in brackets are percentage to total ;
(3) Percentages do not add to 100 due to rounding off;

7.34 In Karnataka, the cropping pattern (Table - 7.18A) reveals that, the major food crops is being cultivated in more than 50% of the area in both watershed and outside the watershed area. The extent of area cultivated in watershed area is double that of the outside watershed area. The major food crops in the Karnataka being Bajra and Jowar. The commercial crops such as groundnut, cotton and onion are grown on 16% of the area, pulses and oilseeds on 6% and fruits and vegetables on 8% of the cultivated area. It is seen that over the last six years, the cropping pattern is marginally changing across the different crops. However, during the field survey, the sample households perceive that fruits such as Pomogranate and Lime are gaining importance.

7.35 In case of Andhra Pradesh, the number of crops grown in the watershed area is considerably lower than that of Karnataka. The major crop in Andhra Pradesh is paddy and the commercial crop being groundnut. It is also seen in case of AP that the changing in cropping pattern in watershed area during the last six years is marginal. However, there is a definite shift from the cropping pattern between the watershed area and outside the watershed area.

7.36 The comparative scenario between the two states indicates that groundnut and pulses cultivation is predominant in AP while food crops is given importance in Karnataka. In case of fruits and vegetables, in Karnataka the extent of cultivation is more as compared to AP.

Productivity of Major Crops

7.37 The productivity of major crops in the watershed area and outside the watershed areas of Karnataka and AP is presented in Table - 7.19A and Table - 7.19B below.

Table - 7.19A : Productivity (Quintals/Acre) of Major Crops - Karnataka

Major Crops	Watershed Area						Outside Watershed Area					
	1	2	3	4	5	6	1	2	3	4	5	6
Bajra	3	4	4	4	4	3	2	2	3	3	3	2
Jowar	3	3	4	4	3	3	3	3	3	3	3	3
Maize	12	12	12	12	11	11	13	13	12	13	13	13
Wheat	4	4	4	4	3	3	3	3	3	3	3	3
Millet	3	4	3	3	3	3	3	3	3	3	3	3
Groundnut	4	4	4	4	4	3	3	3	3	3	3	3
Onion	40	48	41	41	37	43	27	30	28	30	26	26

Note : (1) 2000-01-1; 1999-00-2; 1998-99-3; 1997-98-4; 1996-97-5; 1995-96-6

Table - 7.19B : Productivity (Quintals/Acre) of Major Crops - Andhra Pradesh

Major Crops	Watershed Area						Outside Watershed Area					
	1	2	3	4	5	6	1	2	3	4	5	6
Jowar	8	8	9	9	9	9	-	-	-	-	-	-
Maize	8	9	9	10	11	11	-	-	-	-	-	-
Paddy	30	30	31	32	31	33	25	25	24	25	25	24
Ragi	8	8	6	9	20	10	10	10	12	13	12	13
Groundnut	5	6	7	8	9	9	6	7	8	9	10	10

Note : (1) 2000-01-1; 1999-00-2; 1998-99-3; 1997-98-4; 1996-97-5; 1995-96-6

7.38 The productivity of major crops as seen from Table - 7.19A and Table - 7.19B, reveals that, in both the states, there is not significant increase in productivity over the last six years. However, the comparative picture between the two states shows that in watershed areas, the productivity is higher in AP for Jowar (more than double as compared to Karnataka) and marginal increase in case of groundnut. Onion is the other major commercial crop in Karnataka, whose productivity is fluctuating over the years.

Household Economy

Household Income

7.39 The distribution of sample households by different income levels is presented in Table - 7.20A and Table - 7.20B below.

