"A STUDY OF WATERSHED DEVELOPMENT PROGRAMME IN SANGAMNER TALUKA – A GEOGRAPHICAL ANALYSIS"

Thesis submitted for the Degree

of

DOCTOR OF PHILOSOPHY IN GEOGRAPHY

(Faculty of moral & social sciences)

To.

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DECLARATION

I hereby declare that, the entire work incorporated in this thesis entitled **"A Study of Watershed Development Programme in Sangamner Taluka - A Geographical Analysis".** Which I am submitting for the degree of Doctor of philosophy in Geography to **Tilak Maharashtra Vidyapeeth, Pune** is based on actual work carried out by me under the guidance and supervision **Dr. T. M. Varat,** Department of Geography New Arts Commerce and Sciences College, Ahmedanager. I further declare that, to the best of my knowledge no part of the thesis has been submitted before this for any degree in any university or institute.

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This is to certify that, the thesis entitled ***"A Study of Watershed Development Programme in Sangamner Taluka - A Geographical Analysis,"*** *– Which is being submitted herewith for the award of the degree of Doctor of Philosophy in Geography to Tilak Maharashtra Vidyapeeth, Pune is the result of original work done by* ***Shri. Pokharkar Dilip Vishram*** *under my supervision and guidance. This work has not been published previously for any degree or diploma to this or any other university.*

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ABBREVIATIONS

CCT	:	Continuous Contour Trenches
NGOs	:	Non-Government Organization
VWC	:	Village Watershed Committee
MM	:	Mahila Mandal
ICAR	:	Indian Council Of Agricultural Research
CRIDA	:	Central Research Institute For Dry Land Agricultural
CSWCRIT	:	Central Soil & Water Conservation Research & training Institute
MRD	:	Ministry Of Rural Development
WB	:	World Bank
NWDPRA	:	National Watershed Development Programme for Rainfed Area.
CWDP	:	Comprehensive Watershed Development Programme
IMD	:	Indian Metrological Department
IGWDP	:	Indo-German Watershed Development Programme
NABARD	:	National Bank For Agriculture And Rural Development
WOTR	:	Watershed Organization Trust
IVDP	:	Ideal Village Development Programme
DPAP	:	Drought Prone Area Programme
SHGs	:	Self Help Group
GIS	:	Geographical Information System
WDP	:	Watershed Development Programme
WS	:	Watershed
FPC	:	Forest Protection Committee
WATS	:	Water Absorption Tenches
SMS	:	Samyukta Mahila Samiti
FHGs	:	Farmer Help Group
JFPC	:	Joint Forest Protection Committee
GTZ	:	German Technical Co Operation
GOG	:	Government Of Germany
GOI	:	Government Of India
GOM	:	Government Of Maharashtra
EGS	:	Employment Guarantee Scheme
WUS	:	Water User Society.

CHAPTER I

INTRODUCTION

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CHAPTER I
INTRODUCTION

1.1 INTRODUCTION :

In arid and semi-arid regions conservation of water is more important. Where as in sub-humid and humid regions conservation of Soil is the most important. The water conservation in high rainfall area has also become important. Soil and water conservation on the basis of watershed is more scientific as it involves use of principles of hydrology.

Rainfed agriculture in India's semi-arid tropics is characterized by low productivity, degraded natural resources. Most of the people living in the Indian semi-arid tropics depend on Agriculture and natural resources.

Past experience of natural resources management clearly shows that how Gandhiji's concept of village republics can work for ecological regeneration. Each village with an active community forum and ecosystem of its own to control, manage and share the common resources developed and improved with equity.

Ecology, environment and poverty are closely interwoven and inversely related. Ecological degradation is accompanied by an erosion both in the quality and substance of life of the human community living within that ecospecies. The majority of people living within a particular aerospace draw their sustenance from the natural resources obtaining at least 80 % of a household basket of consumption i.e. biomass (food, fiber, fuel, bio-fertilizers) or biomass based. Natural resources mobilization along watershed links involving the local populace so that they own and identify themselves with the endeavour offers a pathway towards sustainable and equitable development. Watershed development programme aspires to not only catalyse village groups in to mobilizing their degraded environment but also hopes to create the space for the arising and unfolding of the peoples movement for sustainable economic development giving ecological and environmental regeneration as a by product.

1.2 HISTORY OF DROUGHT IN INDIA

1.2.1 Definition of the Term Drought:-

The term drought is used differently by different persons depending upon the context and purpose. To the agronomist it is a shortage of moisture for the crop. The hydrologist defines it as when surface and underground water level are depressed and there is diminution of stream flows. According to economist drought means a situation where water shortage ultimately affects the established economy of the region. To the meteorologist drought represents the absence of rainfall.

Thus, drought is not understood as any absolute condition but as a relative terms. It's representation depends upon the context in which the term is used.

1.2.2 Drought in India:-

There has been drought since ancienent period. Prayers for having rains at regular time, for removing drought are found in Rigveda as well as in Sanskrit literature. There is reference to drought in yakshas nirukta, ‘Valmiki's Ramayana' and ‘Jataka Tales’

In his book “Arthasharsha” (Economic) Koutilya had made a rule that in the period of drought the king should provide food grains and seeds from his food storages to the poor people.

- The drought that occurred during the period 1396 to 1408 in the southern region of Narmada river is known a “Durgadevi Cha Duskal” (drought of Durgadevi). During this period many people from Maharashtra migrated to Gujrat and Malva. After that in 1460 ‘Damaji Panht distributed food grains from the government storage to poor suffering people.
- When Shivaji Maharaja was born, during the period 1624 to 1631 there was a drought in whole Deccan and Gujrat.

Aludden Khilji provided food grains during the period of drought. Abul Fazal described about Akbar’s help to the drought striken people. Akbar started construction of forts as well as tanks for storing water so that the people could get employment during drought. He provided food to

people. During the drought that occurred in the period 1629-31 Shahjehan gave relief in revenue.

- In the regime of east India company during the period (1765 to 1858) there were 12 drought and for four times the condition has become worst.

  Romesh Chandra a historian has wittern that during the period 1877 to 1900 near about 1.5 crore people died because of drought.

1.2.3 Post Independence drought in Maharashtra:-

After the independence there were droughts in Maharashtra during the three period viz 1952-53, 1965-66 and 1970-73. In the drought that occurred during 1952-53, 5281 villages were affected in Mumbai state.

The districts suffered were Ahmednagar, Jalgaon, Dhule, Nashik, Pune, Sangli, Satara, Solapur and Thane. But there were no deaths because government of Maharashtra provided help to the drought striken people. The works undertaken were canal construction, contour continuous trenches (C.C.T.) plantation etc.

- In the drought that occurred during the period 1965-66, 16151 villages from 23 districts out of a 26 were badly affected because of drought. The works undertaken were irrigation, soil conservation and water supply.
- During the period 1970-73 there was continuous drought for three years. In the year 1972-73, 2548 villages out of 35800 in Maharashtra state were affected by drought. Since January 1973 the workers were daily provided a good nutritious food named "Sukadi". During this period the works undertaken were percolation Tank, Roads, irrigation, C.C.T. work, wells. In addition to this in drought stricken area educational facilities like relief in fees were given to the students.
- During the period 1984-85 there was continuous drought for the year.

1.2.4 Recommendations of drought commission:-

British government appointed three drought commissions during the period 1877 to 1900. The commission has to report to the government about the nature of frequent droughts, their causes, assessment of the help provided and guidelines for future.

Sir John Strachi was the chairman of first drought commission. The first drought commission submitted its report in 1880.

Following were the recommendation suggested by first drought commission.

1) The drought stricken people should be provided employment. Those who are disabled and unable to work should be provided food.
2) There should be permanent remedy for drought like improving transport system, irrigation facilities and improving agriculture.
3) A separate fund should be established for the expenditure at time of drought

The second drought commission was headed by Sir James Lyol. The commission submitted the report in 1898. The commission recommended the following.

1) Programme of big and small works should be kept ready. The work at longer distance should be given importance if the utility of work is more.
2) The maximum and minimum rate of daily wages should be fixed.
3) A policy regarding relief of land revenue should be decided.

The drought commission headed by lord Mcdonal provided its report in 1901. The main recommendation were as follows.

1) The programme for providing help should be planned. It should include the programme of work in rural area.
2) If there are the sings of drought the works should immediately be started.
3) Wages should be given as per the work done. The rates for daily wages should be fixed.
4) The persons who are unable to work should be provided financial assistance.
5) The government should take-care of forlorn children.
6) For protecting livestock fodder crops should be cultivated. Loans should be provided for purchasing fodder.
7) The help may be taken from non government organizations (NGO's)

The basic characteristic of drought is a steady rise in temperature with absence or severe deficiency of rainfall over a long period. Even though

drought is function of interaction of several variables such as precipitation temp, wind velocity, sunshine, soil texture, soil moisture and the dominant factor is rainfall.

1.3 NEED OF THE WATERSHED DEVELOPMENT PROGRAMME

"Soil without water is a desert and water without soil is useless". Here comes the necessity of soil and water conservation method and technology combining together in agricultural development plan for treating these resources, for achieving the long and sustained increasing production.

The production in dry land is not only very low but also more unstable due to many factors like low productivity of dry lands. Limited scope for adoption of technological changes, scanty and erratic rainfall, depletion of soil and water resources through natural processes and man made problem.

The rainfed farming calls for both soil and water conservation. The development of watershed based rainfed farming therefore aims at development of the area in an integrated manner for increasing overall productivity.

The effects of environmental degradation are all well known. Activities of man like deforestation wrong farming techniques, live stock, over grazing and faulty land use lead to the destruction of plants and trees cover, exposing the earth to the natural forces like heavy rains, direct sunshine, high winds and drought. This leads to environmental problem like soil erosion, floods, or water scarcity. Agricultural yield is lowered and this results in the decline in the income level of the community and often poverty and famine eventually lead to migration from rural to urban areas.

The equilibrium between need and availability will lead to a better and increased resistance to drought, increase in the supply of food, agricultural produce, water, fuel, fodder, timber and as a result improving standard of living and reducing rate of poverty & migration. The unemployment, seasonal unemployment are common in dry land resulting in poverty, insufficient food and imbalanced diet.

The need to maintain better environment and preserve natural resources like soil, water and vegetation was realized by rules and managed through different kinds of villages Institutions (Gram Panchayat, Co-operative society, village

watershed committee (VWC), Mahila Mandal (MM) etc). Damage to vegetation in rural areas leads to damage to soil and environment.

Soil is the surface film of the earth covering the land masses of the earth. This material is of only a few inches to few feet thick. This material is soil. Soil supports vegetation which in turn supports animal life. If this layer on the surface of the earth disappears all the life-plant animal and human cannot possibly grow. Soil is made up of watershed materials of rock, and of decaying vegetables and animal matter.

Today 66 % of area is rained. The productivity of crops in drylands is very low due to soil erosion. The soil erosion is a major problem in dryland. Due to lack of ground coverage with grass/crop during the pre-monsoon period physical factors are damaged in dryland. Today nearly one-fourth of total land surface of India is affected by erosion due to excessive deforestation over grazing and faulty agricultural practices.

Though 33 percent of geographical area should be under forests only 21 percent of area is under forests. At present the effective forest area is only about 10 percent due to widespread deforestation. There are less water resources to meet the requirement of wild animal. Which in turn affected the wild animals leading to reduce there number. Hence there is urgent need for watershed development in drought prone area.

1.4 WATERSHED DEVELOPMENT PROGRAMME IN INDIA:-

In a real sense, watershed development concept was first introduced by the great social reformer Mahatma Jyotiba Phule about quarter and century ago. But the importance of watershed development was realized very late.

After independence the importance to executive authorities at village level has gradually declined in India due to many changes in rules, policies and variation in punishment etc. in the democratic setup and liberalization spirit of freedom. This led to more damage to soil and environment. Hence government of India and different state governments took up afforestation measures. Soil conservation measures; run off water conservation and utilizing techniques etc. To conserve and utilize natural resources. However effective results were not seen on constant and continuous basis.

In India major areas of Rajasthan, Bihar, Orissa, Madhya Pradesh, Gujrat, Maharashtra, Andhra Pradesh and Karnataka lie in the arid zone. Where drought condition prevails and famines occur often. To come out of this evil, there is one ray of hope and that is watershed development.

Different organizations at various location in the country have under taken experiments on watershed basis broadly. There are five different programmes in the country, which differ in terms of techniques, administration, and planning and system composition.

Government of India launched watershed programme in 1983-84 on a large scale in India to conserve and utilize natural resources for higher productivity of crops and more income/employment generation in addition to create better climatic conditions. Watershed development programme was expanded on longer scale. Though it has been carried out since 1983-84 the impact of watershed development programme is to be evaluated for better strategies / policies and to preserve, conserve and utilize natural resources for betterment of mankind.

Indian council of agricultural research (ICAR) New Delhi, adopted 47 watersheds by providing expertise and technical guidance through central research institute for Dry Land Agricultural (CRIDA) and central soil and water conservation research training institute (CSWCRIT). During 1983-84 to 1989-90 forty seven watersheds were selected under different agro-eco regions in India to study variability, impacts on productivity of crops, employment, income in addition to improve micro-climatic condition. Bench mark studies/survery's were conducted before each location and then current/post evaluation studies were also made by these organization.

Total of forty-seven watersheds under were selected and visited to conduct surveys during 2001-2002. In addition to this these watershed were visited by different institutions such as Ministry of Agriculture, Ministry of Rural Development (MRD), Indian Council of Agricultural Research (ICAR) Institutions, International Agencies which funded watershed and Non Government Organization (NGO's). The above said agencies studied the detailed data on various aspects like rainfall, run off, soil loss, soil erosion, ground water recharge, infiltration rate of rain water, surface water, other physical factors, vegetation, productivity of crops, employment and income generation, improvement in standard of living including education and health etc.

Secondly the World Bank (WB) financed four watershed project in Manoli (Maharashtra) Kabbalanala (Karnataka) Mahesh waram (Andhra Pradesh) in dry land area in 1983 which had active participation of agricultural universities. These projects are scientifically managed. They recognized the need of an integrated watershed development in drylands.

Thirdly, the state government such as Maharashtra and Karnataka has under taken up such programmes either with newly established or existing administrative machinery.

Fourthly, the central government activated a national watershed development programme (NWDP) in 1986 which was implemented by state government with some modification. Lastly, there are projects undertaken by non-government organization (NGO's) which have relatively less scientific input and manpower but their result area exemplary.

The national watershed development project for rainfed area (NWDPRA) was lunched in 1992 in 25 states and 2 UTS for restoration of ecological balance and sustaining biomass production. The purpose of the project is to conserve, upgrade and utilize natural resources in an integrated manner using low cost replicable technology. The project directly involves farmers and other beneficiaries in rainfed area in watershed development to conserve rainwater and top soil. The project envisages self employment of poor farmers and rural masses in animal husbandry. Agro-forestry dry land horticulture, organic farming, fisheries, sericulture etc.

In the eighth plan the target was to treat an area of 28 lakh hectares at the cost of 1100 crores. The project was proposed to be taken up in 2621 blocks in which arable area under assured means of irrigation was less than 30 percent. The size of each watershed for development was fixed in between 500 to 5000 hectares.

In 1996 the programme was revised with various new concepts like development of barren lands, artificial recharge of water, participation of people with money or labour work contribution, reuse of village tank and historical tanks.

The project was continued in the ninth plan also and was planned to treat an area of 22.5 lakh hectares. During the first 4 years of ninth plan (1997-98 to 2000-01) an amount of Rs. 745 crores was released. An area of 22.5 lakh hectares was developed. This project was under marco management scheme.

1.5 WATERSHED DEVELOPMENT AT THE MICRO LEVEL CONCEPT

1.5.1 What is a watershed:-

A watershed can be defined "as the drainage basin or catchments area of a particular stream or river" simply, But, It refers to the area from where the water to a particular drainage system like a river or stream comes from. A Watershed may be small, consisting of a few hectars or huge, covering several thousand of hectares.

The above definition is mostly postulated by hydrological unit. But it is beyond doubt that watershed is a biological, physical, economic and social system based on integrated approach. A watershed has a wide ranging effect on the lives of the people at large.

1.5.2 Watershed Approach and Concept :-

Watershed development refers to the conservation regeneration. In terms of resource development it covers development and management of resources like soil, water, plants, animal, human and all associated components. The total resources can be properly developed only by adopting the watershed approach. The basic unit of development is a watershed, which is manageable hydrological unit. In this approach, development is not confined just to agricultural lands alone but covers all the area starting from the highest point (ridge to valley) of the watershed to the outlet of the natural stream.

Watershed management is an integrated and interdisciplinary approach involving manipulation of natural agricultural and human resources to provide goods and services that are required for the sustainable development of the watershed community. Watershed management must consider the social, economic and outside the watershed.

Watershed management usually involves the use of watershed natural resources by people with their active involvement in harmony with the ecosystem.

Watershed development tries to bring about the best possible balance in the environment between natural resources on one side and man and

grazing animals on the other. It requires people participation for conserving the natural resources, which has been destroyed.

1) Land use planning and utilization on its potential
2) Rain water harvesting
3) It is a holistic concept which tries to integrate several components like soil and water conservation structures to control erosion.
4) Maintaining good vegetative cover over the ground to minimize erosion of soil and maximize water retention in soil
5) Maximizing and stabilizing income of the people in the areas through integrated, agriculture, horticulture, livestock, forestry development.
6) Utilization of marginal lands to its maximum potential use.
7) Increase in crop intensity and crop productivity per unit area per unit time and per unit of water
8) Developing social sustainability, equitable distribution of common property resources like water, forest, produce and ensuring people participation.
9) Involvement of the people for sustainable development.
10) Finally it has led to several dimensions of sustainable development e.g. ecological sustainability, soil erosion, rate of silting and ground water recharge etc.

Based on these principles. The following components and sectors were identified which needed attention

1) Soil and land management (conservation and use)
2) Water management (conservation and use)
3) Human resource development (community development)
4) Afforestation
5) Pasture (folder) development
6) Agricultural development
7) Live stock management
8) Rural energy management

Watershed development involves continuous interaction and exchange between various disciplines. When the environment gets degraded the quality of life of the human community within that region also goes down.

Watershed development thus aims at the renewal of the environment in an integrated and comprehensive manner.

The Integrated Watershed Development Programmes (IWDP) are being implemented in the rainfed/drought prone/desert/non forest wasteland area of country. Almost all the state governments are involved in these programme. These programme are being funded by the central government, through the ministries of agriculture, rural development, environment and forest and some foreign agencies like The Word Bank, Indo-Garman etc. All these projects being implemented on watershed basis have a set of the benefits that would flow out of the projects. The results in concrete physical terms that would be achieved at the end of the project.

1.5.3 Community Participation:-

There is a close relationship between the environment and the human community living within that region and which depends on it for food, water etc. When the economic condition of community deteriorates it leads to over-exploitation and degradation of natural resources. People, for whom agriculture gives low return and is a risky gamble, expand their cattle herds for financial security. This leads to overgrazing and in turn to soil deterioration and erosion, especially in ecologically sensitive regions.
It is necessary for people to see the relationship between their poverty and the degraded environment they live in. They must also be provided with an equally good, if not better economic alternative.

Environmental regeneration is possible only when the concerned people see a reason for it and are fully in control of all aspects of resource mobilization, management and conservation.

Hence there can be no sustainable natural resources management unless it involves the participation of all inhabitants of the concerned environment/area in an active manner.

1.6 WATERSHED DEVELOPMENT PROGRAMME IN MAHARASHTRA:-

A major part of the state of Maharashtra falls in the rain shadow of Sahyadri Mountain. In Maharashtra state one third of the area is drought prone area. This covers Ahmednagar, Solapur, Dhule, Nashik, Pune, Jalna, Jalgaon, Parbhani, Buldhana, Beed and some part of Satara and Sangli districts. Scanty and erratic rainfall is not useful at the time of sowing or at critical stage of growth and these are the characteristic marks of this zone. Because of topographic conditions and absence of vegetation, land of this zone have been getting eroded on a large scale. Water run-off and soil erosion lead to wastage of Soil cover & this is very basic reason behind low productivity of these lands. This low productivity affects the income of agriculture.

The royal commission of agriculture suggested the concept of drought-prone area in Maharashtra. So government of Maharashtra started one center in Solapur district (Mohol Taluka) for studying the drought-prone area problem in 1973. The government of Maharashtra started programme related to soil conservation. The land reform law was passed in 1942. In drought condition government works on the private lands as per this law. Maharashtra (Mumbai) is the first state to apply this law in India.

In 1972 state government, introduced the Employment Guarantee Scheme (EGS). The scheme is useful for watershed development programme. After 1977 the EGS programme was introduced on large scale in the State Government started the works like Nala Building, percolation tank, counter bund etc. All these works are scattered up to 1983. There were so many drawback in this programme such as people participation, owner awareness, scientific approach, maintenance and lack of repairing. So the benefit from this programme was not satisfactory.

The soil conservation programme in state on watershed basis is in operation since 1983. The programme based on watershed named “Krishi Pandhari” and “Shram Shakti Dware Gram Vikas” (Development through voluntary labour) were launched in the villages Ralegaon Siddhi and Adgaon. The government of Maharashtra have launched the scheme named “Ideal Village Development Scheme”. The objectives of the scheme are development of ideal, self sufficient village through watershed management. The effect of co-working of NGO’s,

Government Agencies and villagers was the reduced migration and improvement in the standard of living. The small villages are predominantly facing the problem of scarcity of water. The implementation of the programme is through NGO's and monitoring is through different committees. The core sector programme is necessarily implemented through concerned departments on the priority basis. The funds are made available to the NGO's/villagers by operating a joint account. "Panchsutri" (five principles) is the heart of the scheme. These principles are

1) Shramdan (Voluntary labours)
2) Kuradbandi (Ban on cutting of trees)
3) Charaibandi (Ban on open grazing)
4) Nashabandi (Ban on alcoholism)
5) Nasbandi (family planning)

The programme is being implemented in 296 villages covering 193 Talukas of 33 districts. The 247 NGO's are engaged in this programme. Many watershed projects like Ralegaon Siddhi and Hivare Bajar in Ahmednagar districts. Date watershed in Kolhapur disrict. Gunj watershed in Akola district. Aadgaon in Aurangabad district have become successful. There is considerable increase in number of wells, irrigated area, cropping intensity and ground water tables. The productivity of cereals, pulses and oil seeds have been increased. The response of the 'Panchsutri' is found to be excellent. Ideal village development programme is a major component in Maharashtra.

Government of Maharashtra accepted the watershed development scheme in 1983-84 with merits and demerits. The concept is an important landmark in the history of soil and water conservation programme in the state. The work started from ridge to valley for soil and water conservation. The programme named Comprehensive Watershed Development Programme (CWDP) has been launched for the first time in the country.