Table - 7.20A : No. of Sample Households by Income Levels - Karnataka

Income Level (Rs./Annum)	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
<10000	15 (7)	17 (8)	24 (11)	22 (10)	34 (15)	43 (20)
10000-15000	26 (12)	20 (9)	23 (10)	37 (17)	32 (15)	37 (17)
15000-25000	52 (24)	53 (24)	61 (28)	58 (26)	56 (25)	57 (26)
25000-50000	76 (35)	78 (35)	63 (29)	59 (27)	56 (25)	45 (20)
50000-100000	34 (15)	40 (18)	40 (18)	38 (17)	32 (15)	31 (14)
>100000	17 (8)	12 (5)	9 (4)	6 (3)	10 (5)	7 (3)
Total	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**

Note : Figures in brackets are percentage to total

Table - 7.20B : No. of Sample Households by Income Levels - Andhra Pradesh

Income Level (Rs./Annum)	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
<10000	9 (4)	1 (Neg.)	-	-	-	-
10000-15000	14 (6)	11 (5)	10 (4)	6 (2)	4 (2)	4 (2)
15000-25000	34 (14)	28 (12)	26 (11)	24 (10)	22 (9)	21 (9)
25000-50000	68 (28)	71 (30)	68 (28)	69 (29)	68 (28)	60 (25)
50000-100000	94 (39)	102 (43)	105 (44)	110 (46)	113 (47)	118 (49)
>100000	21 (9)	27 (11)	31 (13)	31 (13)	33 (14)	37 (15)
Total	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**

Note : Figures in brackets are percentage to total

7.40 The distribution of sample households as seen from Table - 7.20A and Table - 7.20B reveals that there is an improvement in the economic levels of the sample households over the last six years. In Karnataka the percentage of sample households having an annual income of less than Rs.10,000 has declined from 20% to 7% between 1995-2001. In case of sample households of Andhra Pradesh, it is observed that there is marginal variations in the income levels over the years. But, the economic levels of the sample households have not declined. In both the states it is noticed that nearly one third of sample households have moved to an average income level of Rs.25000-50000 range.

7.41 The distribution of income of the sample households by different sources of income over the last six years is presented in Table - 7.21A and Table - 7.21B. It is seen that, income from agriculture is the major source in both the states. Over the last six years the contribution from agricultural income to the sample households is the main source of income. Income from livestock among the sample households in AP is more than that of Karnataka. The share of livestock income in AP has decreased from 17% to 13% between 1995-2001 as against an increase from 4% to 7% in Karnataka. The decline in AP is mainly due to lack of rainfall for fodder production.

7.42 Among the sample households of Karnataka, it is noticed that income from other sources is contributing to nearly one fourth of the total income. The other sources are mainly artisans and the service sector. It is observed that income from migration has declined in AP, while in Karnataka it has increased. But the share of income from migration has remained at 2 - 4% in both states. Income from agricultural labour has significantly improved in both the states. This is mainly due to availability of labour within the village indicating the impact of watershed programme.

Table - 7.21A: Sourcewise Income (Rs.) Distribution of Sample Households - Karnataka

Sources of Income	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
Agriculture	5029400 (55)	4750915 (55)	4727415 (58)	4430295 (59)	4282710 (60)	4260220 (64)
Livestock	654445 (7)	604830 (7)	467540 (6)	390690 (5)	334325 (5)	291770 (4)
Labour	887125 (10)	839000 (10)	783200 (10)	660825 (9)	579550 (8)	526110 (8)
Migration	332500 (4)	285790 (3)	210150 (3)	141900 (2)	209100 (3)	109350 (2)
Others	2198200 (24)	2166800 (25)	2013450 (25)	1845380 (25)	1720275 (24)	1495870 (22)
Total	**9101670 (100)**	**8647335 (100)**	**8201755 (100)**	**7469090 (100)**	**7125960 (100)**	**6683320 (100)**

Note : Figures in brackets are percentage to total

Table - 7.21B : Sourcewise Income (Rs.) Distribution of Sample Households - Andhra Pradesh

Sources of Income	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
Agriculture	9826585 (59)	9144335 (58)	9227350 (60)	8677450 (59)	8287455 (60)	7272420 (57)
Livestock	2218550 (13)	2231410 (14)	2128510 (14)	2001370 (14)	1927330 (14)	2131510 (17)
Labour	2963975 (18)	2680000 (17)	2530715 (16)	2266500 (15)	2034100 (15)	1820900 (14)
Migration	461325 (3)	457000 (3)	447550 (3)	436350 (3)	427450 (3)	417450 (3)
Others	1159000 (7)	1174400 (7)	1156550 (7)	1333500 (9)	1164100 (8)	1158600 (9)
Total	**16629435 (100)**	**15687145 (100)**	**15490675 (100)**	**14715170 (100)**	**13840435 (100)**	**12800880 (100)**

7.43 The average annual income per household and Per Capita income of the sample households is given in the following Table - 7.22.

Table - 7.22 : Average Household Income (Rs.) and Per Capita income (Rs.) of Sample households

Year	Karnataka		Andhra Pradesh	
	A	B	A	B
2000 - 01	41371	6792	69289	12513
1999 - 00	39306	6453	65363	11803
1998 - 99	37281	6121	64544	11656
1997 - 98	33950	5574	61313	11072
1996 - 97	32391	5318	57668	10414
1995 - 96	30379	4988	53337	9632

Note : A - Average household Income (Rs.) per annum;
B - Per Capita Income (Rs.) per annum.

7.44 The average household income of the sample households in Karnataka has increased from Rs.30,379 in 1995-96 to Rs.41371 in 2000-01. The per capita income has risen from Rs.4988 to Rs.6792 during this period. In Andhra Pradesh, the average household income of the sample households and the Per Capita income is much higher in comparison to Karnataka. The average income has increased by 36% in Karnataka as compared to 30% raise in Andhra Pradesh between 1995 and 2001.

Household Expenditure

7.45 The distribution of sample households by different expenditure groups is given in Table - 7.23A and Table - 7.23B below. It is seen that the expenditure levels of the sample households in both the states have shown an increase to the higher expenditure levels during the last six years. It is observed that the sample households of Karnataka have moved significantly to the expenditure groups of Rs.15000 - 25000 and Rs.25000 - 50000. In the case of AP sample households the shift is seen towards the expenditure groups of Rs.25000 - 50000 and Rs.50000 - 100000. It is also observed that in AP there are 3% of the sample households whose expenditure group is the highest (Rs.100000 and above). However, in this group, there is no significant shift over the last six years. The increase in the expenditure level could be attributed to the increase in the income levels as seen earlier.

Table - 7.23A : Distribution of Number of Sample Households by Expenditure Groups - Karnataka

Expenditure Groups	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
<10000	21 (10)	21 (10)	23 (10)	29 (13)	37 (17)	45 (20)
10000-15000	44 (20)	50 (23)	57 (26)	63 (29)	70 (32)	78 (35)
15000-25000	92 (42)	96 (44)	95 (43)	84 (38)	78 (35)	64 (29)
25000-50000	56 (25)	46 (21)	41 (19)	40 (18)	30 (14)	29 (13)
50000-100000	7 (3)	7 (3)	4 (2)	4 (2)	5 (2)	4 (2)
>100000	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**	**220 (100)**

Table - 7.23B : Distribution of Number of Sample Households by Expenditure Groups - Andhra Pradesh

Expenditure Groups	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
<10000	7 (3)	8 (3)	9 (4)	10 (4)	10 (4)	9 (4)
10000-15000	15 (6)	15 (6)	15 (6)	16 (7)	19 (8)	20 (8)
15000-25000	32 (13)	32 (13)	40 (17)	42 (18)	47 (20)	49 (20)
25000-50000	114 (47)	113 (47)	112 (47)	106 (44)	99 (41)	97 (40)
50000-100000	65 (27)	65 (27)	56 (23)	58 (24)	57 (24)	58 (24)
>100000	7 (3)	7 (3)	8 (3)	8 (3)	8 (3)	7 (3)
Total	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**	**240 (100)**

7.46 The itemwise expenditure made by the sample households are presented in Table - 7.24A and Table - 7.24B. It is seen from these tables, the expenditure incurred by the sample households in both states increase in absolute terms over the last six years. However, the share of different items over time has not shown any significant shift across the different items. In case of sample households of Karnataka, the share in the expenditure on housing and clothing has marginally increased from 2% to 4% and 16% to 17% respectively. A marginal decline in the share of food expenditure is also noticed among the sample households of Karnataka.