In 1996 government of Maharashtra revised this programme with various new concepts like development of barren lands, artificial recharge of water, participation of people with money or labour work contribution, reuse of village tank and historical tanks. This programme is commonly known as "Integrated Watershed Development Programme" (IWDP)

At present there are 1505 watershed in 338 talukas. On an average there are four to five watershed in one taluka.

Maharashtra State

- Total cultivable area – 2.08 lakh ha.
- Drought prone area – 1.12 lakh ha.
- Tehsils affected – 87
- Villages affected – 17000
- Population in Drought Prone area – 2.5 crors

In the 'world Atlas on environment' Maharashtra has been shown as probable area for desertification. Hence to counteract such situation from arising we must adopt watershed development.

Ahmednagar district is drought prone area and scarcity zone in Maharashtra. Most of the area of Ahmednagar district is rainfed and problems of rainfed agriculture are many and of veried in nature. These are as are related to climatic factors, rainfall and its distribution. So conservation of dry land area for sustained production is a big task. Integrated management of soil, water, plant, man and animals is necessary for more production on sustainable basis for overall development of the area and for conservation of environment.

The efforts for watershed development are being made in Ahmednagar district. In addition to the efforts taken by the government many NGO's are actively involved in watershed development project. In Ahmednagar district some projects are being implemented by NGO's. Notable among them are Hivare Bazar, Mhaswandi, Shivapur, Kasare, Karegaon, Pimpalgaon Wagha, Mendhvan, Gunjalwadi, Darewadi, Sarole Pathar etc.

Thus, Maharashtra is one of the leading states in watershed development programme.

1.7 SIGNIFICANCE OF THE STUDY

Nature is most responsible in producing the greatest varieties on the earths surface. Nature affects human activities and is affected in turn. In natural factors we can include all those objects which may be included in ecological environment.

Rural life is closely related to nature. In rural area all actions of a man, economic as well as social are dependent on nature.

Water is essential for human, animal and plant life. Realization of its full potential is essential for agricultural development. The development of water resources and their utilization is a great significance.

Watershed development project are designed to harmonise the use of water, soil, forest resources in such a way that these resources are conserve. While raising agricultural productivity both by conserving the ground water and increasing irrigation through tank and water harvesting.

A fundamental concept of soil conservation is in correct land use. That is the use of the land in such a way as to obtain maximum productivity with minimum erosion. Watershed project have become widespread in rainfed areas in recent year.

There was increased employment for rural people due to soil and water conservation works and this improved income of people in watershed villages and reduced migration of labour from these villages to outside.

Soil and water conservation structures in arable and non-arable lands reduced soil erosion, soil loss, runoff water etc and increased rainwater infiltration, ground water tables, surface storage, cropping intensity. Productivity of crops, sapling's of different forest tree species, horticultural plants, grass etc.

Hence watershed development programme was considered the best programme to conserve soil and water to increase, vegetation and water resources to improve productivity of crops to generate employment opportunities in rural area. Thus the programme was aimed, prepared, planned and implemented with aim of enchancing food, security income and employments generation and natural resource conservation.

The people of Sangamner taluka adopted a technology driven rural development model with packages designed to meet the existing situation. He aim was to live in harmony with nature and ensure food and water security (drought proofing). Tree roots increase soil porosity to hold were subsurface water, provide shade to conserve soil moisture, provide a most microclimate, and provide fodder for animals for compost. Along with construction of farm ponds, soil conservation is ensured and ground water tables is raised.

1.8 SELECTION OF THE STUDY AREA:-

Sangamner taluka of Ahmednagar district selected as a study region for present investigation is one of the important and biggest Taluka in Ahmednagar District. The

absolute location of the Taluka is $18^0$36' to $19^0$01' North latitude and $74^0$01' to $74^0$56' east longitudes with the total geographical area 1,68,300 ha. The number of villages are 171. It lies in the lower reaches of Pravara and Mula basin, which is one of the well watershed parts of the Maharashtra state. Four rivers benefited by the important irrigation sources available in the region. These are the tributaries of Godavari river. These tributaries are Mula which is to the south, the Adhla and Mahalungi to the west and Pravara which flows through the center of the study area.

Ahmednagar district has been considered as typical scarcity area since long time. The fact finding committee (1960) considered Sangamner taluka as chronically scarcity affected area in various grades. The region enjoys a moderate type of climate with very little extremes of heat and cold. The study region is located in the rain shadow zone. It lies in the semi-drought affected region of the Ahmednagar district of Maharashtra. Due to deforestation on large scale the rainfall is erratic and it affects environment badly. It results in excessive run-off and soil degradation, lack of irrigation facilities, lack of fodder and biomass availability due to scanty rainfall. Agriculture production of projected villages is largely variable. The location of projected area is very typical, where there is no irrigation source because of all factors mentioned above.

This programme is being implemented largely in dry, semi arid region of Ahmednagar district, which comprise as much as 70 % of its geographic area. The Sangamner taluka is a semi-arid, chronically drought-prone area. The average rainfall pattern of Sangamner region ranges from 150 mm to 500 mm.

Livelihood systems in these semi-arid regions are rain dependent and with regular crop failure. People are forced to either seek employment on government funded emergency relief works or migrate in search of income. Raising of herds of sheep and goats provide some buffer. Topography is barren and undulating with shrub vegetation which is heavily grazed. Water tankers were supplying drinking water to these villages throught the year. The environment being extremely degraded and harsh more families depended upon daily wages, labour works & dry land farming. Some families are depend upon liquor business for income source. Some projected villages should truly be described as a desolate villages.

This case study is based on a concrete & long experience in the field credibility as well as the relationships built up over the years was able to bring together at the local level namely the Sangamner region. Various NGO's, private institutions, villagers and

government department in collaborative dynamic directed at regenerating watershed along participatory lives. This experience of the Indo-German watershed program (IGWDP) is now called the "Sangamner Pattern". It involes a place called Sangamner in Ahmednaagr District of the Maharashtra State in India.

The watershed development programme is closely associated with social as well as economic standard of rural people depending on cropping pattern, development in cash crop, grazing land development, deforestation, plantation, live stock, soil and water conservation. A programme for ecological renewal and environmental regeneration along with watershed lines was designed and implemented by IGWDP in fifteen villages in Sangamner Takula of Ahmednagar District in Maharashtra.

All these aspects have been presented in detail in this study. Further, the impact of watershed development program will also be studied.

1. 9 OBJECTIVE OF THE STUDY

The study has been undertaken with the following specific objectives -

1) To study the impact of the programme on Soil & water conservation, area under cultivation and agriculture production.
2) To study the changes in cropping pattern, land use, crop productivity and improved livestock: Before & After completion of the project.
3) To examine the changes in the ground water level and soil, erosion.
4) To study the socio-economic development of the community directly or indirectly dependent on the watershed.
5) To examine people's participation in watershed program & women empowerment in WDP.

1.10 HYPOTHESES OF THE STUDY

Following hypotheses will be tested on the basis of quantitative and qualitative in the proposed study.

1) The increase in the area under cultivation due to watershed development project.

2) Implementation of WDP and improvement in ground water level.
3) Changes in cropping pattern and agricultural production.
4) The social and economic aspects will also change due to this programme.
5) Employment opportunity will be increased by the watershed development programme in the study area.

1.11. SCOPE OF THE STUDY:-

Scientific management of land is one of the aspects of sustainable agriculture land being the fixed resources. The perpetual flow of food, fibre and fuel can be sustained only if the productivity and quality of land is maintained. Integrated watershed management has been accepted as the most rational approach in preventing deterioration of ecosystem, restoration of degraded lands and improving the overall productivity for sustained use.

The study is centered around the theme of geographical analysis of watershed development programme and its success. Now a days rainfall is becoming too erratic, uncertain, uneven and therefore the finding of this study will also be useful to the government to plan for strategies regarding rehabilitation of dry land area in Maharashtra which was 87 percent of rainfed/dry land area. The watershed development programme is an inevitable to these area to come out of the adverse conditions. As such the inference drawn from this study will create awareness among the farmers about the importance of watershed development programme. The findings will be useful for the benefit of farmers in the watershed area.

It is an attempt at comprehensive investigation of environment aspects of watershed management, in real time perspective using GIS techniques. The study analyses the soil erosion, water run-off recharge of the ground water by various soil and water conservation, productivity of soil and the stability in crop production, employment opportunities in rural area, reduction in environmental degradation, preservation of forest and maintenance of socioeconomic status increased through agriculture production management and development of livestock. This study has provided a package of scientific knowledge that can be used effectively to transfer technology from the researcher to the user.

Such a study would help to improve understanding of relationship between environmental causative factors and soil loss. The study highlights the relative contribution of causative factors to the soil loss, which helped to give guidelines for erosion control and frame appropriate conservation strategy (Agronomic and engineering). It is hoped that the recommendation shall be useful for controlling soil loss and intern improve the crop yield at the field as well as at regional level.

The findings of the study are restricted to specific objectives and the same are based on the village level data of watershed area selected for the study. The data was collected from the beneficiaries, village watershed committee (VWC) records, self help groups (SHGS), soil conservation department, forest department and other government office records, NGO's records and through interviews.

There were some difficulties in obtaining certain information from the implementing agency. The conclusions of the study with some modifications could be used to plan for watershed development activities in other area having similar set of topography and agro climatic conditions.

CHAPTER II

REVIEW OF LITERATURE, DATA BASE AND RESEARCH METHODOLOGY

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CHAPTER II

REVIEW OF LITERATURE, DATA BASE AND RESEARCH METHODOLOGY

2.1 INTRODUCTION :

In recent decades, more and more developed countries and developing countries have increasingly adopted watershed management to establish and enabling environments for integrated use, regulation & treatment of water & land resources of watershed based eco-system to accomplish resource conservation and biomass production objectives and there by sustaining social and economic development. In India, since the inception of WDP funded by the ministry of rural areas & employment in 1995-96. For rehabilitation & development of Micro watershed, the world bank (WD), Danish development agency (DANIDA), state institute of rural development (SIRD). Swiss development corporation (SDC), Department for International Development (DFID) and Indo-German watershed Development programmes (IGWDP) provided direct funding support.

Government of Maharashtra has been a pioneer in watershed development having a separate department for carrying out watershed development activities, having regard to the NGO activity in the field of watershed development in Maharashtra Indo-German watershed Development programmes (IGWDP) is being implement in Maharahstra state since 1992 through direct involvement of NABARD. It is, therefore, the need of the hour to review the impact of watershed on conserving & developing natural resources. The available literature that has directly or indirectly related to the aspects of the study has been presented under the following heads.

2.2 CONCEPT AND COMPONENTS OF WATERSHED DEVELOPMENT PROGRAMME

- Gupta (1989) – Stated that the watershed development concept is a peoples project not an area project. The rise in the income of the people will be the progress and success of the concept. There is increase in area of agriculture land and number of wells or ponds on hectarge of area treated.

- Chandra (1990) – Indicated that watershed is the hydrological unit, which contribute to a common drainage point. All water and land drain through the point.
- Hanshurni (1994) – Explained that a watershed is a hydrological unit defined in the landscape. Where all the surface run-off inside the watershed boundary drains through this point.
- Mhegera (1994) – Reported that catchment can be defined as an area of focus or a natural unit of drainage run-off water to a common point. It can be based on the hydrological boundaries or on social and administrative boundaries.

2.3 ORGANIZATION AND WORKING PATTERN OF NATIONAL WATERSHED DEVELOPMENT PROGRAMME.

- Singh and Sharma (1989) – Stated that the watershed management project in the rainfed area consists of three parts.
  1 Basic land treatment to conserve moisture, control erosion and harvest run of water.
  2 Application of software agronomic practice and
  3 Alternative land use.

  They further pointed out that the integrated management of soil, water, plant, man and animal is necessary to maximise production on sustained basis for overall development of the area and for the conservation of the environment.
- Katyal and Das (1994) stressed over integrated watershed development for permanent water resource for sustainable agriculture.
- Hammas (1994) observed that watershed development programme yielded significant economic and environment benefits. This has resulted in enhancing to enhance the crop yields, income and employment. It also led to a reduction in the variability of dry (non-irrigated) crop yields. They future explained the other benefits i.e. regeneration of degraded lands, improved moisture availability and increase in ground water table, land use systems, improved fuel and fodder availability.

- Rambabu (1998) observed that soil erosion and land degradation posed major environmental and economic problem that obstructed the sustainable development of Indian economy.
- Ray (1999) pointed out that the system provided much needed firewood and fodder and resulted in higher productivity from large.

2.4 IMPACT OF NATIONAL WATERSHED DEVELOPMENT PROGRAMME FOR RAINFED AREAS ON AGRICULTURAL DEVELOPMENT

2.4.1 Land Utilization:

- Bhoj (1989) revealed that mini watershed project in phulbari district in orrisa, had not only provided enough water for domestic use but had also brought their degraded land back to life.
- Chaurasia and Singh (1991) reported that soil loss from kharif crop production in Naurar watershed of Almora district (U.P.) was reduced from 4612 metric tones to 992 tonnes because of watershed development. It led to specialization in crop production which fulfilled the minimum requirement of farmers need, as well as produced crop income equal to the existing level.
- Singh and Singh (1991) revealed that after the implementation of watershed development programme at Kendhar in Jalan district (U.P.) the gross cultivated area increased from 696 hectares to 1088 hectares during 1983-84 to 1988-89 years.
- Pimparikar (1994) observed in his study of Adgaon watershed that there was substantial increase in irrigated area from 63 ha (1983-84) to 500 ha (1991-92) due to development of watershed project.

2.4.2 Cropping Pattern:

- Bhoj (1989) observed district shift in cropping pattern of farmers in the Munsiguda mini watershed of Maharashtra. The traditional crop like Rice, Bajara, millet were replaced with high value crops like turmeric, groundnut that were introduced after the implementation of watershed programme.

- Singh (1991) studied the impact of watershed development in Jhansi district of Bundelkhand region (U.P.) and pointed out that after the implementation of watershed project there was shift in area from pulses to cereals and oilseeds during the kharif season. In the Rabi season, the shift in area was in favour of cereals from pulses and oilseeds.
- Pendke (1997) In his study of Wagarwadi watershed in Maharashtra found that a wide range of crop like cotton, gram, groundnut, were grown as compared to pre-project period, where in they were growing only Jawar & Bajara.
- Shinde (1997) In his study of the impact of Ghodegaon watershed stated that there was 5.04 percent increase in area under tur crop, 4.75 percent in gram, 3.6 percent in sugarcane, 1.98 percent in wheat. While there was reduction in area of crop such as Bajara and Jawar.
- Mahandule (1991) revealed that various activities of watershed development in the drought prone area of western Maharashtra proved to be effective in the conservation of soil and water resources as a result of which proportion of irrigated area and the cropping intensity increased by 30 and 53 percent respectively. These changes have made positive impact on the resources.
- Umrani (1991) concluded that wells in Kolhewadi watershed area (Maharashtra) now hold enough water for irrigation and drinking. The farmers now use improved equipment. Fertilizer use has gone up and the cropping intensity has increased by 17 percent and area under horticultural plantation increased tremendously.
- Kapse and Shinde (1999) indicated that various treatments carried out in the Nannaj villages of north Solapur tahsil helped to bring remarkable changes in case of beneficiaries. The proportion of area under irrigated crops was two and half times more on the farms of beneficiaries. As a result beneficiaries could diversify their crop activity which resulted in increase in high value crop including fruits and vegetables.

2.4.3 Crop productivity:

- Verma (1991) reported that the productivity of crop has increased during the post implementation of soil conservation measures in Avanashi Taluka of Coimbtore district Tamil-Nadu. The productivity of fodder cholam had increased by 63.34 percent. The productivity of cotton had increased by 23.37 percent respectively.
- Shrivastava (1991) observed that the effect of watershed in Mandsaur district (U.P.) on the yield levels was positive. All the crops showed higher yield level. The increase in yield was more in case of rabi crops than in kharif crops.
- Narayan (1991) observed that farmers of watershed area obtained higher crop yields then their fellow farmer in control villagers. The mean yield of ragi and groundnut was 1219 and 812 kg/ha in treated area, but it was 912 and 584 kg/ha respectively in the non-treated area.
- Singh (1995) In his study on watershed approach in improving the socio-economic status of tribal area in Rajasthan reported that after implementation of project for five years (1988-89 to 1992-93) the productivity of paddy, Jawar, Gram and Wheat had increased.
- Pendke (1997) revealed that yield of mung, udid had increased by 159.25 percent and Jawar by 19.67 percent. He further observed increase in yield of gram, tur, cotton, bajara, sunflower and sugarcane.
- Deshpande (2001) In the survey of NWDPRA watershed in Maharashtra observed that the crop productivity levels on beneficiary farms were higher. Than the productivity levels on non-beneficiary farms. The crop productivity during kharif was 10 percent whereas in Rabi and Summer seasons it was at an average of 20 percent and 25 percent respectively.

2.4.4 Crop production technology:

- Mahandule (1991) revealed that various activities of watershed development in the drought prone area of western Maharashtra had made positive impact on the resource use structure of individual farm level. The usage level of human labour, bullock's organic manures, application of nitrogen and phosphorus fertilizers had increased the yield production.

- Alshi (1991) reported that the yield of important crops in the Gunj watershed project in Akola district (M.S.) had increased substantially in 1989-90 due to adoption of recommended package of practices over base year (1984-85). The yield increased particularly due to use of high yielding varieties by the farmers.
- Shinde (1997) stated that there was shift in varieties of crops after development of watershed. He observed 100 percent shift in varieties of bajara, cotton, tur, mung, udid, sunflower, groundnut, rabi jawar and wheat as against 50, 90, 50, 35, 55, 60 and 80, 60 percent respectively before watershed development.

2.4.5 Source of Irrigation:

- Prasad (1997) observed that the number of wells during 1985-86 was 09, which increased to 39 during 1992-93 because of water percolation due to watershed structures.
- Pendke (1997) revealed that the number of well has increased from 120 to 539.
- Palande (1989) concluded that 22 percent small farmers improved their old wells either by renovating them or further digging. 15 percent dug new wells, 14 percent installed pumpsets and 11 percent installed pipeline due to the implementation of IRDP in Shrirampur Taluka of Ahmednagar district.

2.4.6 Livestock Position:

- Talashikar (1990) reported that due to increase in vegetation and forest area in watershed, the respondent started their subsidiary occupation of dairy and poultry. It was also reported that the number of crossbreed cows increased from 20 to 100 with milk production of 6 liter/day on the other hand 10 farmers, had adopted poultry.
- Pimparikar (1994) observed that the beneficiaries shifted to other subsidiary occupation such as dairy, goat rearing besides agriculture as the main occupation. The number of crossbreeds cows increased from zero to

425 in the year 1991-92 and milk production increased from 100 liter/day in 1983-84 to 800 liter/day in 1991-92.

- Palande (2000) observed that all the beneficiaries' categories i.e. marginal, small and big farmers together were having cows (84) bullocks (138) buffaloes (44) sheep (68) and goats (130) before programme. This number increased upto 191, 196, 103, 97 and 250 respectively.

2.4.7 Employment Sources:

- Bhoj (1989) revealed that the farmers who were earlier engaged on their land for only 2-3 months in a year were later engaged for 200 days in a year on their land.
- Phulke and Satpute (1992) In their economic evaluation of Adgaon watershed stated that only 460 persons were employed in agriculture before watershed programme which had increased to 770 persons over the period. 80 percent increase in employment in agriculture was observed.
- **Bhople and Patki** (1998) observed that 50 percent of farm women labours got an employment for about 6 to 9 months followed by 38 percent employed for more than a month in farming.

2.4.8 Occupation:

- **Chinnappa** (1991) revealed that agriculture contributed nearly 63.90 percent and 66.00 percent income under irrigated and unirrigated situation respectively while dairy contributed 16.79 and 18.00 percent income while wages accounted for 7.25 and 8.86 percent income in irrigated and unirrigated situation respectively. The other occupation business and service contributed neligiable income in both the situations.
- **Patangre** (2001) observed that 70 percent of the respondents were engaged in dairy + agriculture, while 11.87 percent were engaged in dairy + agriculture + service and 10.64 percent were engaged in dairy + agriculture + business. Only 6.87 percent of the respondent were engaged in dairy alone.

2.5 IMPACT ON SOCIO – ECONOMICS STATUS:

- Patil (1997) observed that majority were from 'Low' socio-economic status group while 44.55 percent of them were from the high socio-economic group.
- Patki (1997) indicated that maximum number 53.64 percent of the respondent were in medium socio-economic status category while 31.28 percent belonged to low socio-economic status category and only 15.08 percent of the respondents belonged to high socio-economic category.
- Pendke (1998) reported that due to development of watershed there was substantial increase in machinery and implements i.e. 7 tractors, 2 matadors, 1 jeep, 5 threshers, 539 electric motors, 40 bullock carts, and 50 spray pumps during 1991-92 as compared to that no tractor, matador, jeep and threshers, 120 electric motors, 25 bullock cart and 17 spray pump.
- Chapin (1998) reported that Socio economic status is the position of an individual or a family, which occupies the prevailing average standard of cultural position, effective income, material possession and participation in group activity of the community. It is thus an important determinant in brining out change in the outlook of an individual.

2.6 WATERSHED MANAGEMENT SOCIAL PARTICIPATION (PEOPLE PARTICIPATION) AND SUSTAINABLE DEVELOPMENT:

- Bhogle (1990) found that the most (68.00 percent) of the respondents were in 'Medium' social participation category, while few (17 percent) belonged to 'Lower' category and 15 percent were from 'Higher' category.
- Pimparikar (1992) observed that majority (92.34 percent) of the respondents were the members of co-operative society, while 5.88 percent were the members of Gram-panchayat, 2.25 percent of them were officer bearers of the organizations.
- Pathan (1994) revealed that majority (81.02 percent) of the beneficiaries were having 'Low' level of social participation followed by 14.81 percent and 4.17 percent of the beneficiaries having 'medium' and 'high' level of social participation respectively.

- Chaudhari (1997) observed that maximum (31.00 percent) number of the respondents were members of co-operative society followed by a good size (21.00 percent) of respondents who were member of youth club, whereas only 16% were member of Gram-panchayat and 20 percent respondents did not participate any organization.
- Palande (2000) indicated that social participation of NWDPRA was 38 percent of marginal farmers, 20 percent small farmers, 24 percent big farmers had 'better' participation, while 8 percent marginal farmers, 24 percent small farmers, 11 percent big farmers and 91 percent labourers had 'no' social participation.
- Shingade (2001) observed that social participation had positive and significant relation with socio-economic impact of member of dairy co-operative societies.
- Hardikar (2002) observed that small social participation had positive and significant association because of the impact of NWDP.

2.7 VIEWS AND DIRECTIVES OF LEADERS IN NATIONAL WATERSHED DEVELOPMENT PROGRAMME FOR RAINFED AREA (NWDPRA):

- **Anna Hazare (The Pioneer of watershed development Programme):**

  The Ralegan Siddhi Project is a case of village level comprehensive micro-watershed development, located in a drought – prone area of Deccan plateau, carried out under the leadership of an ex-serviceman of Indian Army, by properly utilizing financial technical and organizational help provided by Maharashtra State Government Agencies, and Voluntary Agencies and by ensuring people's participation in the process.

  This project has achieved the most comprehensive result of village level micro watershed development. Drastic increase in irrigation facilities, establishment of institutions for management and sharing of irrigation facilities, suitable change in land – use and cropping patterns, substantial increase in crop-yield and livestock productivity, provision of adequate income and employment opportunities are the outcomes of this project.

Success of this project has gained a lot of publicity and several voluntary agencies are trying to replicate this in other villages nationwide.

The state Government has formulated ideal scheme called "Adarsh Gram Yojana (AGY)" with the help of Shri Anna Hazare and other pioneers in this field. Under this scheme a committee headed by Shri Anna Hazare will develop 300 villages from various part of Maharashtra on these lines.

- **Shri Vijay Anna Borhade (Adgaon Watershed Development An Expertise in Water Resources)**

  This project is an ideal a case of village level integrated micro watershed development in a drought – prone area, located on Deccan plateau, and carried out by a regional voluntary agency – Marathwada Sheti Sahayak Mandal (MSSM) with the help of funds from a foreign agency, technical and financial support from various agencies of Maharashtra Government and by ensuring people participation.

  Government organization has achieved lot of favourable changes in the village. There is substantial increase in irrigation facilities, diversification in crop cultivation and horticultural plantation, increase in crop and livestock yield, generation of adequate income and employment opportunities, are the important out comes of the project.

- **Fa – Harman Bacher (Scientific and Technical Support and the Chairman – WOTR)**

  The Watershed Organization Trust (WOTR) is an NGO established in 1993 to undertake development activities in resource- fragile rainfed areas. The main focus areas of WOTR are capacity building of village groups and NGOs for participatory watershed development, self helf promotion, direct implementation of watershed project, micro finance activities, training and extension for organization.

  It was therefore decided to initiate a large scale programme of participatory watershed development. The need for adequate finance technical and managerial support led fr. Herman Bacher who had long experience working in the NGO sector in rural Maharashtra presently known as the Indo-Garman Watershed Development Programme (IGWDP)

WOTR operated in 4 states, Maharashtra, Andhra Pradesh, Madhya Pradesh and Rajasthan. It implements and directly supports 121 NGOs facilitating watershed treatment in over 385.836 hectares involving a population of more then 500000 in 30 districts of above 4 states.

It was heartening to note that wherever watershed activities were under taken in comprehensive manner by people themselves the effect of drought were hardly noticeable or greatly mitigated in villages like Medhvan, Sherikoldara, Nandkheda, Darewadi, Dongaon and many others. Which were traditionally water – supply tanker fed villages and where people migrated during times of drought, continued to live life in years of normal rainfall. The surrounding areas presented a study in contrast.

The Indo-German Watershed Development Programme proved to be very fruitful in the low rain fed regions and it has motivated the vast majority in India. German government has taken the note of fa Bacher's Initiative in the watershed development programme and awarded "Federal cross of the order of merit" award for his out standing contribution.

- **Shri Vilashrao Salunkhe (The pioneer of Pani Panchayat)**

The Naigaon Project is a case of village level micro – watershed development carried out by 2 voluntary agencies with the help of fund received from Government agencies and foreign funding agencies and by organizing people to contribute, utilize and themselves manage, the water distribution project. This project has focused in effort on development of integrated watershed management of Naigaon village and on replication of informal co-operative lift irrigation scheme for equitable distribution of water in the surrounding areas. This project has been regarded as the earliest efforts made in India for the systematic development of village level Watershed and spreading the elements and principles generated by successful experiments.

- **Annasaheb Shinde (Former Union Agricultural Minister for Central Govt.)**

The programme of the agricultural product is needed to be given proper direction and meaningful appearance. Today also, crops are grown in many parts of the country in a traditional way. The agricultural land in the country should not be used in a traditional way but an agricultural product

programme should be undertaken in a new direction by giving emphasis on the growth of pulses, oily seeds, fruit gardens etc. Available water resources should be used for the crops in a large quantity. The traditional method of providing water to the crops is very inefficient. If water is supplied in the traditional way, only 35 percent water is used up by the crops and 65 percent goes waste. It is necessary to make the foundation of the agricultural soil wide by making it wet. Unless it is done, the uncertainty and hardship in the lives of farmers will not be reduced.

- **Comrade Datta Deshmukh (The pioneer of the eight months water distribution policy)**

  Occurring to Datta Deshmukh instead of supplying water in abundance to the agricultural land, priority must be given to the research in which dry agricultural land should produce more without much water. Large dams should not be built. Our need of water can be fulfilled only by watershed development programme and small dams.

  The planning should be made by setting an objective of bringing 6 to 70 percent land under water in Maharashtra.

  Every acre of land should be provided guaranteed water at least for one season / crop and if it is so, the needs about health the needs of industrial, civil and rural life are likely to be satisfied and it must be done. Until today, there was consideration of the water on the surface of the earth only. The water inside the earth was not considered so much. The stock of water on the surface is reduced due to evaporation but the collection underneath the surface remains protected.

  The need cannot be fulfilled by "Block water, Absorb water method" in the watershed management programme only. Because watershed management programme can be successful in certain situation only where there is barren land, the area under agriculture is less, where water flows down the slope to the following streams. In such type of land only, this programme will be successful and useful. Out of the whole agricultural area in Maharashtra only 10 percent area comes under this category.

- **Mohan Dhariya (The Promoter of Vanarai - An institution, related to environment)**

  The president of Vanrai, an institution working for environment related tasks, has recommended to create accumulation of water by building weirs with empty sacks of cement for 2/3 months from place to place.

  Right of public on water:- Water is a natural gift and the public has equal right on it. The government should manage the public contact from the point of view of social justice by playing the role of trustee. As well the central government has announced National water policy in 2000. In that policy it was recommended that drinking water should be the first the priority and then agricultural water and water needed for industries.

  The rain water in a particular area should be blocked in the same area. Only then, every village will be free from tankers. The villages depending on tankers should form "water-brigade" to block the water in the same area where it falls and the water falling in the fields should be blocked in the same fields. More trenches, and wells should be dug and sediment should be drawn out from the dams / lakes / ponds old wells to block more water. Constructing the dams with empty cement bags should block streams, brooks. As well as the rain water falling on the tops roofs of the buildings, temples, schools should be turned the nearby wells. The determination of the water-brigade should be tanker free village.

- **Dr. Mukund Ghare (A senior expert on underground water in Maharashtra)**

  The watershed management programme is a guaranteed way to come out of drought. Every hector costs one lakh sixty thousand rupees for sprinkling and as per the new planning of watershed management project it costs 10 thousand rupees only. In fact the highest number of people under poverty line and marginal farmers live in watershed management project area. While building any dam it's lifetime is assumed nearly one hundred years. Though we assume the lifetime two hundred years, the question arises what will be after that. The possibility of remaining the flat land in the water of Shivasagar, Nathsagar can't be denied. These dams have been filled with sand

and mud by the collection of flowing water as there are no watershed management project to block the soil and water.

Agriculture in dry land, agricultural products, forestation, dairy products, water recharging, change in cropping pattern & such other solutions will have to be found by making watershed management development.

- **Dr. B.G. Dhokarikar (Former Director of Groundwater Survey Development, Government of Maharashtra)**

The management of heavy rainwater is possible when the following water percolation is stopped and water is stocked in the cavity of stones/ rocks. For that the water obtained from four months rainy season should be considered independent and it is necessary to manage the water at the time of flowing away.

We ourselves have created obstacles in the process of percolating water in the bowels of the earth by blocking the flowing water and then scooping it.

Under 'Block water and absorb water', we are having progress in the technique of blocking water. But such progress is harmful. An increase in water level at one place is not the effect of blocking water but it is the effect of rejected recharge at another place. When water is blocked in hard rocks, the water enter in the bowels of the earth and water level increases.

Stock of water should be increased in bowels of the earth with the help of hydro fracture in the villages, field and dry land. Artificial stock of water in the watershed development programme causes to sustain stock of water in that area for longer time.

Scientific remedies to overcome the shortage of water:

1. Artificial small and micro recharge in watershed management area.
2. Hydro fracturing method
3. Bore blast technique
4. Jacket well technique
5. Facture seal cementation technique
6. Recharge by trench like filter method
7. Refilling of water under earth by bore wells

These techniques should be used.

- **Dr. B.M. Karamarkar (Senior expert on Underground Water Source)**

  By creating series of farm-lakes in the watershed management programme area, consistency in the planning should be created. If we create serial farm-lakes, they will be suitable alternatives for weirs. Attempts are being made all over to block every drop of rain water and to absorb and stock it underground. Of course, it is earnestly needed. By doing various experiments, it is possible to be successful. It is seen that the works done in the watershed development area emphasizes only surface treatment. It is necessary to plan and manage the water absorbed and blocked underground with great efforts. The problem of shortage of water can be overcome along with efforts of refilling of water, its management and awakening of local people is done.

- **Shri Popatrao Pawar (The Promoter of Watershed Development Programme and the Transformer of the village Hiware Bazar into an ideal village)**

  The problem of migration of the village was solved by the five principles such as prevention of cattle grazing, prevention of cutting trees, prevention of alcohol, family planning and shramdan. Stray grazing was stopped. From the top to bottom of the mountain there was work of C.C.T. The plantation of trees, growing of grass on dryland & other such activities and the campaign 'Plant Trees Save Trees' was implemented. Because of loose boulder Structure, percolation tanks, checks dams and farm-lakes, there was availability of water from eight months to twelve months. The water is available until June. In the surrounding on the land of 300 to 400 hectres, near about 8 to 9 lakh trees have been planted. There are 171 wells, 51 nala bunds, 07 percolation tanks, 02 cement weirs. There is a scheme like 'where as a well, there is electricity.' It has changed the economy of the village. The method of crop has been changed. However, harvesting, fruit gardens in dry land, visit to the field, trips, and study tour, these things have transformed the village. The crops like sugarcane, banana need more water so they are not taken. There are no bore wells in the fields. The use of water is very careful and economical. And because of its village is tanker-free. The village production of milk is 2000 liters. There are 180 hybrid cows and 60 buffalos.

Due to prevention of grazing the quantity of fodder increased. The production of fodder was 300 tones. There are 40 two-wheelers and 20 tractors. The number of school going girls increased. The women have become literate. The target of literacy is achieved. Once a year, a health checkup camp is organized. Every house was a Toilet facility. The foundation principal village is "One village, one water well". “One village, one Crematorium". "One village one temple". Other villages like Korwadi, Nimgaon Wagha, Jarabangaon, Bhoyare Pathar, Kamargaon, Chas, Akolener, have taken the ideal of Hiware Bazar and they are also implementing such activities.

2.8 SOURCE OF DATA

A) **Primary Data** : Primary Data was collected from the sample beneficiaries through personal interviews for this purpose. A special questionnaire was prepared. For collection of data from the household pre-tested before the field work.

B) **Secondary Data** : The Secondary Data information has also been collected from the VWC, SHG & NGOs records. Data on socio-economic, SHGs activities impact on production, cropping pattern, land use, income & generation of employment in agriculture, live stock; etc was collected through set of questionnaire specially prepared for the purpose. Discussions were also held with the state govt. departments i.e. Soil conservation, Forest, Agriculture, Live stock & Officials of Watershed Origination Trust (WOTR), NGOs, bank branches, village level workers and at the group level of VWC, SHG, Youth club, farmers club & gram sabha separately to examine the awareness about the watershed development and for cross checking of the data collected. For the collection of data complete round of the watershed and the visit to the different areas made it possible to study the implementation to the project, drainage line and soil conservation treatment situation of agriculture, forest, plantation, live stock, ground water and availability of fodder, fuel, source of irrigation and drinking water, social relation etc, and the environment on the whole.

2.9 RESEARCH METHODOLOGY :

- **Sampling Method**

  The government of Maharashtra and other Non-government organization (NGO's) selected the 36 villages for watershed development programme in 1990 to 1995 in the study area . Out of these 23 projects are in full implementation stage.

  Out of these 23 watersheds programme Developed under 'Indo-German Watershed Development Programme' (IGWDP). 11 watersheds were developed under "Ideal Village Development Programme" (IVDP) and 02 Watershed were developed under "Drought Prone Area Programme" (DPAP)

  Out of 23 successful projects which are implemented by NGOs. 15 projects were selected for the present study. (i.e. Mendhvan, Sarole Pathar, Mhaswandi, Bhojdari, Malegaon Pathar, Gunjalwad, Darewadi, Kasare, Karule, Shivapur, Kouthe Kamleshwar, Kubharwadi , Vankute, Savarchol & Sattaychiwadi.)

  15% to 25% beneficiaries were selected form each of the 15 watershed villages by random sampling method. The information was collected from them with the help of questionnaires. Appropriate representation was given to the farmers possessing less then 5 acres of land, medium & big land holders & women land holders.

  The broad objective of this research is to study geographical and socio-economics evaluation of watershed development programme. After completion of the watershed project they were evaluated after 5 years and 10 years for studying the positive change in geographical, economical, sociological aspects related to agriculture field.

- Cost and output relationship was calculated by the data collected through the beneficiary questionnaires
- The extent of water conservation attributable. The various components of watershed development programme has been measured in term of increase irrigated area, seasonal irrigated area, irrigation intensity etc. Also data on water level of the wells situated in the project area in different seasons were collected and shown by graphs and diagrams.

- Besides analysis of data from sample beneficiaries at micro level, data from women organization purposely collected to examine the impact on the status of migration of labour from the watershed area & availability of employment due to watershed development activities and its impact on their well being is shown by graphs and diagrams.
- The collected data will be complied with the help of using the analysis appropriate statistical and computer techniques, such as geographical information system (GIS).
- For testing the rain fall and water table relationship correlation, co efficient is calculated.
- Linear regression is calculated for water column and water ground level.

Different recourse input developed in the soil conservation activities; water conservation activities and other developmental activities will be valued. The results obtained will be interpreted in the context of hypothesis formulated in the proposed study.

- **Reference year** -

  Year : The reference year of the study was agricultural year 1991-92 to 2005-06.

- **Limitation of Data.**

1) There may be difference between the data available during the reference year and the available data for the following year.
2) This research evaluation is limited for Sangamner Taluka only. The observation made maybe useful only in Sangamner Taluka and may not be useful for other District of Maharashtra & India.
3) The observation made in the present study are based on the information provided by beneficiaries VWC, NGO & Govt. official etc. There maybe limitation for the present research because of some lacunae present in the information provided by these people.

2.10 CHAPTER SCHEME

This study has been divided into seven chapters. The first chapter deals history of drought in India, need of soil and water conservation, watershed development programme in India, watershed development programme in maharashtra, significane

of the study, Selection of the study area, objective , Hypotheses and scope of the study.

The second chapter deals review of literature, Data base, research methodology and chapter scheme.

Third chapter highlights physiography, drainage, climate , soil, Ground water , Natural vegetation and methods of watershed development.

Fourth chapter deals with Demographic details, Educational status, scenario of socioeconomic parameters of watershed, social services sector unit, village level institutions, and people participation in watershed Development programme.

Fifth Chapter is devoted, the selected villages of sangamner Taluka, the changes in Land use pattern, cropping pattern, production & income from crop, livestock position, source of irrigation , Rainfall- Ground water relationship and women Development (SHGs) in the study area.

Sixth chapter covers the study of comparative analysis of the land use pattern, cropped area, crop yield , Net income, live stock, Number of wells and water Table , Agri employment and agri wage rate, Land value, Growth of service sector unit , SHG status of WDP , Loan utilization, watershed development technology, Ngo planning and implementation process and villagers opinion about the changes in Terrain future, Land Utilization and water Availability in study area.

The seven and last chapter is regarded with conclusion of the study to get comprehensive view and suitable recommendations are also given to change the situation and there by to achieve watershed development.

CHAPTER III

STUDY AREA- GEOGRAPHICAL ASPECTS

3.1 Introduction.

3.2 Geographical Aspects

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3.2.2 Physiography and Relief

3.2.3 Physical Division

3.2.3.1 Hilly Region

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CHAPTER III

STUDY AREA- GEOGRAPHICAL ASPECTS

3.1 INTRODUCTION :

Agricultural production and returns depend on geographical and climatic conditions, such as soil types, temperature, rainfall, humidity etc. These factors vary from place to place. It is necessary to study the geographical and agro-economic features of the area. With this objective in view, some important features of the area selected for the present investigation are briefly discussed.

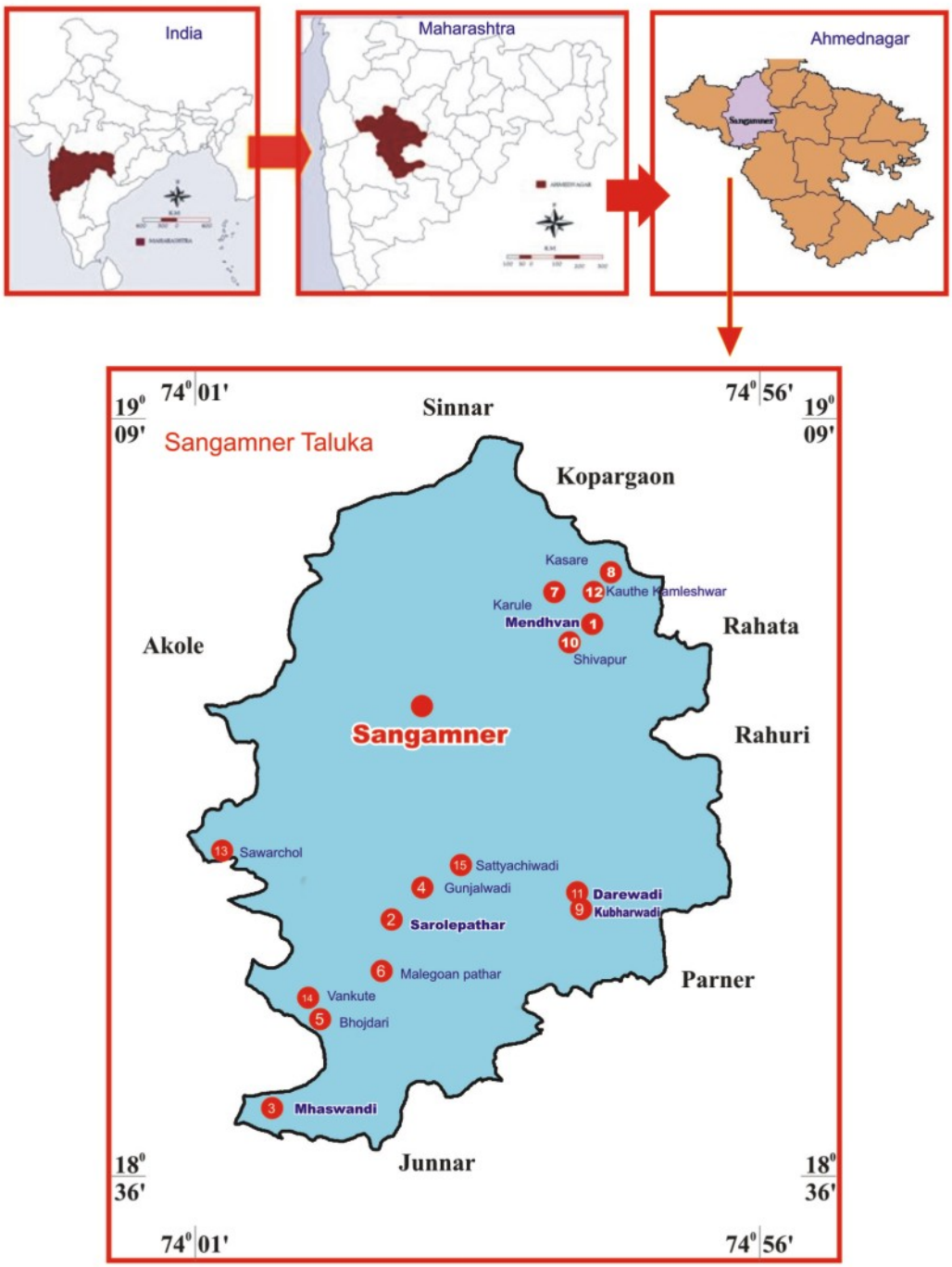
3.2 GEOGRAPHICAL ASPECTS:-

3.2.1 Location:-

Ahmednagar district is the centrally located district in Maharashtra. According to agro- climatic zones of Maharashtra state, Ahmednagar district comes under scarcity zone. Sangamner Taluka is one of the important Taluka in the Ahmednagar district. Sangamner Taluka is situated in the northwestern part of Ahmednagar district. The absolute location of the Taluka is from 18^0 36' to 19^0 9' north latitude and 74^0 of 01' to 74^0 56' East longitude, with the total geographical area (TGA) of 1680.1 sq. kms (fig. 1.1). As per the 1991 census, the total population of the taluka comprising 162 in-habited villages is 7,09,616. Sangamner is second largest taluka considering the area and it occupies the fourth place according the population in the Ahmednagar district.

Sangamner Taluka is bounded by Sinnar Taluka (Nashik district) in north, Kopergaon in north-east, Rahata and Rahuri in east, Parner in South-east, Junnar (Pune district) in South, Akole in West. It is situated 100 km away in the south-east direction of Ahmednagar district place. It is situated on the banks of Pravara, Adala and Mhalungi confluence. It is an important station on the Pune-Nashik national highway (NH-50). The town has been famous for vegetable market, dairy farming, sugar industry, tobacco industry, cloth market. The educational set up of the taluka is very good. (fig. 3.1)

LOCATION MAP OF STUDY AREA



Map No. 3.1

3.2.2 Physiography :-

The physiography of the taluka has been understood with the help of generalized information about relief, drainage, soil, climate, natural vegetation and ground water.

The physical features of the study area are dominated by low rugged, highly dissected topography. The relief of the taluka has immense variety (fig. 3.2)

3.2.3 Physical Division- Sangamner Taluka:-

lies in rain shadow zone. It is situated party in upper Godavari basin. Hilly and plain region divides Sangamner Taluka in to four main physical divisions namely.

3.2.3.1 Hilly Region:-

There is the Adala hills, Kalsubai range near the peak of Patta Fort. This range abruptly ends about 2 km north wards of Sangamner. This regions average elevation is of 861 m. The second hilly region set up is in south direction.