7.47 The comparative picture between the two states, indicates that share of food expenditure is more in Karnataka than that in Andhra Pradesh. While in case of the expenditure incurred on education, health, transport and fuel, the households of AP have higher share as compared to Karnataka.

Table - 7.24A : Itemwise Annual Household Expenditure (Rs.) - Karnataka

Items of Expenditure	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
Food	2524385 (52)	2426658 (52)	2338865 (54)	2251506 (54)	2164165 (55)	2090826 (57)
Clothing	851880 (17)	806430 (17)	733650 (17)	703220 (17)	634925 (16)	599250 (16)
Housing	172400 (4)	122050 (3)	120652 (3)	106425 (3)	98573 (2)	86775 (2)
Education	215600 (4)	201100 (4)	183800 (4)	161725 (4)	149400 (4)	135600 (4)
Health	256050 (5)	250350 (5)	212520 (5)	202250 (5)	193250 (5)	172885 (5)
Transport	304580 (6)	296406 (6)	267374 (6)	250075 (6)	231300 (6)	211380 (6)
Fuel	121191 (2)	116016 (2)	108 (3)	103245 (2)	97287 (2)	92039 (2)
Others	450485 (9)	430200 (9)	385825 (9)	362375 (9)	331600 (9)	306450 (8)
Total	**4896571 (100)**	**4649210 (100)**	**4350817 (100)**	**4140821 (100)**	**3900500 (100)**	**3695205 (100)**

Note : Figures in brackets are percentages to Total.

Table - 7.24B : Itemwise Annual Household Expenditure (Rs.) - Andhra Pradesh

Items of Expenditure	2000-01	1999-00	1998-99	1997-98	1996-97	1995-96
Food	4879180 (47)	4861680 (47)	4756880 (47)	4730700 (47)	4605150 (47)	4573800 (46)
Clothing	1701050 (16)	1686050 (16)	1642950 (16)	1616750 (16)	1572650 (16)	1548600 (16)
Housing	69700 (1)	56700 (1)	61700 (1)	65700 (1)	70700 (1)	75700 (1)
Education	1233500 (12)	1286500 (12)	1183000 (12)	1215250 (12)	1204500 (12)	1173450 (12)
Health	1155000 (11)	1157500 (11)	1147000 (11)	1147750 (11)	1145250 (12)	1141250 (12)
Transport	936500 (9)	939500 (9)	913500 (9)	884250 (9)	857500 (9)	867750 (9)
Fuel	456600 (4)	439100 (4)	417250 (4)	408000 (4)	439250 (4)	522000 (5)
Others	11000 (Neg.)	-	-	-	-	-
Total	**10442530 (100)**	**10427030 (100)**	**10122280 (100)**	**10068400 (100)**	**9895000 (100)**	**9902550 (100)**

Note : Figures in brackets are percentages to Total.

7.48 The average household expenditure and per capita expenditure of the sample households is presented in the following Table - 7.25.

Table - 7.25 : Average Household Expenditure and Per Capita Expenditure of Sample Households

Year	Karnataka		Andhra Pradesh	
	A	B	A	B
2000-01	22257	3654	43510	7857
1999-00	21133	3470	43446	7846
1998-99	19776	3247	42176	7616
1997-98	18822	3090	41952	7576
1996-97	17730	2910	41229	7445
1995-96	16796	2758	41260	7451

Note : A - Average Household Expenditure (Rs.) per annum;
B - Per capita Expenditure (Rs.) per annum.

7.49 The average household expenditure and per capita expenditure has increased over the last six years (Table - 7.25) in both the states. The average expenditure has increased by 33% among the sample households of Karnataka and by only 5% in case of AP. However, it is observed that the average expenditure among the AP sample households is more than double that of the average expenditure of the sample households of Karnataka.

8.0 PERCEPTION OF COMMUNITY ON WATERSHED DEVELOPMENT PROGRAMMES

8.01 One of the objective of this study is to assess the impact of the Watershed programme as perceived by the community. The participation of community in the Watershed programme is the basic principle behind the new guideline formulated by GOI in 1995. In this section, the perception of the sample households on the watershed development programme are discussed. The information are collected through group discussions, checklists and from sample households in the selected Watersheds.