The Baleshwar range is the second great spur of Sahyadri which branches off at Ratangad at distance 11 km, south-east of Kulang and completely traverses the Akola and Sangamner taluka forming the watershed between the Pravara in the north and the Mula in the south. The range culminates with Baleshwar as a central mass, whose summit has been crowned by a temple in Hemadpanthi style now in ruins and surrounded by spurs radiating from the center in all direction. This peak is of the height 1156 m. An isolated hill at the end of one of these spurs extending to the north, west is the fort of Pemgad. Between Baleshwar and Hevargaon (Devgadd- Temple) is the last notable peak in the range. This peak is across Chandanapuri valley and near Pune-Nashik Highway from the east of Hevargaon the hills decrease in height and finally subside in the open plain to the west of Rahuri. This range is about 100 km long. In that region Jawale Baleshwar, Sawargaon Ghule, Pokhari Baleshwar, Pemgiri and Sawarchol etc. villages are located.

SANGAMNER TALUKA
PHYSIOGRAPHY

Index	
▲	Peaks
⬭	Hills

Hight in Meter	
	500 to 700 M.
	700 to 900 M.

Map No. 3.2

3.2.3.2 Plateau Region:-

Adala sub-region is called ‘Sinnar Plateau’. This region has an average elevation of 600 to 700 m. In this region Talegaon, Nimon, Maldad villages are located. The second plateau is in south direction to Baleshwar sub-plateau region. The height of the region is 800 to 900 m. In this region Sarolepathar, Varudipathar, Malegaon Pathar, Gunjalwadi, Dolasane, Darewadi, Nandur Khandarmal villages are located.

3.2.3.3. Piedmont Plateau Region:-

This is the river basin and plateau region in between the large area covering- (I) Pravara basin and plateau region. In the north direction Nilwande, Paregaon, Talegaon, Mendhvan, Kasare villages are located and in south direction Aandwadi, Khamba, Warwandi, Pimpalgaon Depa villages are located. (II) Mula basin and Baleshwar plateau region. Villages located in this region are Mhaswandi, Bhojdari, Vankute, Sakur, Akalapur and Kurkundi.

3.2.3.4 Narrow River Basin:-

A number of Nalas and Tributary in piedmont plateau region developed Narrow cultivated land-

(I) Central part of Sangamner Taluka is a very large and important in Pravara basin. In this area soil depth is very deep and this soil region is fertile. All these areas are irrigated and have high productivity. In this region Dhadarphal, Sangvi, Nimgaon Paga, Khandgaon, Sangamner, Jorve, Rahimpur, Ozar, Ashvi, Kharadi villages are located.

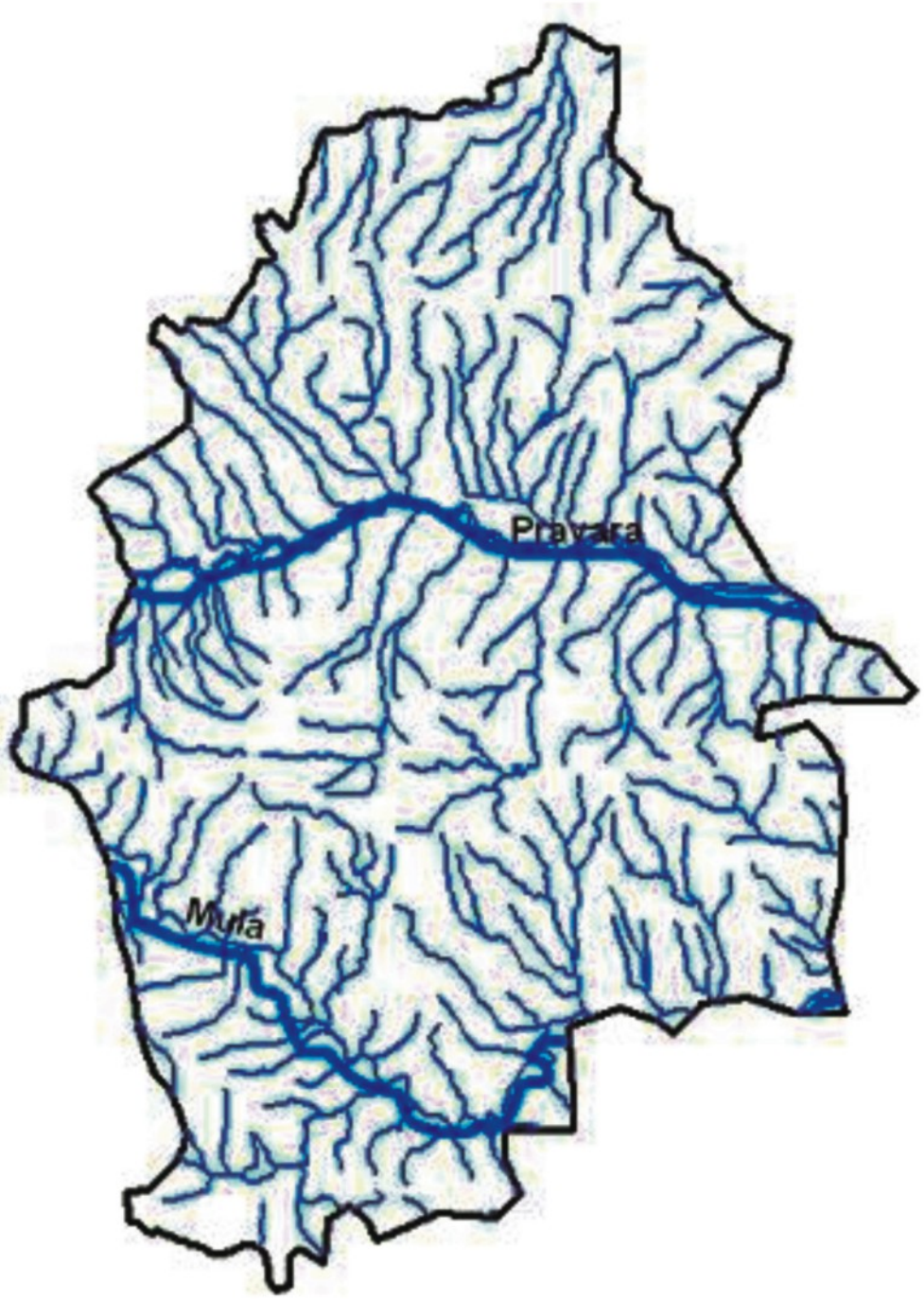
(II) In south direction the natural boundary is formed by Mula river basin. The Mula narrow basin is irrigated area having high productivity. In this valley Ambi, Ghargaon, Sakur, Mandve, Borban villages are located.

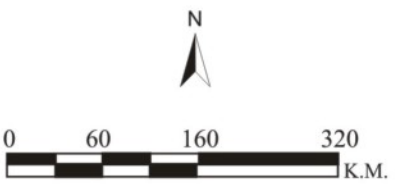
3.2.4 DRAINAGE:-

The north western region of the Taluka is adjacent to the western Ghats. It includes some part of the Sangamner taluka. There are two river systems that flow through Sangamner taluka (Fig. 3.3)

SANGAMNER TALUKA

DRAINAGE PATTERN





Map No. 3.3

(I) Pravara River:- Pravara is a major drainage pattern of Sangamner Taluka. It has covered nearly 2/3 portion of Taluka. It flows from west to east direction dividing the taluka in its north and south parts.

Tributaries from northern portion are more in numbers and long in their lengths. Mhalungi and Adala are coming from the north west corners to Sangamner Town. There are two major tributaries on the left bank of Pravara. There are also tributaries coming from other sides in the form of Nalas.

Some tributaries flow from the southern side i.e. to the right bank of the Pravara River. These tributaries flow from north to south direction and nearly in right angle to Pravara River.

(II) Mula River:- Mula is another drainage system of this region. Mula has occupied 1/3 portion of taluka region. This river is flowing from north west to south east direction. Mula is also having tributary coming from northern hilly region, but it flows in the from of Nalas. Its length is short. Kus is the major tributary flowing in to the right bank of Mula. Mula has less tributaries than Pravara. Observing the total pattern of drainage system of this area, it is dendritic pattern of drainage. This pattern has helped very much in the agriculture production.

Mula and Pravara are the major river which play an important role in the economy of Sangamner Taluka. Bhandardara Dam has been constructed during British period because the dam Pravara has became perennial river. It serves lift irrigation projects from the commanding area. Mula dam is situated at Mulanagar in Rahuri taluka. The role of Mula in agriculture in commanding area is not important as Pravara.

Natural tank, percolation tank, nala bunds, kolhapur type (K.T. wair) wair are the other sources of irrigation apart from this drainage systems and these sources are developed in Pimpalgaon Konzira, Dhorwadi, Darewadi, Ambi. These sources play an important role in agriculture production.

3.2.5 CLIMATE:-

The climate of Sangamner taluka is generally hot. In this region there is hot summer and general dryness during major part of year except during rainy season.

Rainy Season which normally starts in the second week of June and is over by the end of September. October and November constitute the post monsoon or retreating south-west monsoon season. Winter season is from the month of December to February. The different parameters of climatic condition are discussed below.

3.2.5.1 Rainfall:-

Sangamner taluka comes under scarcity zone. There is erratic rainfall with uneven distribution with more uncertainties. Sangamner taluka is chronically affected. The average annual rainfall of Sangamner taluka is from 396.06 mm to 495.05 mm for the past 25 years (Sangamner rain station). The maximum rainfall during the year is observed in September- as per IMD reports.

The higher rainfall at the hilly region is 475 mm. This region at which there is a high rainfall is divided between Pravara and Mula river. The higher rainfall in hilly region may be a result of Topography. The rainfall intensity is high around 30 mm/hr to 80 mm/hr, which result in high run-off erosion and flash floods. Rainfall decreases towards the eastern part of area. The rainfall is lowest in plateau region in north eastern part of taluka. The annual rainfall is not satisfactory. Therefore, originally the agricultural cropping pattern of this region is only dependent upon rainfall, and kharif is the major season.

The region receives all this annual precipitation from the south west monsoon. Thus almost the entire district is characterized by drought condition.

3.2.5.2 Temperature:-

The cold weather starts in the middle of November and continues till the end of February. The coldest month of the year is December with 30.5^0C as maximum and 13.7^0C as minimum temperature. During the cold season the taluka is some time affected by cold waves. From March to the first half of June the day temperature increases progressively but the nights remains comparatively cool. The hottest month of the year is May in which mean maximum temperature is 39.9^0C and mean minimum temperature is about 25.4^0C. The maximum temperature rises up to 43^0 or 44^0C. With the arrival of the monsoon in the taluka there is an appreciable drop in temperature and weather becomes pleasant. After monsoon, in October, the day temperature

increases gradually. Maximum day temperature is recorded in October. However the night temperatures decrease after the withdrawal of the monsoon.

3.2.5.3 Humidity:-

As the characteristic feature of semiarid climate region dryness prevails throughout the year except in the south west monsoon season. The air from February to May is dry and particularly so in the moon time and the average relative humidity is around 20 percent. During south west monsoon it is between 60 to 80 percent and then decreases rapidly in the post monsoon season. The temperature conditions are favourable for agriculture throughout the district but scarcity of water is well felt problem. Evapotranspiration affects prospects of crop husbandry, light intensity and photoperiod. Of sunshine remains more in summer months.

3.2.5.4 Wind:-

Wind is generally from light to moderate, with some strengthening in the south-west in monsoon season. Winds are from directions of southwest in the post-monsoon season. Winds from the northwest and north are common in the mornings while in the afternoons the winds blow from direction between north and east. In the cold season winds are variable in direction. Winds between northwest and southwest being more common. In the summer season northerly to northwesterly winds are more common.

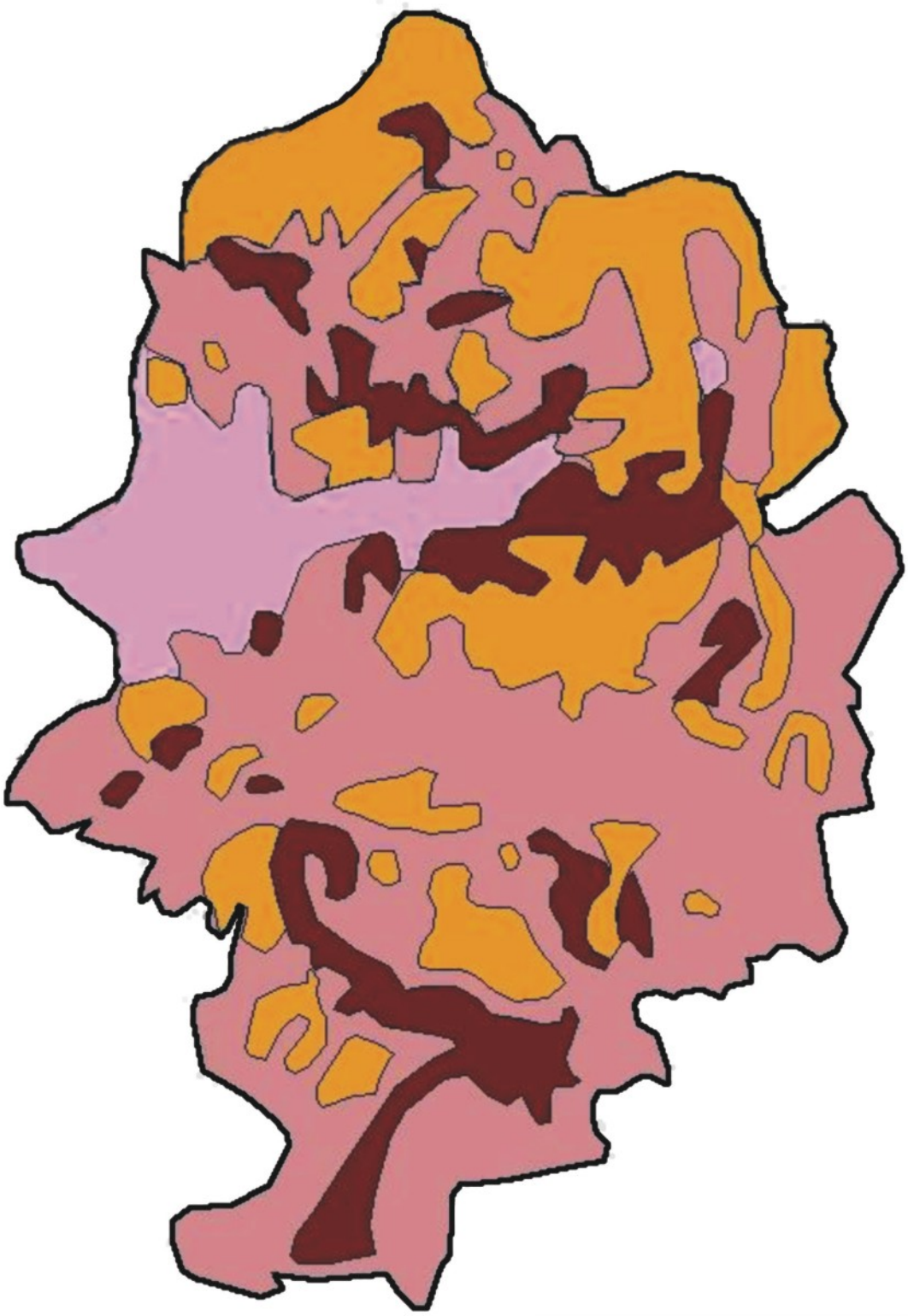
3.2.6 SOIL:-

In Sangamner taluka the soil is plain and has a comparatively good depth. Near the Pravara river wide tracts of deep rich lands are found. In the Adhala valley there is a good deal of fertile land bordering the river bank and further up in the hilly areas to the west of Akola.

Soil is a layer of unconsolidated material, at the earths surface. Which has come from the rocks (according Dr. Bemmetts). According to the structure the soil of this region can broadly be classified in to four groups i.e. black or kali, red or tambat, sandy clay loamy soil and the grey inferior quality soil locally known as barad (fig. 3.4).

SANGAMNER TALUKA

SOIL MAP



Map No. 3.4

3.2.6. 1 Black, Sandy clay loamy soil (Sangamner Soil Types):-

This soil has covered Northern Central Portion of taluka. In Pravara river region deep black soil is found. There black soil is developed because of the depositions of thick alluvium. (Covers an area approximately 15,248.57 ha). In this region rich manjul soil, a reddish sandy loamy and chopan soil are found. These soil are admirably suitable for garden cropping. This is the porous soil. This soil is important for growing sugarcane, cotton, wheat and cash crops.

3.2.6.2 Murum Clay Soil (Manoli Soil Types) :-

This soil is in central eastern portion of Taluka. This soil has covered the area of northern boundary and eastern boundary of Sangamner taluka. (covers an area approximately 52,456.64 ha). This area comes under Pravara basin. PH value of the soil is 7 to 8. It is high humus soil. Therefore, it is suitable for agriculture.

3.2.6.3 Loamy Soil (Vadgaon Pan and Ghargaon Soil Types) :-

This soil is rich fertile black, loamy soil. It has covered the area of Mula basin and eastern area of taluka (covering an area approximately 29,914 ha). This soil is suitable for producing the Sugarcane, Ground nut, vegetables and cash crops.

This type of soil contains silt; clay and sand. Silt in loamy soil is 42 %. Sand represent is 40 %. Where as clay represent is 18 %.

3.2.6.4 Murum soil (Pimpalgaon Depa Soil Types) :-

These are the soil of high lands of taluka area. It has covered hilly terrain portion of northern as well as southern side of taluka. These regions are called ‘grazing lands’. In this region soil cover is very thin with low fertility. (Cover an area approximately 72,100.12 ha)

In the northern portion murum soil has extended from west to east leaving small short strip of murum soil to its north. This portion of taluka area has height more that 600 m. It is shallow in depth and due to the deep slopes erosion is considerable. On this region traditional crops like Bajara, Jowar are

SANGAMNER TALUKA DIFFERENT AGRO CLIMATIC REGION
Soil Types and Main Crop

Sr.	Region Name	Physiography Location	Soil Character	Present Land Utilization	Soil Production	Soil Problem	Suggestion	Total Area (ha.) Villages
1	**Baleshwar Plateau region**	Plateau region piedmont plateau	Slightly deep, well drained, fine calcareous soil on very gently sloping lands with moderate land. sandy burad in brown colour (up to 25 cm depth)	Suitable for Kharip crop e.g. Bajara, Wheat, Pulses & vegetables	Medium	• The depth of soil is very less. Difficult for growing roots. • Soil erosion is height. • Water holding capacity is less. • Soil fertility ranges from less to medium. • After the irrigation land becomes dry early.	• Soil and water conservation. • Change cropping pattern patta crop cultivation. • Crops that can survive in the less rains should be taken e.g. Amla, Tamarind.	Sarole Pathar Varudi Pathar Savargaon Chule Malegaon Pimpalgaon Rankhamb Dolasane Vankute Nandur Khandarmal Mhswandi Bota **Total Area 72100 ha.**
2	**Sangamner Region**	Low and sloppy land across Nalas and Rivers, Old flood land region	This soil is very deep, dark & brown in colour. Fine soil on gently sloping plains and valleys with moderate erosion, moderate salinity associated with deep & well deep. These soils get surface cracks on large scale. Water holding capacity is good	Good for Kharip and Rabi crop e.g. Wheat, Tur, Cotton, Sugarcane, Vegetables.	Good	• Texture of the soil is good. There fore, less percolate. • Erosion process occurs very slowly and the fertility decreases gradually. • Soil gets cracks onm the large scale and there fore, the roots get damages & it affects the cop yield.	• The texture of the soil is good. Useful for residence. In order to have good production organic fertilizer should be used. • Suitable system should be adopted for percolation. • Cultivation should done at regular time. • Cropping pattern should also be changed.	Dhandarphal Nimgaon Sangavi Nimaj Khandgaon Sangamner Devgaon Jakhuri Jorve Rahimpur Kanoli Jawale Kadlag Rajapur **Total Area 45162 ha.**

Sr.	Region Name	Physiography Location	Soil Character	Present Land Utilization	Soil Production	Soil Problem	Suggestion	Total Area (ha.) Villages
3	**Talegaon Region**	Land below the slopy land on the moderate slop	Very shallow well-drained clay, soil on gently sloping lands with moderate erosion. Dark brown in colour. Water holding capacity is medium.	Suitable for Kharip crop e.g. Bajara, Jawar, Wheat, Soyabin	Medium	• Soil erosion medium. • Water holding capacity medium. • Fertility medium.	• Organic fertilizers should be used. • Crops should be taken in patta system. • Cropping pattern changes in more effective. • Varieties giving more yield can be cultivated if the irrigation facility is available.	Talegaon. Nimon. Sonewadi. Chincholi Gurav. Nannaj Dumala. Kauthe. Kasare. Medhavan Lohare. **Total Area 51038 ha.**

SANGAMNER TALUKA

Agro Climatic Zone

Map No. 3.5

the two main crops of the plateau. Pulses, mainly Tur, Mug and Gram are often grown as mixed crops. Another track of murum soil has covered western zone and this types of soil has specially extended to the south side of the taluka. As per the relief map of Sangamner Taluka. It is also an area of having altitude more than 600 m. Murum soil is not suitable for agriculture. Fertilizers are not used on this soil. In this soil water easily perculates. If this soil is provided natural as well as artificial fertilizers this soil may become suitable for crops.

3.2.7 GROUND WATER

The geological setting of Sangamner taluka has a decisive role in determining the ground water possibilities in different regions of the taluka. The taluka is mainly occupied by basaltic lava flows and alluvium of the Pravara and Mula rivers. The ground water level varies from region to region.

Aquifer performance tests on wells, tapping massive traps indicate that the former have comparatively much higher yields than the latter. Tube wells are successful in adjoining area of pravara and Mula river basin.

Study of the chemical quality of water samples, from different wells shows that the water is generally good for the both domestic and irrigation purposes. In the areas irrigated by wells and lift irrigation care has to be taken to avoid problems of water logging and consequent quality deterioration as noticed in the, adjoining part of Pravara river at Jorve, Rahimpur, Kharadi, Kanoli, Ozar etc.

Contour bunding would also be an important measure in order to check the surface run-off water. This would considerably increase the recharge to the ground-water body. The best example of this is Aanandwadi region (Dhagadi baba) where C.C.T. work has been completed successfully and has given good results.

Nowadays there is a tremendous scientific advancement, with the help of satellite photographs underground geology of particular area can be understood, with help of sub soil water survey and development machinery. The structure of underground geology can be studied to carry out watershed development successfully. On the basis of information of water percolation process in Sarole Pathar and Darewadi watershed hydro fracture method was implemented and the water percolation of drinking water was solved.