8.02 The impact of the WSDP as perceived by the sample households on different aspects is given in Table - 8.1 below. It is observed from the Table - 8.1 that in both the States, the sample households perceive soil and moisture conservation has been the major impact of the programme. This has led to the better yield. Increase in the ground water level is the effect of water harvesting on watershed basis. Availability of drinking water and also for livestock and horticultural crops has improved. Employment creation under the WSDP is the other major impact as perceived by the community. Also, the programme had created an impact on the land value because of increase in fertility and productivity.

Table - 8.1 : Perception on Impact of WSDPs on different variables reported by sample households - Karnataka.

Sl. No.	Variables	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Soil Conservation	172	86	160	67
2.	Moisture Conservation	125	62	128	53
3.	Better yield	92	46	116	48
4.	Fodder and fuel availability	36	18	47	20
5.	Control of soil erosion slow down of rain water run-off	58	29	69	29
6.	Increase ground water table, Increase rainy days, good energy (erosion)	61	30	74	31
7.	Drinking water available for livestock and for horticulture crops	69	35	78	32
8.	Employment Generation	72	36	87	36
9.	Increase in land value	29	14	36	15

8.03 Beneficiaries point out that the structures raised have directly helped to increase the moisture conservation in the soil and similarly to raise groundwater table as reported by the sample households across the watershed. Also, the structures raised and their respective importance are being highlighted by the selected sample households. For example, nala bunds, pickup weir, checkdam gully check, farm ponds mitigated the groundwater table and while bunds of different types helped to increase the soil and moisture conservation. The revealing fact is that dryland farming community are aware of the significance of the structures in rainfed farming in the study areas. Table - 8.2 gives the number of sample households perceived an increase in the moisture conservation of the soil and increase in the ground water table due to different water arresting structures.

Table - 8.2 : Perception on Increase in moisture conservation and raise ground water level due to different Structures

Sl. No.	Structures	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Nala bund	110	50	140	58
2.	Checkdam	106	48	118	49
3.	Farm ponds	62	28	69	29
4.	Gully checks	37	17	41	17
5.	Bunds / small / vegetative	61	28	67	28
6.	Not aware	29	13	32	13

8.04 The number of households reporting construction of structures which have helped to control the soil erosion is presented in Table - 8.3. Bunds have predominantly dominate in arresting the soil erosion in the selected watershed area. Though the other activities like block plantation, gully checks, diversion channel etc. . seem to be not significant, but their importance depends on the landscape / geographic condition which has also helped to some extent to control the soil erosion.

Table - 8.3 : Perception on Controlling soil erosion through different activities

Sl. No.	Activities	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Bunds	39	18	42	18
2.	Vegetative bunds / small bunds	116	53	112	47
3.	Pick up weir	47	21	52	22
4.	Block plantation	110	50	121	50
5.	Gully checks	98	45	110	46
6.	Not known	30	14	37	15

8.05 As already discussed, agriculture, horticulture and forestry programmes have been implemented by the implementing agencies in the selected watershed areas. Apart from other activities, block plantation is also been undertaken in the watershed areas. The impact of this scheme on fuel, fodder is given in Table - 8.4. Overall, the perception of impact of the indicator including more number of rainy days, controlling soil erosion, good environmental condition, availability of green manure etc. show quite encouraging results in the selected watershed areas. Among the indicators, reducing the fuel problem to the beneficiaries households and increase more number of rainy days are more appreciably reported in the study areas.

Table - 8.4 : Perception on Impact of Block Plantation

Sl. No.	Perception	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Eased out fuel problems	56	25	64	27
2.	Increased in rainy days	47	21	53	22
3.	Reduction in fodder problems	27	12	31	13
4.	Controlling soil erosion	17	8	21	9
5.	Availability of green manure	21	10	23	9
6.	Not aware	16	7	29	12

8.06 The perception on farmers' involvement in implementing WSDPs is indicated in Table - 8.5. The majority of the sample households reported that their involvement is necessary / warranted. This trend clearly exhibits that the farming community under dryland agriculture areas have evinced keen interest in participating in the watershed programmes. The sample households, who have expressed that their participation as may not be necessary belong to small farmers category and also lower stratum of the social hierarchy.