3.2.8 NATURAL VEGETATION/FOREST

Forest, a valuable natural resource plays ecologically significant role improving the quality of life of the rural people. Forests perform the protective, productive and esthetic functions for enhancing the quality of surrounding environment.

Sangamner taluka has an area of 31,327 ha under forest. The forest area makes 18.61 percent of the total geographical area (T.G.A.) of the Sangamner taluka. The region wise distribution of area under forest is quite uneven. Sangamner taluka is having good proportion of area under forest.

Sangamner forest department has transformed its traditional conservative management practices to people centered approach, with specific objectives of restoration of natural balance, economic mobilization, scientific management of forest and promotion of public participation in forest department. This region has about 40 percent of forest covered area with high rate of deforestation. Hilly and plateau region is also known as "area for cattle to stand" where nearly 10 percent people are under the poverty line.

The Sangamner forest region comes under Ahmednagar forest division. The forests in the taluka are divided as protected forest, reserved forest and the rest are unclassed forest. The total forest area coming under Sangamner forest department is classified below.

Total forest area under the forest dept.	Reserved forest	Protected forest	Unclassed forest	Percentage of the forest area to the total area
31327.00 Ha	31327.00 Ha	-	461.16 Ha	18.61

Table 3.1

The forest in the taluka represent the southern Tropical Dry deciduous types. They are scattered in shelter of spurs, and valley's and are situated in hilly, plateau and piedmont plateau region of taluka.

The commercially important species found in the forest are Teak, Neem, Babul, Khair, Hiwar, Apta, Anjan, Bamboo, Sisu, Arjun, Kusum, Kashid, Palas, etc.

The growth is stunted and poor due to poor soil and lack of adequate humus. Vast stretches of grass land are also found. The species of grass commonly found are Kusal, Dongari – gavat, Pavanya, Marvel, Kunda and Rosha.

The forest in Sangamner taluka produce small quantity of teak poles, firewood, grass and myrobalan's. In Ahmednagar forest division, this produce from the forest has a good market at Ahmednagar and Sangamner.

All the reserved forests are under the management of the forest Department. They are divided into three divisions.

a) Sangamner Bhag – I
b) Sangamner Bhag – II
c) Sangamner Bhag – III

The following table indicates the relationship between soil and vegetation in Sangamner Taluka. (Table 3.3)

Sr. No.	Forest Division	Area (Ha)	Character of soil	Forest Types (Species)
1	Sangamner Bhag – I	14839.511 Ha	Slightly deep, well drained soil on very gently sloping lands with moderate erosion undulating land, barad soil.	Dry deciduous best – species are Teak, Hiwar, Neem, Khair, Babul, Anjan etc Chief Grass area.
2	Sangamner Bhag – II	10089.800 Ha	Silt, clay and sandy soil very fertile, good for forest. This soil is very deep, dark brown in colour. Fine soil on gently sloping plains and valleys with moderate erosion.	Chief species are – Babul, Neem, Seesu, Kusum, Anjan, Kashid.
3	Sangamner Bhag – III	6398.500 Ha	Rich manjul soil. Raddish sandy loamy and chopan soil on the bank of Pravara river. Very fertile and useful for forest.	Moist deciduous belt – Sesav, Cidia, Mango, Su-babul, Apta, Gulmohar, Bamboo, Kashid Nilgiri.

Table 3.3

3.3 METHODS OF WATERSHED DEVELOPMENT PROGRAMME :-

Following treatements are used for watershed development programme.

- **C.C.T. : –** This is a type of trench that from a kind girdle around the will slope at a given contour especially used for treating non arable area of hill slopes. Continuous contour trench recommended In the upper reaches of watershed, trenches that dug on contour lines is called a counter trench. Contour lines is called a counter trench. Contours are the important soil conservation measures. They control runoff and erosion, improve subsurface drainage and conserve soil moisture.
- **Loose boulder :–** The small drainage line having catchments up to 10 Ha. Can be plugged with the help of locally available stone in order to check velocity of water effect the deposition of Load , decrease the erosive force of the watershand increase the recharge of rain water into the ground .
- **Contour Bunding and graded Bunding :-** Contour bunding in shallow and medium soil at appropriate vertical interval and horizontal distance across the slopes helps in reduction of soil erosion and conservation of moisture .
- **Contour bunds :-** Consists of constructing narrow based trapezoidal bunds on contours to improve runoff rain water such that it percolates and recharges the root profile on either side of the bunds up to 50 to distance between two such terraces
- **Gabien Structure :-** wire boxes filled with loose stones mainly for ground water recharges and stabilization of water course.
- **Check dams : –** Concrete massonary or earth dams to store and slow down water only justified in conjuction with lift irrigation scheme. Note that many dams especially before sedimentation has formed on bottom will also contributed to ground water recharge.
- **Brush wood Dam :-** In this, two rows of wooden stakes are driven into the gully bed and fied with brushwood. Wooden logs are also used for packing between stakes. Further , Long tress are laid lengthwise.
- **Farm Ponds :-** Farm ponds are water bodies of variable size constructed by excavating a pit or as an embankment across a water course, the water so

stored can be utilized for irrigation a limited area. It can be a source for livestock and drinking water.

- **Water obsourb Trenches (WAT) :-** It control or arrest the subsurface run off or flow of water. It is effective in maintaining water table In upstream drainage line.
- **Runoff management measures :- (Nala bunding):-** The runoff from the catchement of 10ha to 200 ha can be stored in nala bunding having different designed and capacity. As per the location. This helps to store excess run off water and recharge ground water table very efficiently. The excess run off comes from drainage lien is again stored in nala by constructing small K.T. bandharas.

  These method are applied for water shed development programme in the study area.

Low cost & hi-tech aids were used for physical surveys training.

Continuous contour Terenchers (CCT)

CCT on hills

Stone bund with CCT

Loose boulder structure

Nalabund Chain

Check Dam

Farm pond An activity in WDP

Infiltration of water in CCT

Farm bund

CCT before plantation

CCT area covered with vegetation after plantation

Recharging of wells

Development of Dryland horticulture

Afforestation after implementation WDP

Chapter IV

Socio Economic Aspect

4.1 Introduction

4.2 Demographic Details in WDP villages.

4.3 Educational Status in WDP villages.

4.4 Scenario of Socio Economic Parameters of Watershed in WDP villages.

4.5 Social Services Sector Unit in WDP villages.

4.6 Village Level Institutions in WDP villages.

4.7 People participation in watershed programme.

4.7.1 Village watershed committee (VWC)

4.7.2 Joint forest Protected committee (JFPC)

4.7.3 Gram Panchayat

4.7.4 Mahila Mandal (Self help group)

4.7.5 Co-Operative Society Member Participation

4.7.6 Dairy Co-Operative Society

4.7.7 Youth Club

4.7.8 Bhajni Mandal

CHAPTER – IV
SOCIO ECONOMIC ASPECT

4.1 INTRODUCTION :

The study villages are major villages involved in their respective watershed projects implemented under IGWDP at Mendhvan, Maswandi, Bhojdari, Sarolepathar, Malegaon Pathar, Gunjalwadi, Karule, Kasare, Shivapur, Kaute Kamleshwar Darewadi shelakewadi , vankute, Kumbharwadi Jondhalewadi, sawarchol, Mhaswandi & Sasttyachiwadi. All theses fitten villagers are situated in Sangamner taluka of Ahmednager district.

These projects under IGWDP are being implemented in Maharashtra state since 1992 through direct involvement of NABARD. The project under this programme is primarily selected on watershed basis and non Governmentental organizations (NGOS) are active as guide and philosopher. The local community is fully involved in planning, implementation, resource utilization and post development management.

Ten (10) years have passed after the completion of Twelve (12) projects. Three (03) projects were completed before 05 to 06 years. This project conducts an evaluation study to understand their implementation, socio-economic impact on agriculture and sustainability in future.

The following tables indicate the various data collected by the project implementing agencies (NGO) during the year 1990-91 and source from Feasibility study Report and by preparing questionnaires of socio-economics aspects .

4.2 DEMOGRAPHIC DETAILS IN WDP VILLAGES.

In fifteen villages, amonqest the number of sample households, male population is approximately 10 to 12 percent more than that of females, The gender ratio of women to men in Mendhvan is 854, Mhaswandi 939, Sarole Pathar 971, Bhojdari 785, Karule 1024, Sattyachiwadi 809, females per 1000 males.

After implementation of the project Gender ratio in Mendhvan became 975, Mhaswandi 972, Sarole Pathar 877, Bhojdari 912, Karule 898, Sattyachiwadi 839, females per 1000 males. It is evident that before the implementation of the programme the gender ratio was in worst state but after the implementation period the

gender ratio improved considerably as compared to that was during the period 1992-93.

As per the census of India 1991, total number of households and population in Mendhven was 212 and 1455, Kasare 183 and 1111, Shivapur 251 and 1451,Darewadi 146 and 921, vankute 268 and 1477, Gunjalwadi 139 and 840. Maleqaon Pather 161 and 759, respectively after implementation of the project. As per the census of India 2001,total number of households and population in Mendhven was 255 and 1620, Kasare 251 and 1451, Shivapur 277 and 1411, Darewadi 192 and 1206, Vankute 309 and 1968, Gunjalwadi 182 and 1222, Malegaon Pathar 87 and 952, respectively. The gender ratio of these villages thus is showing more equitable distribution of population among men and women (Ceusus 2001). Literacy rate was 50 to 60 percent in these villages. The following table 4.2, 4.3, 4.4 shows the demographic details.

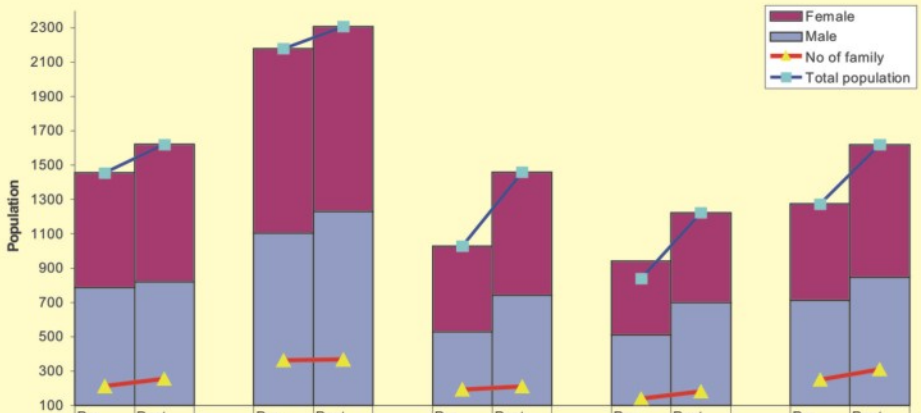
Occupational pattern at the current situation of the projected villages viz Kumbharwadi, Vankute, Sarole Pathar, Gunjalwadi, Darewadi, Mhaswandi, Kasare, Shivapur, Kauthe Kamaleshwar, Mendhvan and Bhojdari shows that they draw employment from growing crops in all season except summer. Agricultural labour migrates from these villages in the summer season.

The Total numbers of persons are engaged in other livelihood activities like Dairy farming, rearing sheep, Goat, poultry. In all three season after watershed implementation project, the situation is significantly better in Bhojdari, Sarole pathar, Mhaswandi, Malegaon Pathar, Kasare Gunjalwadi, Mendhvan as Compared to Karule, Shivapur, Kauthe Kamleshwar, Sawarchol, Sattyachiwadi, Kumbharwadi because the number of livelihood activities have increased in the above projected villages.

With respect to migrating laboures in Karule, Kasare, Gunjalwadi, Sawarchol, Sattyachiwadi, Vankute, Kauthe Kamaleshar, there is no change in the situation as same number of labourers continue to migrate in these seasons. In Mendhvan, Sarolepathar, Malegaon Pathar, Bhojdari, Mhaswandi, Darewadi, Kumbharwadi, Shivapur there is no incidence of migratory labourer observed in both periods.

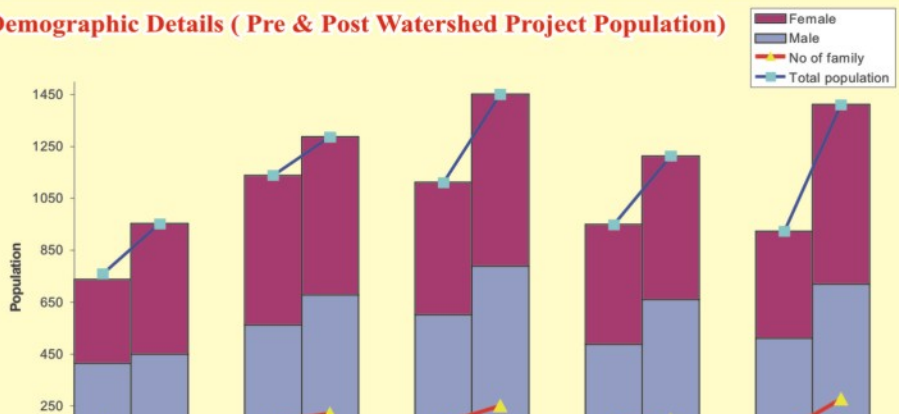
In Bhojdari, Sarolepathar, Darewadi, Mendhvan, Kumbharwadi, Vankute, Shivapur, Significant number of people are engaged in agriculture labour during summer. Whereas in Karule, Kasare, Kuthe Kamalesher, Sawarchol, Sattyachiwadi negligible people are involved in this activity throughout the year. This is probably

Table & Fig. 4.2 **Demographic Details (Pre & Post Watershed Project Population)**



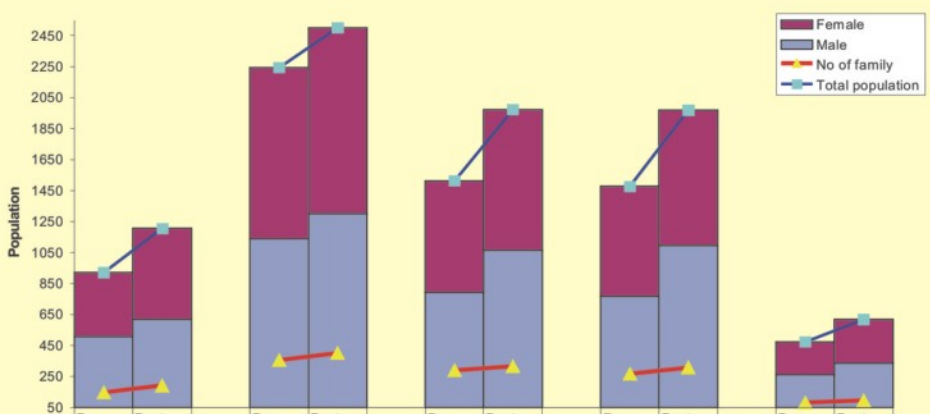
	Mendhavan		sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Female	670	800	1074	1078	498	720	430	524	560	772
Male	785	820	1105	1229	530	740	510	698	713	846
No of family	212	255	362	367	194	210	139	182	249	311
Total population	1455	1620	2179	2307	1028	1460	840	1222	1273	1618

Table & Fig. 4.3 **Demographic Details (Pre & Post Watershed Project Population)**



	malegaon pthar		Krule		kasare		kumbharwadi		shivapur	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Female	324	502	576	609	509	662	461	554	413	691
Male	414	450	562	678	602	789	488	659	510	720
No of family	161	87	186	220	183	251	171	196	150	277
Total population	759	952	1138	1287	1111	1451	949	1213	923	1411

Table & Fig. 4.4 **Demographic Details (Pre & Post Watershed Project Population)**



	darewadi		kauthe kamleshvar		sawarchol		vankute		sattyachi wadi	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Female	413	588	1105	1200	722	910	710	872	212	282
Male	508	618	1139	1300	791	1063	767	1096	262	336
No of family	146	192	356	402	289	316	268	309	83	96
Total population	921	1206	2244	2500	1513	1973	1477	1968	474	618

because of land cultivation activities done in summer so as to make the land ready for Kharif Crops . These works are done by manual labour and with the help of animals in Sawarchol, Kumbharwadi, Kasare, Mhaswandi, Malegaon Pathar while the farmer in Sarole Pather, Gunjalwadi, Mendhvan Kauthe Kamleshwar, Karule, Kasare, Bhojdari mostly prefer tractor driven agriculture implements to do the similar works.

4.3 EDUCATIONAL STATUS IN WDP VILLAGES.

Sangamner taluka is ranked second among the Ahmednager districts in Maharashtra in HDI (Human Development Index) due to number of educated Population.

Education level of the people is enhanced, especially the number of High School going children significantly increased as compared to the pre watershed situation. The following table (Table 4.5, 4.6, 4.7) shows the educational status.

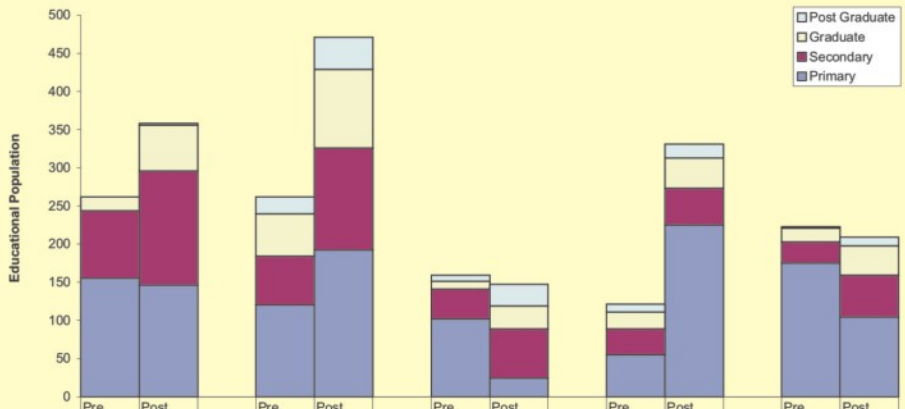
Primary School age group –

95 to 100 percent of the girls and boys between 6-10 years are attending primary school. Secondary school age group- 85 to 95 percent girls and boys are attending the secondary school. In Gunjalwadi, Darewadi, Sarole Pathar, Mhaswandi, Kumbharwadi there are no children of the school going age who are out of school. In the projected villages i.e. Sarolepathar, Gunjalwadi., Bhojdari, Kauthe Kamleshwar, better educational facilities are available. In Sarole Pathar project village there is 110-year-old primary school. There is one Secondary School, Junior college, Tribal boys and girl's school with the Hostel facility. These villages have good educational set up.

After watershed development project. There is much improvement in college level education. The general Literacy level shows improving trend. But, is not much improvement in post Graduate Level education. Only in a few project villages such as Sarole Pathar, Mhaswandi, Bhojdari, Gunjalwadi, Malegoan Pathar post Graduate education is good. A very few people have acquired vocational skills for livelihood such as Weaving, electrician, driving, Tailoring, Motor rewinding, fabrication, colouring, building contraction, etc. There are 15 persons in projected villages who have been trained in watershed development and livestock management during the project period from the PIA (Project Implementing Agency) it self. There are two women in projected villages that have been trained in SHG Record keeping, and Nursery management during the project period from the WOTR (Watershed

Table & Fig. 4.5

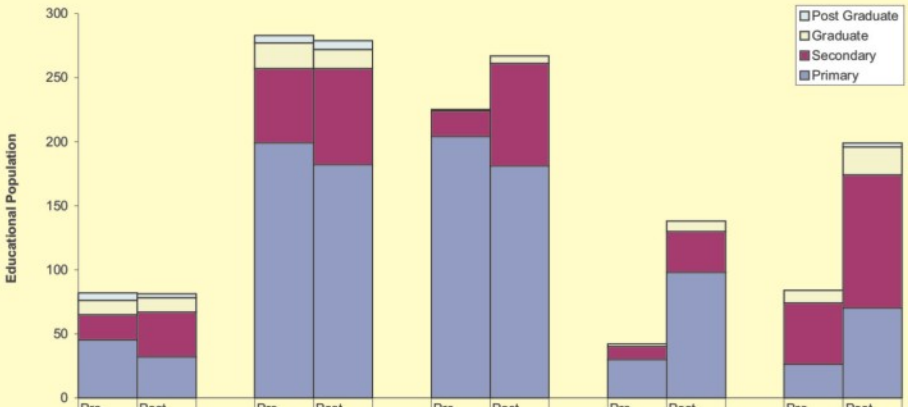
Pre & Post Educational Status in WDP Villages.



	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Post Graduate	0	2	22	42	8	28	10	18	2	11
Graduate	18	60	56	103	10	30	22	40	18	39
Secondary	89	150	64	134	39	65	34	48	28	55
Primary	155	146	120	192	102	24	55	225	175	104

Table & Fig. 4.6

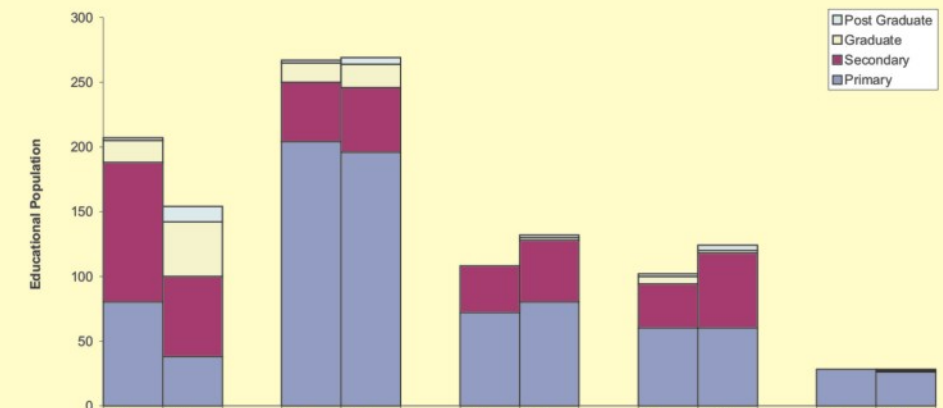
Pre & Post Educational Status in WDP Villages.



	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Post Graduate	6	3	6	7	0	0	0	0	0	3
Graduate	11	11	20	15	1	6	2	8	10	22
Secondary	20	35	58	75	20	80	10	32	48	104
Primary	45	32	199	182	204	181	30	98	26	70

Table & Fig. 4.7

Pre & Post Educational Status in WDP Villages.



	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Post Graduate	2	12	2	5	0	2	2	4	0	0
Graduate	17	42	15	18	0	2	6	2	0	1
Secondary	108	62	46	50	36	48	34	58	0	1
Primary	80	38	204	196	72	80	60	60	28	26

Organization Trust). But it is evident that after the watershed development programme the educational status of the villages Improved considerably.

4.4 SCENARIO OF SOCIO-ECONOMIC PARAMETERS OF WATERSHED IN WDP VILLAGES..

The stock of family asset is an indication of the standard of living of the people of society. Show Table No.4.8, 4.9, 4.10

During last 10 years people of Mendhwan, Mhaswandi, Sarole Pathar, Bhojdari, Karule, Darewadi, Kasare, Gunjalwadi have increased their family assists such as Tractors, Motorcycles, Threshers, Kadabakutti, spray pump. An only Bullock cart family asset was decreased in all the projected villages. The main assets that each family owned was either a cycle, Motorcycles and pair of bullocks and farm implements during pre-watershed period. With the improvement in agricultural operations and increase in family income from farm, the communication and Transport facilities increased. The people of Sawarchol, Sattyachiwadi, Kumbharwadi, Malegaon Pathar villages are against as spending money on entertainment. They do not spent money on entertainment because their income is comparatively less.

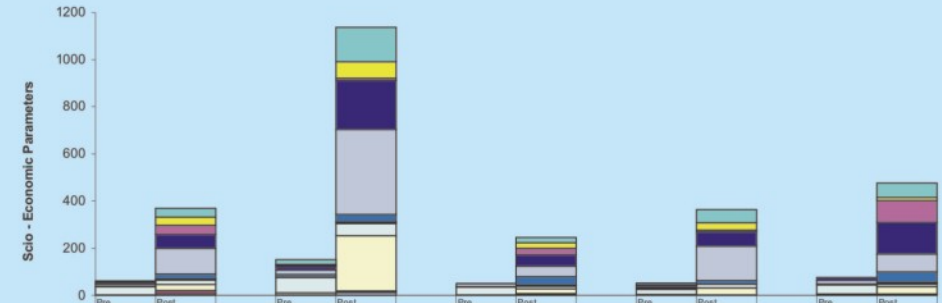
The people from these villages invested comparatively less on communication and building and other assets. But they mostly used the income for their livelihood and consumption.

But in the post watershed development Progamme, the assets positions of the families have improved as compared to the Pre-WS development situation. Other family assets such as kitchen garden, Individual latrines, soakpits were negligible before watershed development projects in Mendhan, Mhaswandi, Bhojdari, Kauthe Kamleshwar, Darewadi, Vankute, Kumbharwadi, Sawarchol, Malegaon Pathar and Sattyachiwadi. But, after Implementation watershed development Progamme these family assets are being used on large scale.

People participation increased because of VWC, GS & Mahila Mandal. The sense of responsibility & unity is being developed among the people and social changes could also take place due to various external factors.

Table & Fig. 4.8

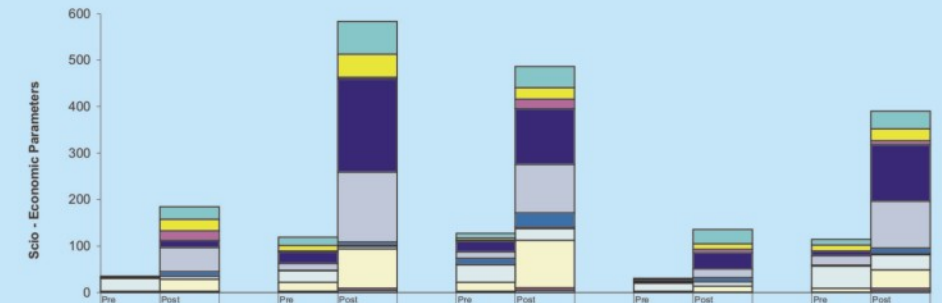
Pre & Post Scenario of Scio - Economic Parameters in WDP Villages



	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Soak Pits	0	37	20	145	0	21	7	56	0	60
Individnal Latrines	0	35	5	70	0	23	2	32	0	12
Kitchen Garden	7	38	2	10	0	30	0	7	0	93
Television	6	60	18	208	1	47	10	62	12	135
Telephone	9	108	17	360	12	45	3	144	15	75
Spray Pump	2	20	12	31	3	35	3	15	4	45
Kadaba Cuttur	0	2	0	5	0	2	0	0	0	4
Threshers	0	3	1	3	0	2	0	1	0	3
Bullock Cart	35	20	65	52	32	11	23	17	40	12
Motar Cycles	1	25	10	235	1	21	3	28	4	32
Tractors	1	14	1	5	1	5	0	1	0	2
Transport Vehicle	0	6	0	12	0	2	0	1	0	2

Table & Fig. 4.9

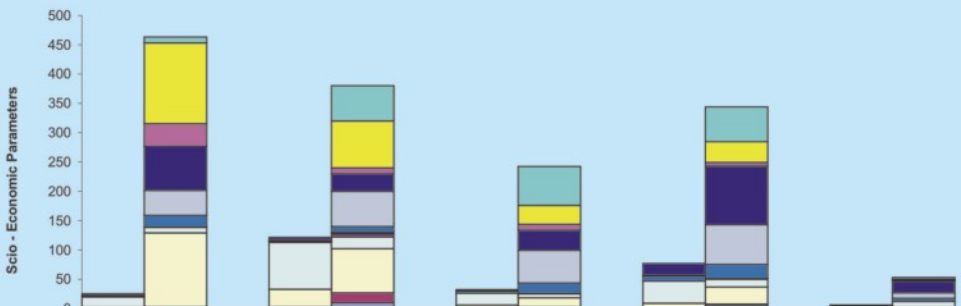
Pre & Post Scenario of Scio - Economic Parameters in WDP Villages



	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Soak Pits	0	26	18	70	10	45	0	30	12	38
Individnal Latrines	0	25	12	50	5	25	0	12	13	26
Kitchen Garden	2	21	1	4	2	20	2	8	0	8
Television	0	15	25	200	22	120	3	34	10	122
Telephone	2	52	15	150	15	105	2	19	20	100
Spray Pump	1	10	1	8	12	30	3	9	2	12
Kadaba Cuttur	0	0	0	0	0	0	0	0	0	0
Threshers	0	0	0	2	1	4	0	0	0	3
Bullock Cart	28	7	25	5	38	25	18	9	48	32
Motar Cycles	2	26	20	85	20	102	2	13	8	40
Tractors	0	1	1	5	1	6	0	0	1	6
Transport Vehicle	0	1	1	4	1	4	0	1	0	3

Table & Fig. 4.10

Pre & Post Scenario of Scio - Economic Parameters in WDP Villages



	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Soak Pits	0	10	0	60	0	66	0	60	0	3
Individnal Latrines	0	138	0	80	0	32	0	35	0	1
Kitchen Garden	0	38	0	10	0	10	0	6	0	2
Television	3	76	5	30	0	35	20	100	2	20
Telephone	0	42	2	60	2	55	2	68	0	10
Spray Pump	2	20	1	10	4	18	8	24	2	5
Kadaba Cuttur	0	0	0	3	0	0	0	0	0	0
Threshers	0	1	0	5	0	1	0	1	0	0
Bullock Cart	18	9	80	20	20	7	38	13	2	10
Motar Cycles	2	126	30	75	6	15	9	30	0	2
Tractors	0	1	2	17	0	1	0	1	0	0
Transport Vehicle	0	2	1	10	0	2	0	6	0	0

4.5 SOCIAL SERVICES SECTOR UNIT IN WDP VILLAGES.:-

The external intervention has contributed for changes in economic and social conditions of the community. The relevant changes in social services sector unit are presented in Table No. 4.11, 4.12, 4.13

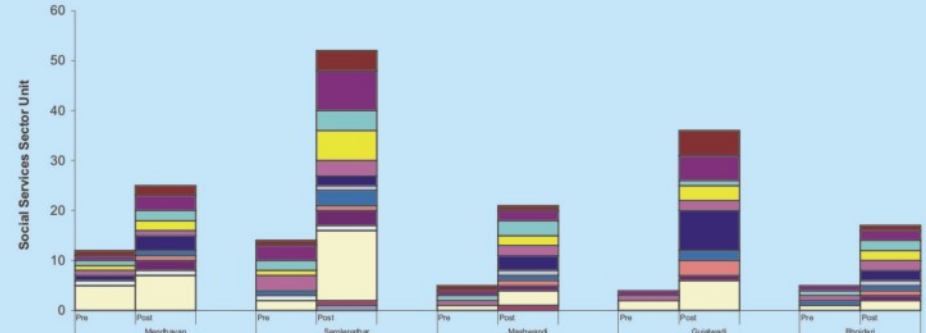
Mhaswandi, Vankute, Bhojdari, Sarolepathar, Gunjalwadi. Darewadi, Kumbharwadi, Sawarchol, Sattyachiwadi, all these villages were considered as the most backward villages in the region. People from the surrounding villages were not ready to give their daughters in marriage to the residents of all these villages. These Villages were affected by drinking water problem. Nearly 40 percent of the families from these villages were affected by alcoholism. Most of the men young and old used to waste most of their time in futile discussion, gossiping and playing cards for 04 to 06 months in the year. The villages were dependent on Agricultural works. There was lack of many necessary facilities like medical dispensary, veterinary aid center, post office, and State transport bus stand. HYV seed and fertilizer distribution center. godown etc for facility for which they had to depend upon neighboring villages.

Growth and development of primary sectors like Agriculture, Horticulture, social forestry, Animal Husbandry and Dairy farming have led to the growth and development of other social service type units like carpentry, tailoring, barbar unit, Grocery shop, flourmills, Hotel (Tea Stall) transport rentals facility owned by some families from the project area itself. Before implementation of the watershed development project villagers in Medhavan, Mhaswandi, Karule, Kasare, Shivapur, KautheKamaleshwar, Darewadi, Vankute. Kumbharwadi, Gunjalwadi, Sawarchol, Malegaon Pathar, Sattyachiwadi were dependent on neighboring villages for all these facilities. This indicates that the situation of the project area before implementation of watershed development programme was so poor, that it was not able to sustain the units, providing even the most basic services.

After the completion watershed development project these service units have been helpful in creating additional direct / indirect employment opportunities in the Projected Village Darewadi, Kumbharwadi, Gunjalwadi, Sawarchol, Bhojdari, Mhaswandi, Shivapur, Kasare, Karule, Kauthe Kamleshwar, Mendhvan, Sarolepathar.

Table & Fig. 4.11

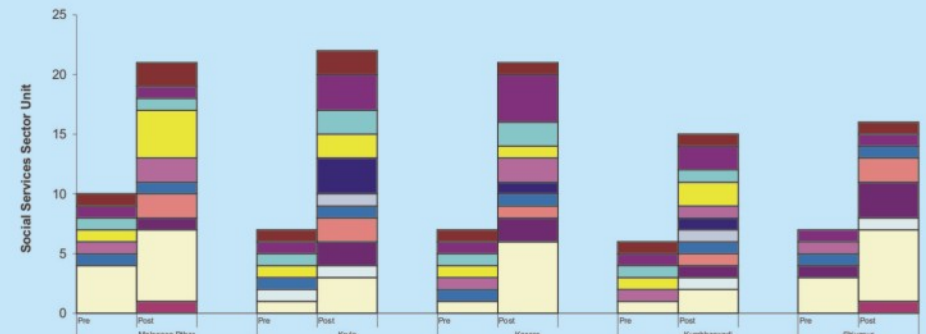
Pre & Post Social Services Sector Unit



	Menchavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojderi	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Flour Mills	1	2	1	4	1	1	0	5	0	1
Grocery shop	1	3	3	8	1	2	1	5	1	2
Barbar unit	1	2	2	4	1	3	0	1	1	2
Tailoring unit	1	2	1	6	0	2	0	3	0	2
Carpentery unit	1	1	3	3	1	2	1	2	1	2
Hotel (Tea stall)	1	3	0	2	0	3	0	8	0	2
Gyam	0	0	0	1	0	1	0	0	0	1
Bhajani Mandal	0	1	1	3	0	1	0	2	1	1
Mahila Mandal	0	1	0	1	0	1	0	3	0	1
Youth club	0	2	0	3	0	1	0	1	0	1
Mosque	1	1	1	1	0	0	0	0	0	0
Temple	5	7	2	14	1	3	2	6	1	2
Library	0	0	0	1	0	1	0	0	0	0
Medical Store	0	0	0	1	0		0	0	0	0

Table & Fig. 4.12

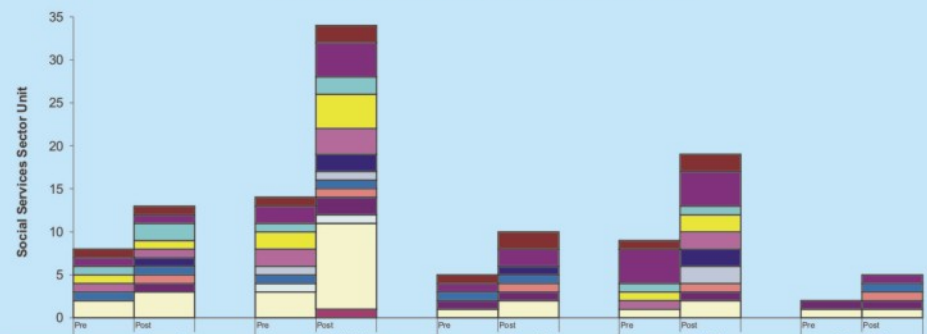
Pre & Post Social Services Sector Unit



	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Flour Mills	1	2	1	2	1	1	1	1	0	1
Grocery shop	1	1	1	3	1	4	1	2	1	1
Barbar unit	1	1	1	2	1	2	1	1	0	0
Tailoring unit	1	4	1	2	1	1	1	2	0	0
Carpentery unit	1	2	0	0	1	2	1	1	1	0
Hotel (Tea stall)	0	0	0	3	0	1	0	1	0	0
Gyam	0	0	0	1	0	0	0	1	0	0
Bhajani Mandal	1	1	1	1	1	1	0	1	1	1
Mahila Mandal	0	2	0	2	0	1	0	1	0	2
Youth club	0	1	0	2	0	2	0	1	1	3
Mosque	0	0	1	1	0	0	0	1	0	1
Temple	4	6	1	3	1	6	1	2	3	6
Library	0	1	0	0	0	0	0	0	0	1
Medical Store	0	0	0	0	0	0	0	0	0	0

Table & Fig. 4.13

Pre & Post Social Services Sector Unit



	Darewadi		Kauthe Kamleshwar		Sawarchol		Vankute		Satiyachi Wadi	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Flour Mills	1	1	1	2	1	2	1	2	0	0
Grocery shop	1	1	2	4	1	2	4	4	0	1
Barbar unit	1	2	1	2	0	0	1	1	0	0
Tailoring unit	1	1	2	4	0	0	1	2	0	0
Carpentery unit	1	1	2	3	0	0	1	2	0	0
Hotel (Tea stall)	0	1	0	2	0	1	0	2	0	0
Gyam	0	0	1	1	0	0	0	2	0	0
Bhajani Mandal	1	1	1	1	1	1	0	0	0	1
Mahila Mandal	0	1	0	1	0	1	0	1	0	1
Youth club	0	1	0	2	1	1	0	1	1	1
Mosque	0	0	1	1	0	0	0	0	0	0
Temple	2	3	3	10	1	2	1	2	1	1
Library	0	0	0	1	0	0	0	0	0	0
Medical Store	0	0	0	0	0	0	0	0	0	0

4.6 VILLAGE LEVEL INSTITUTIONS IN WDP VILLAGES.

The projects may look to be successful soon after its implementation but it may not be sustainable in the long period. This may be due to lack of proper management, poor know-how about project, improper management of funds and above all lack of people's participation in the maintenance of assets created under the project.

Small informal groups or associations oriented toward fulfilling certain board needs of villagers developed in projected villages. These groups are not directly related to program implementation. But they helped in the smooth implementation of the program and have become partners of VWC. For example, to help the poor, a group of villagers formed the credit co-operative. Society, self help Group (SHG) dairy, co-operative society, farmer help group (FHG) Which are organized and managed by the villagers in association with NGO's like WOTR, social center Nisargayan, Sangamner Bhag Sahkari Sakhar Karkhana. (SBSSK)

Table No.4.14, 4.15, 4.16

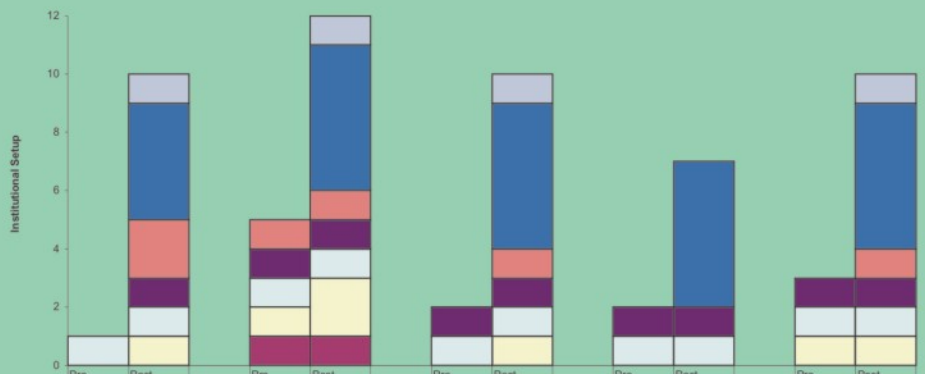
In addition to these villages level groups there are formal institutions of local government, such as Grampanchayat, co-operative society. Ahmednagar District co-operative credit bank (ADCCB) and credit society.

In the pre watershed development period in projected villages like Mendhvan, Mhaswandi, Bhojdari, Karule, Kasare, Shivapur, Darewadi, Kumbharwadi, Vankute, Gunjalwadi, Sattyachiwadi, there was no Dairy co-operative society, Self Help Group (SHG) and Farmer Help Group (FHG). But after implementation of watershed project these villages developed these institutional facilities of the NGO's.

Thus, the various institution actors are directly related to the implementation of the watershed development program, and their contribution to the program is operational in the legal and political framework.

Table & Fig. 4.14

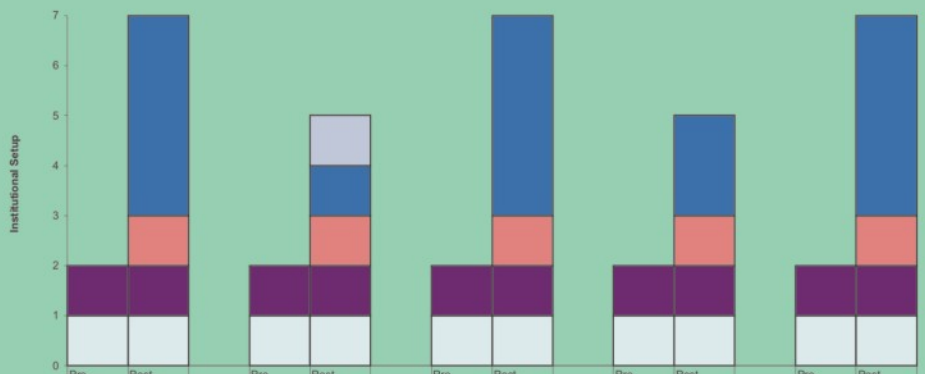
Pre & Post Institutional Setup in WDP Villages



	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
FHG	0	1	0	1	0	1	0	0	0	1
SHG	0	4	0	5	0	5	0	5	0	5
Dairy	0	2	1	1	0	1	0	0	0	1
Co-Opretive Society	0	1	1	1	1	1	1	1	1	1
Gram Panchayat	1	1	1	1	1	1	1	1	1	1
Credit Co-Operative	0	1	1	2	0	1	0	0	1	1
A.D.C.C. Bank	0	0	1	1	0	0	0	0	0	0
National Bank	0	0	0	0	0	0	0	0	0	0

Table & Fig. 4.15

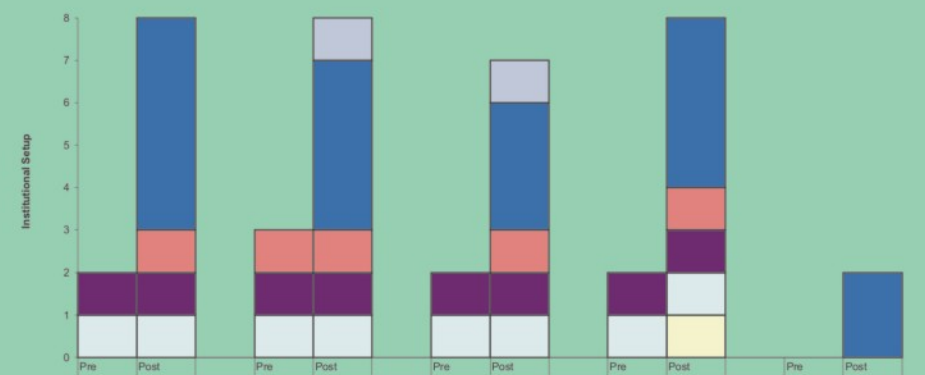
Pre & Post Institutional Setup in WDP Villages



	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
FHG		0	0	1	0	0		0	0	0
SHG	0	4	0	1	0	4	0	2	0	4
Dairy	0	1	0	1	0	1	0	1	0	1
Co-Opretive Society	1	1	1	1	1	1	1	1	1	1
Gram Panchayat	1	1	1	1	1	1	1	1	1	1
Credit Co-Operative	0	0	0	0	0	0	0	0	0	0
A.D.C.C. Bank	0	0	0	0	0	0	0	0	0	0
National Bank	0	0	0	0	0	0	0	0	0	0

Table & Fig. 4.16

Pre & Post Institutional Setup in WDP Villages



	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
FHG		1	0	1	0	1	0	1	0	0
SHG	0	5	0	4	0	3	0	4	0	2
Dairy	0	1	1	1	0	1	0	1	0	0
Co-Opretive Society	1	1	1	1	1	1	1	1	0	0
Gram Panchayat	1	1	1	1	1	1	1	1	0	0
Credit Co-Operative	0	0	0	0	0	0	0	1	0	0
A.D.C.C. Bank	0	0	0	0	0	0	0	0	0	0
National Bank	0	0	0	0	0	0	0	0	0	0

4.7 PEOPLE PARTICIPATION IN WATERSHED PROGRAMME.

This Programme was formulated in the late 1980^{s} and launched in 1991. The first phase lasted from1991 to 1998. Initially people's participation was consultative in nature. In 1996 the participation approach was intensified and accelerated.