Table - 8.5 : Sample Households Perception as regards to involvement in WSDPs

Sl. No.	Involvement is necessary	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Yes	157	71	183	76
2.	No	63	29	57	24
	Total	**220**	**100**	**240**	**100**

8.07 The farmers who reported that their involvement is necessary in WSDPs were further questioned as to at what stages of implementation their involvement is considered as appropriate. The opinions expressed by them are presented in Table - 8.6. The overall impression is that the sample households desired to participate equally in all the stages of planning, implementation and maintenance.

Table - 8.6 : Stages of farmers involvement in the WSDPs

Sl. No.	Involvement is necessary	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Planning	93	42	112	47
2.	Implementation	87	40	94	39
3.	Maintenance	62	28	79	33
4.	Not interested / not known	41	19	53	22

8.08 The sample households perception to strengthen the activities relating to watershed programmes is presented in Table - 8.7. The suggestions that were pointed out are loan facility, new structure, package of practices like suggestions for alternative crops/ contingent crops and need for more horticulture saplings. Nearly one third of the sample households in both states have suggested that more number of water harvesting structures like nala bunds, check dams etc., have to be taken up in the watershed areas. This will help in availability of ground water for the use of livestock and for irrigating horticultural crops - that too during the summer periods. Further, the tendency towards growing horticulture crops are also reported more in number. During the distress period, suitable alternative crops / contingent crops are also been asked by the sample households in the studied areas.

Table - 8.7 : Sample Households Perceptions to Strengthen WSDPs

Sl. No.	Involvement is necessary	Karnataka		Andhra Pradesh	
		No. of Households	Percentage	No. of Households	Percentage
1.	Advance of loans on a) Livestock b) Crop loans c) Land Development d) Farm Implements	 42 51 67 24	 19 23 30 11	 53 59 78 27	 22 25 32 11
2.	New activities (nala bunds, gully checks / checkdam)	76	34	82	34
3.	Distribution of horticulture saplings	64	29	79	33
4.	Need for more remunerative crops	51	23	58	24

9.0 FUNCTIONING OF WATERSHED ASSOCIATIONS AND WATER USER GROUPS

9.01 The 1995 guidelines of GOI on the Watershed Development Programmes (WSDP) emphasises formation of Watershed Association (WA) through User Groups (UG) / SHGs. The Watershed Association consists of all the members of the user groups / SHGs. The members of the user groups / SHGs are the people who have different economic and social interests due to watershed development activities. The Watershed Associations will have to evolve its own working procedures. The WA has to elect its own President.

9.02 The Watershed Committee (WC) consists of nominated members from the user groups and SHGs with five and four representatives each. The Watershed Committee will have its own Chairman. The Watershed Committee will select Secretary and three volunteers. The WC will have its own bank account, which will be operated by the Chairman of WC, one member of Watershed Development Team (WDT) and the Watershed Secretary. The WC will open another account for "Watershed Development Fund". This account is to be operated by the President of WA, Chairman of the WC and Project Leader of WDT. The fund in this account is to be utilised only for repairs / maintenance or further development of activities in the Watershed area. This has to be operated only after the completion of the project period.

9.03 In the sample watersheds studied for the present study, the functionality of the WA, UG and SHGs are discussed in the following paragraphs.

Initiation of WSDP

9.04 The WSDP has been initiated by both the Government and the NGOs. In the following Table - 9.1, the relevant information is given.

Table - 9.1 : Initiation for Formation of Watershed Associations

District	Sample Watershed	Initiation by
Bijapur	■ Shivanagi ■ Tidagundi ■ Jambagi	Dept. Dept. + NGO Dept. + NGO
Kolar	■ Hosurhalla	Dept. + NGO
Anantapur	■ Singampalli ■ Bukkacharla (A) ■ Adadakulapalli	Dept. + NGO Dept. + NGO Dept. + NGO
Mahabubnagar	■ Kodur	Dept. Dept.