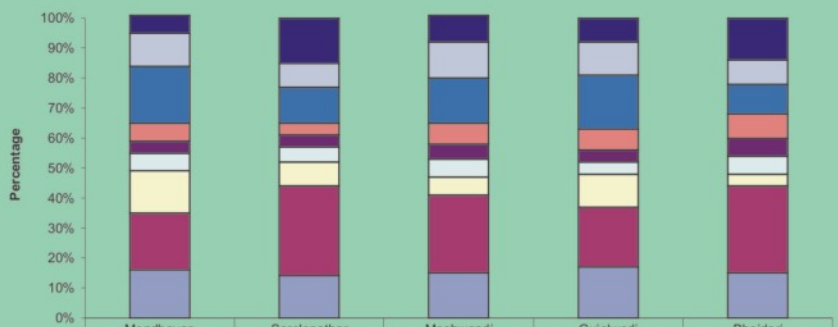
Watershed development programme provided an opportunity to people to involve at all stage and participate in all activities to develop their own resources. The involvement of people including women increased through associations\ group, training, field visit, demonstration etc.

Two most important factors for the success of the 15 projects were effective leadership and people participation in watershed development. Fa Harmann Bacher, (Chairman, WOTR), Fa. Crispino Lobo (Executive Director WOTR) Mr. Balasaheb Thorat (Agricultural Minister, MS), Fa. Robat, Prof. V.M. Shewale (President, Nisargayan), Mr. Balasaheb Umberlar, Prof. Dilip Pokharkar, Mr. Kedari, Mr. Phapale in consolation with the people, evolved a code of conduct to be followed by them in the process. This was essential for maintenance and protection of various works and for sharing equitably the benefits generated by these works.

The common characteristics observed in these 15 projects was that the consultation leaders / lead agencies were strongly motivated to find a solution to chronic drought in Maharashtra in the case of Mendhvan, Darewadi, Gunjal wadi, Malegaon Pathar, Mhaswandi, Bhojdari, Kasare, Karule, Sarolepathar. The leaders had this specific motive in their mind.

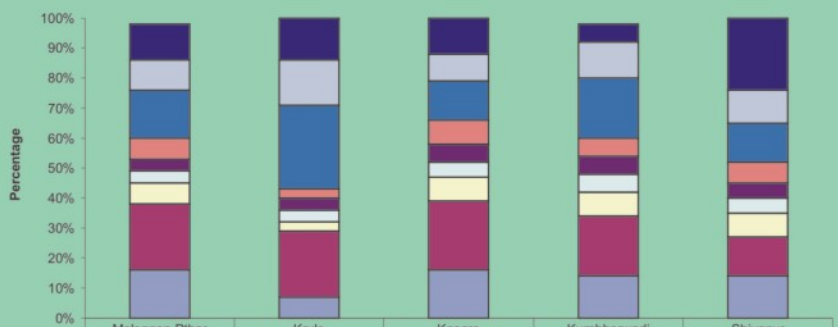
The following tables No. 4.17, 4.18, 4.19 indicate the opinion and perception of the respondent with regard to participation, leadership, villages institutions, and resource status in their respective villages. These perceptions are important and indicate level of awareness.

Table & Fig. 4.17 **Village wise Peoples Participation in Watershed Programme**



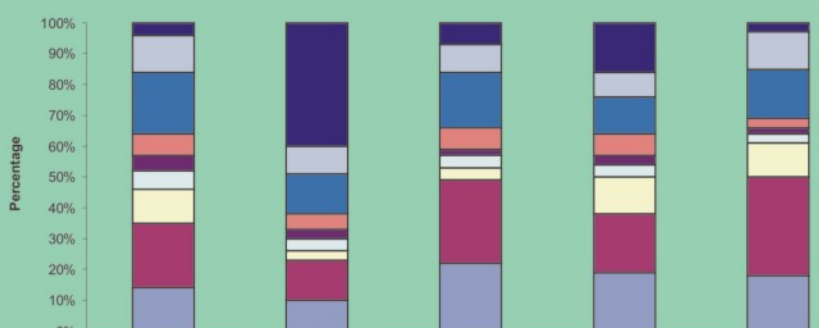
	Mendhavan	Sarolepathar	Mashwandi	Gujalwadi	Bhojdari
No Response	6%	15%	9%	8%	14%
Bhajani Mandal	11%	8%	12%	11%	8%
Youth Club	19%	12%	15%	18%	10%
Dairy Member	6%	4%	7%	7%	8%
Society Member	4%	4%	5%	4%	6%
Gram Panchayat Member	6%	5%	6%	4%	6%
Forest Proctered Committee	14%	8%	6%	11%	4%
Mahila Mandal	19%	30%	26%	20%	29%
VWC Member	16%	14%	15%	17%	15%

Table & Fig. 4.18 **Village wise Peoples Participation in Watershed Programme**



	Malegaon Pthar	Krule	Kasare	Kumbharwadi	Shivapur
No Response	12%	14%	12%	6%	24%
Bhajani Mandal	10%	15%	9%	12%	11%
Youth Club	16%	28%	13%	20%	13%
Dairy Member	7%	3%	8%	6%	7%
Society Member	4%	4%	6%	6%	5%
Gram Panchayat Member	4%	4%	5%	6%	5%
Forest Proctered Committee	7%	3%	8%	8%	8%
Mahila Mandal	22%	22%	23%	20%	13%
VWC Member	16%	7%	16%	14%	14%

Table & Fig. 4.19 **Village wise Peoples Participation in Watershed Programme**



	Darewadi	Kauthe Kamleshvar	Sawarchol	Vankute	Sattyachi Wadi
No Response	4%	40%	7%	16%	3%
Bhajani Mandal	12%	9%	9%	8%	12%
Youth Club	20%	13%	18%	12%	16%
Dairy Member	7%	5%	7%	7%	3%
Society Member	5%	3%	2%	3%	2%
Gram Panchayat Member	6%	4%	4%	4%	3%
Forest Proctered Committee	11%	3%	4%	12%	11%
Mahila Mandal	21%	13%	27%	19%	32%
VWC Member	14%	10%	22%	19%	18%

4.3.1 Village Watershed Committee (VWC)

The VWC has been constituted and registered under societies Act.1860. There are 10 to 25 member including 03 Women representing all the 15 villages. The President of VWC is the joint signatory for the joint account operated under indo German watershed development programme. The work to be taken up, quality of the work done and the payments to be made and the issues related to watershed are regularly discussed in the monthly VWC meetings and the latest development report is presented in Gram Sabha. The VWC is empowered to take action against the people who violate the basic principles of the programme like Shramdan (contribution of voluntary Labour), ban on cutting trees from public lands, ban on free Grazing of livestock and payment of dues etc.

The percentage of participation of VWC in watershed development programme is as follows: Mendhan (16%) Mhaswandi (15%), Sarolepathar (14%), Darewadi (14%), Kumbharwadi (14%), Sattyachiwadi (18%), Sawarchol (21%), Malegaon Pathar (16%), Vankute (19%), Kasare (16%), Bhojdari (15%), Karule (07%) and Kauthe Kamaleshwar (14%).

4.3.2 Joint forest Protect Committee (JFPC)

In the 15 watersheds project Joint Forest Protect Committee was fromed (JFPC) at the village level. This JFPC have been registered to forest Department. The forest Department permitted the treatments under in forest area. The JFPC is taking steps to protect the forest and hence people forms the neighborhoods have stopped cutting the forest trees in the watershed area.

The percentage of participation of JFPC in watershed development programme is as fallows - Mendhvan (14%), Bhojdari (04%), Mhaswandi (06%) , Vankute (12%), Kasare (08%), Darewadi (21%), Sarolepathar (08%), Malegaon Pathar(07%),Sattyachiwadi (11%) , Gunjalwadi (11%), Kumbharwadi (08%), Shivapur (08%), Sawarchol (04%), Karule (03%), Kauthe Kamaleshwar (03%).

4.3.3 Grampanchayat (Gram Sabha - Village Assembly)

The watershed committee organized voluntary Gram Sabhas (GSS) in 15 villages. Every Grampanchayat has 07 to 12 member including 02 women. The Grampanchayat members motivate people for Shramdan and spreading awareness regarding Watershed Development Programme. The Gram Sabha discusses about the

Degraded area and women facing the problem of drinking water before WSDP.

Traditional farming methods before WSDP.

Gram sabha- Decision making process

work planning, Shramdan, fund, field visit and it always motivates people for participation in watershed development activities. There is a need for promoting co-operation, co-ordination and relationship between local organization and watershed committee.

The percentage of participation of Grampanchayat member in watershed development programme is as fallows – Mendhvan (06%), Mhaswandi (06%), Bhojdari (06%), Sarolepathar (05%), Gunjalwadi (04%), Kumbharwadi (06%), Kasare (05%), Karule (04%), Shivapur (05%), Malegaon Pathar (07%), Sattyachiwadi (03%), Kuthe Kamaleshwar (04%), Vankute (04%).

4.3.4 Mahila Mandal (Self Help Group)

The Mahila Mandal has been registered under societies Act. There are 15 to 145 Women members from all 15 villages. Women were involved in the project implementation right from the planning and decision making in watershed development programme.

Women are more comfortable in smaller homogeneous women groups and are able to express their views too. Most of the Self Help Groups (SHGS) formed in the projects are having 15 to 35 members. There are 135 SHGS in the 15 villages having membership of about 3000. They contribute small loans for household needs and for income generating activities to increase their potential and awareness and to support each other financially.

The percentage of participation of Mahila Mandal in watershed development programme is as fallows- Sarolepathar (30%), Malegaon Pathar (22%), Mhaswandi (26%), Gunjalwadi (20%), Darewadi (21%), Karule (22%), Kasare (23%), Bhojdari (23%), Sattyachiwadi (33%), Shivapur (13%), Kaute Kamleshawar (13%), Sawarchol (27%), Mendhvan (19%).

4.3.5 Co-operative society Member Participation –

In the co-operative societies in 15 villages there are 07 to 09 members including 02 women. The co-operative society Members are motivated for Shramdan. The society provides the Agricultural loan for fertilizers, crop loan to develop the Agriculture.

The percentage of participation of co-operative society Member in watershed development programme is as fallows-Mendhvan (04%), Sarole Pather (04%),

Hon. Miss Koth (German official) observing and having dialogue with SHG Member

The participation of women in gram sabha in the WDP

Panlot melawa- MPKV Experts Guiding the villagers

A poultry run by SHG members

People contributed (Shramdan) 16 percent of the labour cost.

Farmer Club member taking information about weather instrument.

Mhaswandi (05%), Bhojdari (06%), Gunjalwadi (04%), Kumbharwadi (06%), Vankute (03%), Shivapur (05%), Kauthe Kamaleshwar (03%), Sawarchol (02%), Kasare (06%), Karule (04%), Sattyachiwadi (02%).

4.3.6 Dairy co-operative society.

Dairy co-operative society is a formally registered body and the members are farmers who own land are eligible for membership, which cost Rs 51. This Dairy aims to increase farm income through related activities and support to watershed development programme. The percentage of participation of Dairy member in watershed programme is as fallows- Mendhvan (06%), Mhaswandi (07%), Sarolepathar (04%), Bhojdari (08%), Karule (03%), Kasare (08%), Shivapur (07%), Darewadi (07%), Kauthe Kamleshwar (05%(, Kumbharwadi (06%), Gunjalwadi (07%), Sawarchol (07%), Malegaon Pathar (07%), Sattyachiwadi (03%).

4.3.7 Youth Group

The youth from the 15 villagers have formed Youth Groups. Youth organize every year sport competition in cricket, Kabbaddi etc. They involve and help in marriage ceremonies and cultural functions like Ganesh Utsav, Navratra festival, Pola, Holi and village fair. These youth groups are always actively involved in watershed development programme for creative work. The percentage of participation of youth club Members in watershed development programme is as fallows- Sarole Pathar (12%), Vankute (12%), Darewadi (20%), Bhojdari (10%), Malegaon Pathar (16%), Gunjalwadi (18%), Kauthe Kamleshwar (13%), Karule (28%), Kasare (13%), Shivapur (13%), Kumbharwadi (20%), Sattyachiwadi (16%).

4.3.8 Bhajani Mandal

The Religious people have formed the Bhajani Mandal. This Mandal organizes every week Bhajan, Puja, Swaddhyaya, These Mandal is always helpful to watershed development programme. The village wise Bhajani Mandal percentage participation in watershed programme is as fallows – Mendhvan (11%), Mhaswandi (12%), Sarolepathar (08%), Bhojdari (08%), Karule (15%), Kasare (09%), Shivapur (11%), Darewadi (11%), Vankute (08%), Kumbharwadi (12%), Gunjalwadi (09%), Malegaon Pathar (10%), Sattyachiwadi (12%).

CHAPTER V :

IMPACT AND EVOLUTION OF WDP ON MENDHWAN, SAROLE PATHAR, MHASWANDI & DAREWADI VILLAGES.

5.1 Introduction.

5.2 The Selected Villages Of Sangamner Taluka.

1. Mendhvan

1.1 – Main Text : Ws Project Of Mendhvan.

- **Location**
- **Topography and Drainage**
- **Climate & Rainfall.**
- **Soil**

1.2 - Impact Of Watershed Development At Mendhvan.

1.2.1 Changes In Land Use Pattern.

1.2.2 Changes In Cropping Pattern.

1.2.3 Changes In Production & Income From Crop.

1.2.4 Changes In Livestock Position.

1.2.5 Changes In Source Of Irrigation.

1.2.6 Rainfall- Ground Water Relationship.

1.2.7 Women Development (SHGs).

2 Sarole Pathar.

2.1 – Main Text : Ws Project Of Sarole Pathar.

- **Location**
- **Topography and Drainage**
- **Climate & Rainfall.**
- **Soil**

2.2 - Impact Of Watershed Development At Sarole Pathar.

2.2.1 Changes In Land Use Pattern.

2.2.2 Changes In Cropping Pattern.

2.2.3 Changes In Production & Income From Crop.

2.2.4 Changes In Livestock Position.

2.2.5 Changes In Source Of Irrigation.

2.2.6 Rainfall- Ground Water Relationship.

2.2.7 Women Development (SHGs).

3 Mhaswandi.

3.1 – Main Text : Ws Project Of Mhaswandi.

- **Location**
- **Topography and Drainage**
- **Climate & Rainfall.**
- **Soil**

3.2 - Impact Of Watershed Development At Mhaswandi.

3.2.1 Changes In Land Use Pattern.

3.2.2 Changes In Cropping Pattern.

3.2.3 Changes In Production & Income From Crop.

3.2.4 Changes In Livestock Position.

3.2.5 Changes In Source Of Irrigation.

3.2.6 Rainfall- Ground Water Relationship.

3.2.7 Women Development (SHGs).

4. Darewadi .

4.1 – Main Text : Ws Project Of Darewadi.

- **Location**
- **Topography and Drainage**
- **Climate & Rainfall.**
- **Soil**

4.2 - Impact Of Watershed Development At Darewadi.

4.2.1 Changes In Land Use Pattern.

4.2.2 Changes In Cropping Pattern.

4.2.3 Changes In Production & Income From Crop.

4.2.4 Changes In Livestock Position.

4.2.5 Changes In Source Of Irrigation.

4.2.6 Rainfall- Ground Water Relationship.

4.2.7 Women Development (SHGs).

CHAPTER V :
IMPACT AND EVOLUTION OF WDP ON MENDHWAN, SAROLE PATHAR, MHASWANDI & DAREWADI VILLAGES.

5.1 INTRODUCTION :

Land utilization, cropping patterns, production and income from crop, live stock, sources of irrigation rainfall ground water relationship and women development (SHG) has been described in fifth chapter.

5.2 THE SELECTED VILLAGES OF SANGAMNER TALUKA :.

From Sangamner Taluka of a Ahmednagar District in Maharashtra state, Researcher selected fifteen projects namely – Mendhwan, Sarole Pathart, Mhaswandi, Gunjalwadi, Bhojdari, Malegaon Pathar, Karule, Kasare, Kumbharwadi, Shivapur, Darewadi, Savarchol, Vankute & Sattyachiwadi. These villages were selected for impact and evaluation of watershed development projects. The researcher to surveyed and collected the data from each and every village of the study region, but because of the limitation he has selected four villages Mendhvan, Mhaswandi, Sarole Pathar & Darewadi.

1. MEDNHAVAN

1.1. MAIN TEXT – WATERSHED PROJECT OF MENDHAVAN:

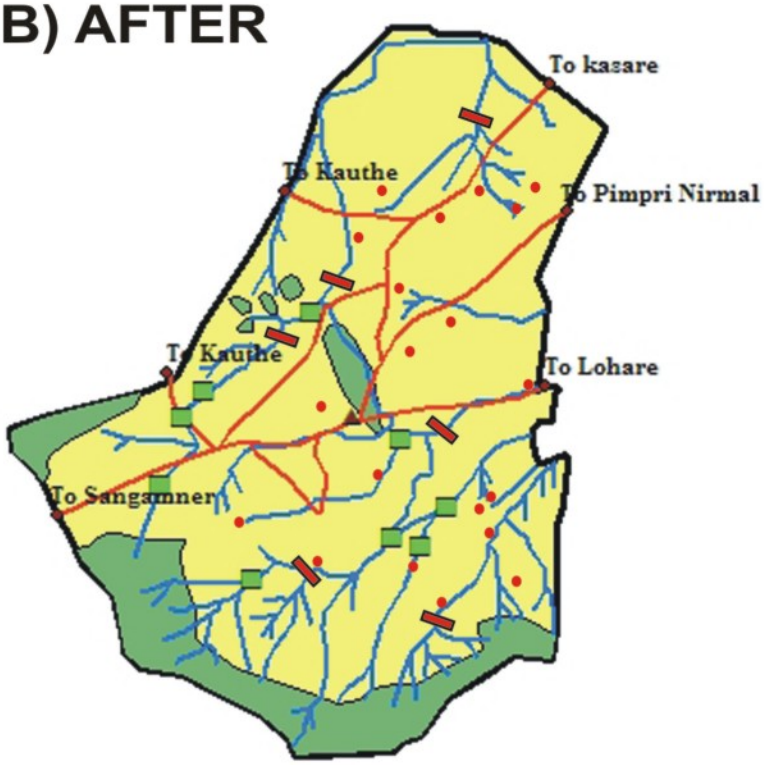
- Location: The village Mendhvan is located in Sangamner Taluka, which is 20 km away at North – East of Sangamner. The project area is located at 74^0 20' to 74^0 21' East 19^0 30' to 19^0 32' longitude and North latitude.
- Topography and Drainage: The village area is characterized by undulating topography with hills and valleys. The southern boundary of village represents an extension of Sahydri hill ranges. The ground generally slopes downwards in North Eastern direction. The village is well drained by two major stream viz. Budkhi stream and Pandharkada Stream. Both the streams joins kath nalla at Adgaon Khurd. Kath nalla finally joins river Godavari.
- Climate and Rainfall: Mendhvan falls in the rain shadow zone of Western Ghats. The Average Annual Rainfall (AAR) is 476.7 mm. Rainfall is received from south west mansoon. The mean daily temperature varies from 12.30 C in December to 40.10 C in May. The yearly mean daily temperature was maximum 32.30C to

MENDHWAN PROJECT AREA

SOIL AND WATER CONSERVATION WORK

A) BEFORE

B) AFTER



Legend

Sym	Particular
	Boundary
	Drainage Line
	Road
	Afforestation
	Agriculture-Work done CCT/FB/SB
	Checkdam
	Gabian
	Percolation Tank
	Nalabund
	Well

N

0 95 190 380 Meters

Map No. 5.1

minimum 18.50C. The extreme recorded temperature is 43.70C on may 9, 1960 and lowest was 2.20C on January 7, 1945.

- Soil: On the basis of soil depth, slope, physical and chemical characteristic & degree of erosion the soil is classified as follows:

Table 5.1 : Classification of soil in the project area:

a) Good Agricultural Lands :		
1	Mendhvan series I (Medium clay loam)	115.00 ha (8.48%)
2	Mendhvan Series II (Shallow Silty to Sandy loam)	151.00 ha (11.14%)
b) Not suitable for Agriculture		
3	Mendhvan Series III (Shallow loamy and medium to gentle slopes)	311.00 ha (22.94%)
4	Mendhvan Series IV (Sandy Loam to loamy sand on moderate to steep slopes)	355.00 ha (26.19%)
5	Stormy waste	343.00 ha (25.30%)
6	Not available for cultivation	80.42 ha (5.93%)
7	Total Area	1355.42 ha (100%)

Source: VWC & NGO Record.

1.2 IMPACT OF WATERSHED DEVELOPMENT AT MENDHVAN VILLAGE

1.2.1 CHANGE IN LAND USE PATTERN :

Table 5.2 : Changes in land use pattern

Sr. No.	Particulars	Before WS (ha) (1990-91)	Percentage (%)	After WS (ha) (2000-01)	Percentage change
1	Reserved Forest	178.11	13.14	178.11	13.14
2	Barren and uncultivable waste	376.31	27.76	226.31	-16.70
3	Fallow and including private grazing land	238.75	17.61	130.75	-9.46
4	Area put to non agri uses such as road, streams, habital / gaothan etc.	45.00	3.32	85.00	6.27
5	Cultivated land a) Perenially irrigated by well b) Seasonally irrigated by well c) Rainfed	517.26 31.00 105.80 381.46	38.14 05.99 20.26 73.74	735.26 65.00 250.80 420.46	+55.24 +08.70 +35.00 +57.18
6	Total Geographical area	1355.42	100.00	1355.42	100

Source: Data related to present pattern of 2000-01

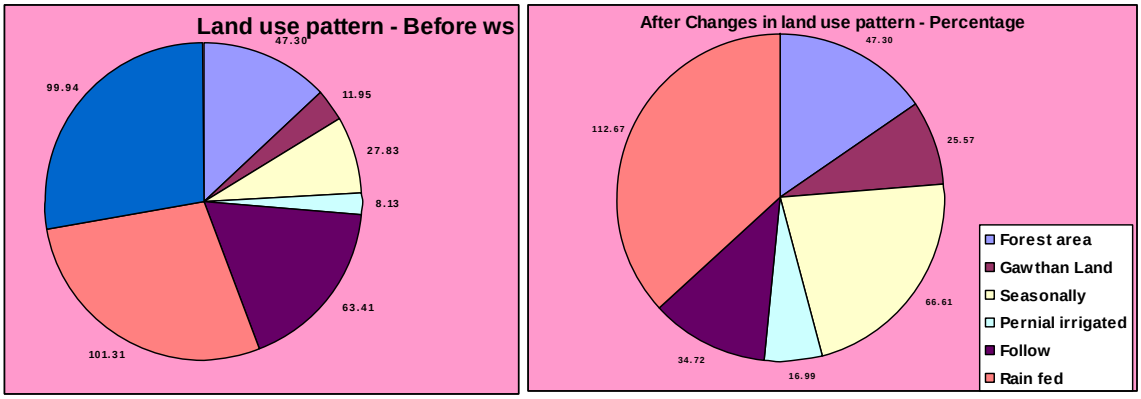


Fig. 5.2 : Changes in land use pattern of Mendhvan Watershed

The total geographical area of the watershed comprising 1355.42 ha was put under different of watershed project land use before and after implementation of project is presented in table 5.2 . Area under perennial irrigation has increased from 31.00 ha in 1990-91 to 65.00 ha area increased in the year 2000-01. Area under seasonally irrigation has increased from 105.80 ha in 1990-91 to 250.80 ha area increased in 2000-01 year. The availability rainfed cultivated area increased from 381.46 ha in 1990-91 year to 420.46 ha area in 2000-01. Barren and Uncultivated waste land area has decreased from 376.31 ha (27.76%) in 1990-91 to 130.75 ha (-16.70) in 2000-01. Village settlement area increased from 45.00 ha in 1990-91 to 85.00 ha in 2000-01, after 10 year of watershed completion.