	■ Kishan Nagar	

9.05 The initiation of the WSDP has been through village meetings and Gram Sabhas. The NGOs have made continuous motivation and awareness campaigns about the impact of the WS programmes. Also, it is to be noted that where NGOs are not available, the department has taken efforts to motivate the community about the usefulness of the WS programmes.

Formation of WA

9.05 In all the sample watersheds the user groups and SHGs have been formed into WC excepting in Shivanagi Watershed in Bijapur district. Further, WC have been formed in all the watersheds of Andhra Pradesh and excepting in three habitations of Karnataka. The WC have been formed based on the WU groups. It is to be noted that in Karnataka the concept of WUG is diluted after the formation of WCs. However, in Andhra Pradesh, in three of the WS, UG are still functioning while in others UG members do not foresee any problem with the WC.

Functioning of WC

9.07 It is seen that WC are functioning in all the WS where it has been formed. However, it is to be noted that in Karnataka none of the WA have been registered as per the 1995 GOI guidelines. The guidelines of the GOI have not been followed from the beginning. Hence, the actual functioning of the WC depends on the NGO or the Govt. Dept.. The attitude of the implementing agencies including the NGO for follow-up activities in places where the WSD works have been implemented and completed are not encouraging. There has been no follow-up after the completion of the project. Whereas in Andhra Pradesh, the WCs are working well and meeting regularly. The intervention by the NGO and the Dept. has resulted in WC as an effective institution right from the beginning.

Functioning of SHGs

9.08 In all the Watersheds SHGs have been formed. The functioning of the SHGs is limited only to credit facilities among the members only and not extended beyond for development activities. In most of the SHGs there is no forward linkage with financial institutions for taking up income generating activities.

10.0 IMPACT OF THE WATERSHED PROGRAMME

10.01 The success of any programme is judged by the fact that it addresses the issue of equality, maintenance, sustainability and replication on a wider scale. The successful implementation of watershed programme lead to increase in the utilisation of land use status, production and hence increase in the income from crop production. Also it is expected that watershed programmes will increase the fodder production and thus improvement in the livestock sector. The impact on the rural non-farm sector is an important area, which has to be focussed in the watershed programmes.

10.02 Based on the filed study, discussions with the community and observations, the impact of the watershed programme in the selected sample watershed areas are categorised as follows:

- Pre-project and Post-project scenario of the activities in the sample watershed areas.
- Changes in the income of the landowning families in the sample watershed areas.
- Changing cropping pattern due to watershed programmes.
- Impact on the livestock income.
- Employment generation.
- Gender issues.
- Institutional linkages.

10.03 One of the impacts of the watershed programme is on the structural changes in the activities. It is perceived that with more importance given to the land based activities, there will be increased area under cultivation, reduction in the migration status, improvement in the livestock status and other rural non farm activities. In the sample watershed areas, there has been an increase in the cultivated area since the pre project situation. The arable area in the watershed have been fully utilised since the inception of the programme. It is seen that in Karnataka, 76% of the area inside the watershed have been brought under well irrigation. It is 80 % in the case of Andhra Pradesh. It is observed that there has been increase in the number of wells in the watershed area over a period of time and also rejuvenation of dried up wells. This is because of the increase in the ground water levels and soil moisture conservation activities implemented under the programme. The detailed profile of the sample watersheds described in Chapter 6.0 gives the additional area brought under cultivation due to the watershed programme.

10.04 It is observed that there in no major shift from the Farm activities to the non-farm activities. This is due to more dependence on the farm sector and lack of infrastructure facilities availability for non farm sector. The community perceives that there is a reduction in the migration during the project implementation period. This is due to the employment generated in the construction of water harvesting structures. The younger generation in the sample watersheds of Karnataka are still migrating. In the case of sample watershed areas of Andhra Pradesh, due to lack of rainfall during the last three years, migration has become inevitable.

10.05 The activities relating to the livestock improvement has registered a positive impact due to the watershed development activities (see Chapter 7.0, paragraph nos. 7.23 to 7.26). The improvement in the fodder production in the sample watershed areas is one of the reason for this (see chapter 8.0 paragraph 8.02). There are milk cooperatives established in the sample watershed areas. These societies have provided an opportunity towards takingup dairying activity, marketing of milk and substantiating in the income earnings.

10.06 The changing cropping pattern between the pre-project and post-project period clearly indicates a shift towards the cultivation of commercial crops such as groundnut, pulses and horticultural crops in the watershed areas. During the pre-project period since most of the land in the watershed area was either kept fallow or least cultivated, the crops was mainly food crops with low production. The impact of the programme as seen through the changing cropping pattern reveals that in Karnataka the food crops inside the watershed area has improved and slowly changing towards commercial crops such as Groundnut, Cotton and Onion. Also Horticultural crops (Lemons and Pomogranate) are gaining importance in this area. In Andhra Pradesh, Groundnut and Pulses is predominantly being cultivated in the Watershed areas. These aspects are described in Chapter 7.0 under paragraphs 7.33 to 7.38.

10.07 The changes in the income of the landowning community in the sample watershed areas is significant since the implementation of watershed activities. It is seen that the income of the sample households has increased by nearly one third since the pre-project situation. The changes in the level of income is also noticeable in both the states. The average income level has increased in the range of Rs.25,000 to Rs. 50,000. The income from agriculture which is the predominant source, has shown an increase in absolute terms in both the states.

10.08 The issue of equality and gender still requires more attention. It is seen that in the sample watershed areas due to the dominance of the big land owning community, the marginal groups have little say in the programme. The gender equity during employment generation is still biased towards the male group. However, the impact of the programme in Andhra Pradesh has led to in few instances of women being elected as GP President. This is a welcome sign in the empowerment of women.

10.09 The institutionalisation of the watershed programme through the formation of Watershed Associations is a step towards bringing equity and sustainability. However, in reality, the watershed associations are dominated by big land owning community. There is little or no say by the marginalised groups. The functioning of the Watershed Associations in the sample watershed areas is discussed in chapter 9.0.

10.10 The interface between the PRI's and the Watershed Associations is not seen at all. This is because the members of the Watershed associations feel that if the PRI's were given importance in the programme then the Watershed associations would be politicised. The NGO's also feel that if the Watershed Associations are made a part of the PRI's then the implementation of activities will be at the hands of the political leaders.

10.11 The SHG's formed in the watershed areas have a direct positive impact on the economic independence of the rural women. It is seen n both the states SHG's have been formed and is working in various degrees. It is observed that the SHG's credit system is mainly utilised for their immediate needs such as medical, social, repayment of loans and educational purposes. They are not in a position to strengthen their productive activities for further income generation. This is due to the need for more effective linkages between SHG's and financial institutions.

11.0 SUGGESTIONS FOR IMPROVEMENT IN SUSTAINABILITY

11.01 Based on the analyses, discussions and observations on the impact of the watershed programme in the sample watershed areas, the following suggestions could improve in the working of the programme for long-term sustainability:

a) Follow-up by the implementing agencies to the watershed areas after the completion of the activities is vital. would help in the institutionalisation of the system and.

b) The coordination between the different related departments is to be ensured.

c) The funds generated under the watershed development fund has to be utilised only for operation and maintenance of the assets created under the project. It is seen that this fund is not being utilised due to the local political situations prevailing. Also, there is no coordination with the NGO's and the implementing agencies.

d) The Watershed associations could be made a sub committee of the Gram Panchayats, so that the utility of the development programmes could be optimised. Also, all the institutions in the village could be integrated for systematic implementation of development programmes.

e) Linkages should be established between the SHG's and the Financial Institutions for making the women to take-up income generating activities. The GP's could support in the marketing of the produce of SHG's.

f) Identifying the need based rural non-farm activities for equitability and sustainability of the watershed programmes.

g) Need for more thrust on Community participation in the Programme.

h) The lessons learnt from similar external aided programmes have to be incorporated which requires continuous monitoring by the implementing agency. For ex., experiences from the ongoing watershed programme in Karnataka with the assistance from DFID would be helpful for longterm sustainability.

i) The animal husbandry programme has to be intensified in the watershed areas.

j) The forest department should be involved in the Pasture development, Afforestation, Silvi-pasture activities.

k) Development of Process Documentation will generate the institutional memory of the programme.