The analysis of these tables brings in to light following observation.

a. The average holding size of dry land agriculture is comparatively larger than that of the irrigated agriculture as productivity of land is very low. There was increase in the net shown area, gross cropped area and the irrigated area during the post WDP.
b. The net irrigated area in pre watershed development situation was only 31.00ha., which has increased 65.00ha.after implementation watershed development programme.

c. Though additional land has come under cultivation due to development of watershed. There was increase is area of settlement, road, stream and gaothan by 40ha. during post WDP.

d. Area under seasonally irrigated increased by (+34ha.) and rainfid area (+57.18 ha.) during post WDP.

e. The average family income increased to Rs. 36128 per family and most of which was from increased farming and dairy activities. The area under cultivation also increased.

1.2.2 : CHANGES IN CROPPING PATTERNS

Table 5.3 Changes in cropping pattern – Kharip season

Sr. No.	Crop	Before watershed development (1990-91) ha			After five years of watershed completion (1995-96) ha			After ten year of watershed completion (2000-01) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Bajara	290	00	290	220	35	255	160	76	236
2	Jawar	70	18	88	65	40	105	70	80	150
	Total	360	18	378	285	75	360	230	156	386

Table 5.4 : Changes in cropping pattern – Rabi season

Sr.No.	Crop	Before watershed development (1990-91) ha			After five years of watershed completion (1995-96) ha			After ten year of watershed completion (2000-01) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Wheat	12	43	55	30	65	95	35	130	165
2	Gram	28	55	83	45	75	120	70	120	190
3	Jawar	35	40	75	55	60	115	90	75	165
	Total	75	138	213	130	200	330	195	325	520

Table 5.5: Changes in cropping pattern – Vegetable crops

Sr. No.	Crop	Before watershed development (1990-91) ha			After five years of watershed completion (1995-96) ha			After ten year of watershed completion (2000-01) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Onion	30	55	85	60	90	150	70	160	230
2	Tomato	09	40	49	12	60	72	18	90	108
3	Chillies	05	20	25	10	40	50	12	80	92
	Total	44	115	159	82	190	272	100	330	430

Fig. 5.3

Changes in cropping pattern area (Kharip season)

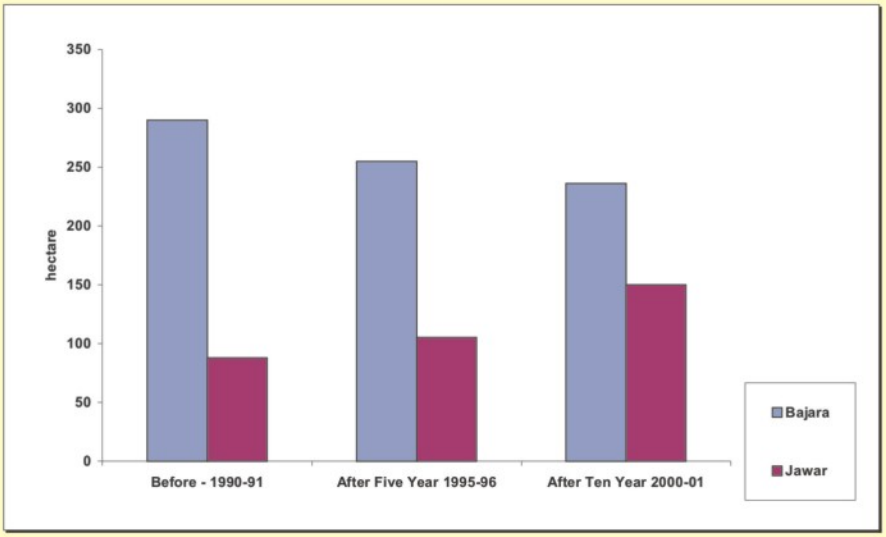


Fig. 5.4

Changes in cropping pattern area (Rabi season)

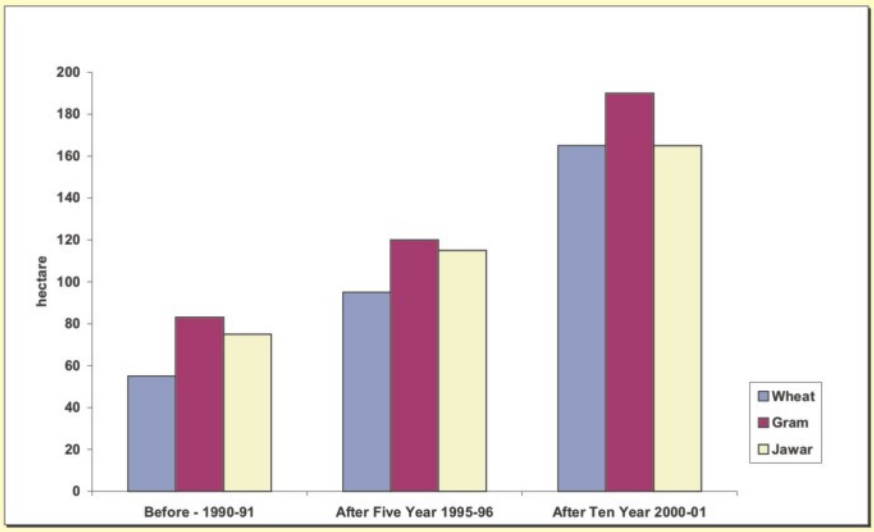
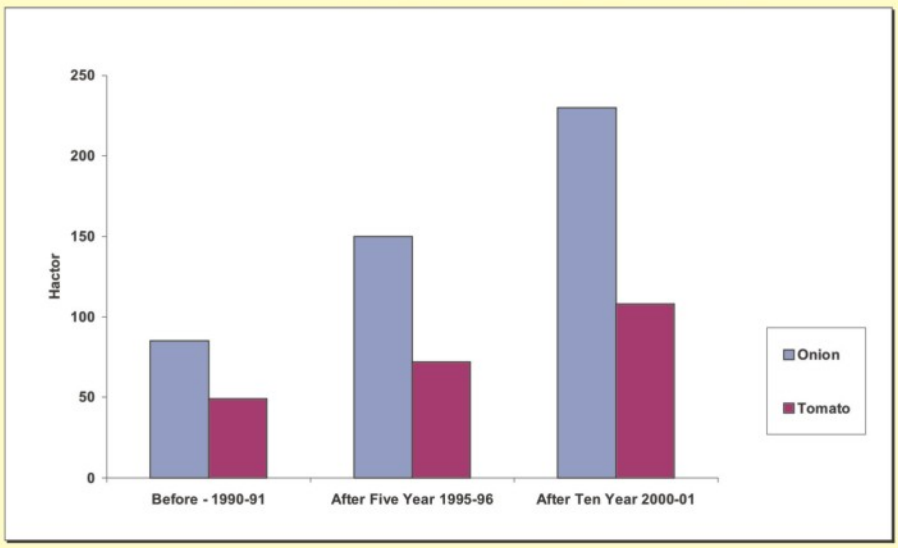


Fig. 5.5

Changes in cropping pattern area (Vegetable Crop)



There is pre-dominance of common cereal crops in the cropping pattern and it is an important peculiarity of dry land agriculture. There is a shift from cereal crop to high value crops. Because of this diversification in agriculture the allied activities has also taken place along with the development of agriculture in the area. The cropping pattern in the watershed during 1990-91, 1995-96 and 2000-01 for different crops in the three periods are shown in Table 5.3, 5.4, & 5.5.

The area under bajara crops decreased from 290.00 ha in 1990-91 to 236.00 ha in 2001-02. The entire bajara crop was grown in the Kharif season as a rainfed crop. This was followed by Jawar wheat and gram in the rabi season in the irrigated area with minor area under onion, tomato and chillies during the Kharif and rabi season. The shift in the cropping pattern in watershed was seen in the diversification of crops under cultivation. Diversification of commercial crops was more perceptible in the area under onion, which occupied 85.00 ha of the cropped area in 1990-91 to 230.00 ha in 2000-01. The area under vegetable crop chillies increased from 25.00 ha in 1990-91 to 92.00 ha in 2000-01. Other commercial crops that were being cultivated in small measures include cotton, groundnut and potato. There was an introduction of dryland horticultural crops like guava and ber in the watershed.

The analysis of these tables brings in to light following observation.

a. Gradual fall in the usage of local varieties and more of improved / hybrid varieties in post watershed development project was observed significantly.
b. The number of farmers cultivating improved / HYV Wheat increased variety and the area under wheat increased by 55 ha. to 165 ha. during post WDP.
c. Number of farmers cultivating local variety of Bajara declined in post WDP. Improved high yielding variety (HYV) has been used in middle fields in Mendhvan village during post watershed development period.
d. The entire Bajara crop was grown in Kharif season as rainfed crop. This was followed by Jawar, Wheat, Gram in rabbi season in the irrigated area with minor area under chilies and Tomato during the rabbi season showing the shift in the cropping pattern during the post WDP.

1.2.3 CHANGES IN PRODUCTION INCOME FROM CROP.

Table 5.6 : Production and income from crops grown before watershed development period (1990-91)

(Rs. Per ha)

Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	03	600	1800	700	1100
2	Jawar	K/R	05	700	3500	650	2850
3	Wheat	Rabi	11	650	7150	1800	5350
4	Gram	Rabi	05	750	3750	700	3050
5	Onion	K/R	43	850	36550	1600	34950
6	Chillies	K/R	03	800	2400	1300	1100

Table 5.7 : Production and income from crops grown 5 year after completion of watershed (1995-96)

(Rs. Per ha)

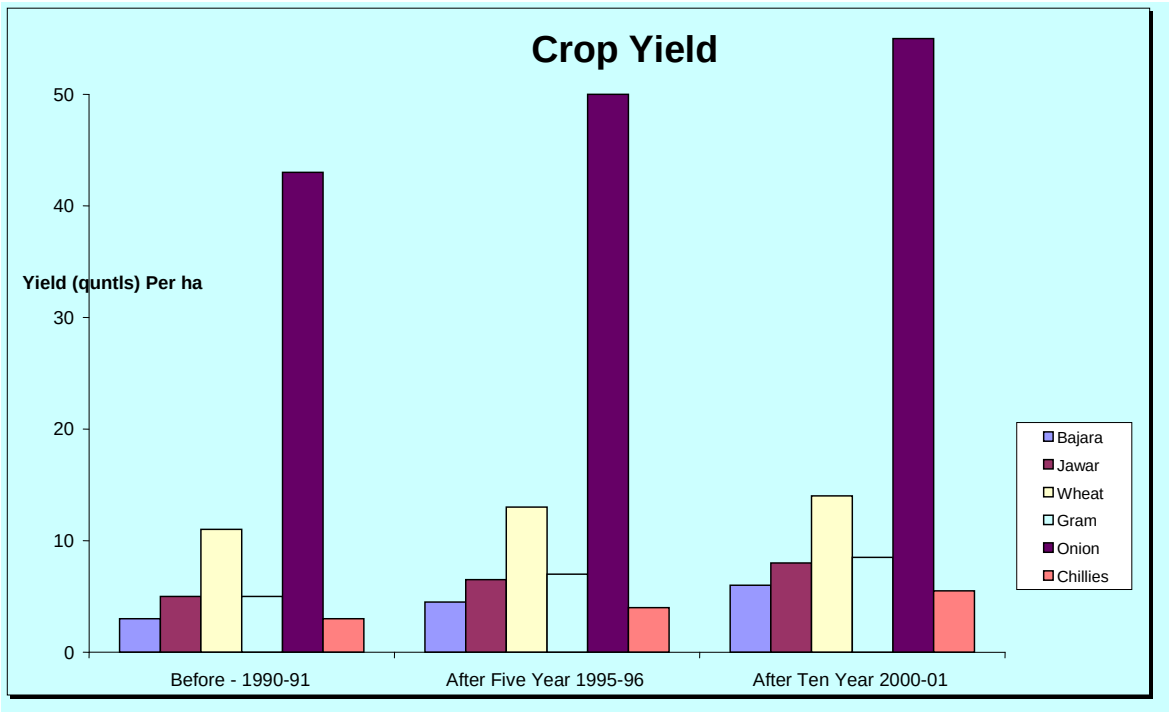
Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	5.5	750	3375	850	2525
2	Jawar	K/R	6.5	850	5525	700	4825
3	Wheat	Rabi	13	750	9750	1900	7850
4	Gram	Rabi	07	850	5950	750	5200
5	Onion	K/R	50	1000	50000	1950	48050
6	Chillies	K/R	04	900	3600	1350	2250

Source- V.W.C. and Govt. Office Record & Villagers diloge

Table 5.8 : Production and Income from crop grown ten year after completion of watershed (2000-01)

(Rs. Per ha)

Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	06	850	5100	1000	4100
2	Jawar	K/R	08	800	6400	950	5450
3	Wheat	Rabi	14	850	11900	2200	9700
4	Gram	Rabi	8.5	1100	9350	1100	8250
5	Onion	K/R	55	1150	63250	3000	60250
6	Chillies	K/R	5.5	1100	6050	1200	4850



Crop Yield

Fig. 5.6, 5.7, 5.8 : Production of crop yield grown before Watershed, After 5 year and after 10 years completion Watershed.

Production and Income From Crop:

The availability of in-situ moisture and the adoption seem to have contributed to increase in the yield rate of both irrigated as well as un-irrigated crops in the watershed. The increased yield is more apparent in the irrigated areas than in the un-irrigated area. Comparative yield rates of important crops in the watershed during the three different periods are given in Table 5.6, 5.7, 5.8.

The average yield of bajara, the main crop in the watershed was 03 quintals in 1990-91, which increased up to 5.5 quintals in 1995-96 and 06 quintals per hector on average in 2000-01 after ten year. The per hectagare production of wheat increased from 11 to 13 and 14 quintals and the production of onion also tremendously increased from 43 to 50 and 55 quintals, during the above mention period. The average yield of commercial crops that have been introduced in the watershed areas was also comparatively better.

The cost of cultivation per hector for different crops is an indicator of the level of technology used in crop cultivation. Before the implementation of the WDP most of the cropping in the area was on a subsistence basis and the major inputs being seed and family labour. However, with the implementation of the programme and

consequent availability of irrigation water and in-situ moisture, farmers were able to use high yielding varieties of seeds as well as application of chemicals fertilizers for crop production. The average cost of cultivation for the main crop of Bajara was Rs. 700 per hectarge during pre development situation which was increased to Rs. 850 in 1995-96 and Rs. 1000 in 2000-01. The difference in the cost of cultivation is more apparent in the irrigated crops as compared to the un-irrigated crops. The cost of cultivation per hectare of onion has increased from Rs. 1600 per hectare in 1990-91 to Rs. 1950 in 1995-96 and Rs. 3000 in 2000-01.

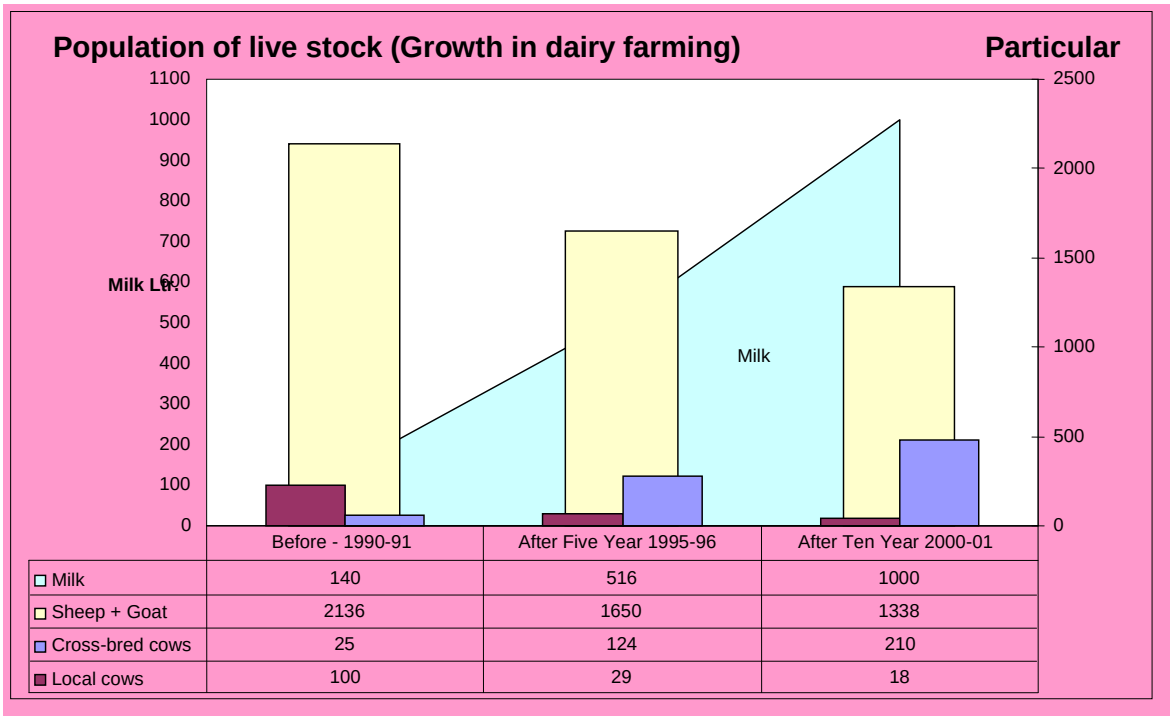
The analysis of these tables brings in to light following observation.

a. The average yield of Bajara, the main crop in the watershed was 03 qt/ha. in pre watershed development situation, which was increased to 06 qt/ha during post WDP and net income also increased from Rs.1800/- in pre watershed to Rs. 5100/- during post WDP.
b. Cultivation of local variety of Onion entailed losses, which were replace after watershed when by Phule Pragati Fursungi. The net income improved significantly up to Rs. 25300/-.
c. Area and net income from wheat improved during post WDP. Many improved varieties were introduced there by increasing the net income of the farmers.
d. The average cost of cultivation for vegetable crop of chillies was Rs. 1100/- per hector during the pre development situation, which increased to Rs. 4850/- per hector during post WDP.
e. Because increase in irrigation area and increased in the Yield per hector of difference crops the share of farm income in total family income has gone up to 60 percentages.

1.2.4. CHANGES IN LIVESTOCK POSITION:

Table 5.9 : Population of livestock (Growth in Dairy farming)

Sr. No.	Particulars	Before WS (1994-95)	After WS Five year completion (1997-98)	After WS 10 Year Completion (2004-05)
1	Local cows	100	29	18
2	Cross – bred cows	25	124	210
3	Sheep & Goat	2136	1650	1338
4	Average daily milk collection in liters	140	516	1000
5	Selling price for milk (in Rs./Lit.)	06	8.5	11



Source: V.W.C. Record and field observation

Fig. 5.9 : Population of livestock (Growth in Dairy farming)

The main occupation of the population of the watershed area was rearing of sheeps before the implementation of the WDP. The people used to take the flocks of sheep for grazing inside the village during the rainy season and migrate to the neighboring villages for sheep rearing in the summer months. But because of the implementation of the programme there was increase in the availability of fodder from crop cultivation and hence the migration of shepherds was totally stopped.

The number of cross bred cattle available in the village were very less in number before the pre-development situation. As per the sample on an average one cross bred cow is being maintained by each family in addition to the existing stock of local cows. However, the population of local cows as compared to the cross-bred cows become less in the village Table 5.9. The yearly milk collection of co-operative dairy was 140 lit. in the 1990-91 which increased to 516 and 1000 liter in the year 1995-96 and 2000-01 respectively.

The analysis of these tables brings in to light following observation.

a. The main occupation of the population in the watershed was area rearing of Sheep before the implementation of the WDP.
b. There was a remarkable increased in the activities related to Dairy in the watershed area after the development of WS. The number of Cross bred Cows increased after the implementation of WS.
c. Average dairy milk collection of co-operative dairy increased from 140 liter in pre watershed development situation to 1000 liters during post WDP.
d. 70 percent to 80 percent of livestock owners are using veterinary services.

1.2.5 CHANGES IN SOURCE OF IRRIGATION :

Table 5.10: Number, depth of well and other irrigation resources

Sr. No.	Details	Before WS (1990-91)	After five years of WS completion (1995-96)	After ten years of WS completion (2000-01)
1	Total number of wells	41	64	93
2	Average depth of wells	28 feet	33 feet	40 feet
3	Wells with parapet wall	18 Nos	23 Nos	29 Nos
4	Total number of tube wells	02	05	-
5	Average depth of tube wells	280 feet	265 feet	-
6	Total number of perculation tanks	-	01	-
7	Total number of checks dam	-	05	01

Source: V.W.C. Record and field work

Irrigation is a rare phenomenon in the dry land agriculture of Mendhwan. Where Little irrigation was available from the wells, most of which was used during the summer season. There is no other source of irrigation like canals, ponds etc. in the village. The details of the number of wells, average of depth, the number of tube wells, percolation tanks and check dam is given in Table 5.10

Different soil and water conservation activities performed under watershed development programme could help recharging of the wells in the Mendhvan area. Construction works like check dam, underground dam, Nala bunds and C.C.T. work proved helpful in increasing water level in wells.

1.2.6 RAINFALL – GROUND WATER RELATIONSHIP :

Mendham watershed let on denote these variables as

X1 – Water column in meter (WC)

X1 – Ground Water level (GWL) in meter

Table - I

X_1	X_2	X_1^2	X_2^2	$X_1 - X_2$
3.50	4.50	12.25	20.25	15.75
3.98	3.02	15.8404	9.1204	12.0196
3.98	3.03	15.8404	9.1809	12.0594
4.09	2.91	16.7281	8.4681	11.9019
15.55	13.46	60.6585	47.0194	51.7309

To predict the value of water column when ground water level is given. We well fit regression line of X_1 (water column) on X_2 (ground water level)

We know that both these two variable are related with each other we 1st find the correlation co-efficient between X_1 and X_2 than with the help of X_2 we will find X_1 (water column.)

The required formula are given below

n = no of observation = 4

$\bar{X}_1$ = Average water column in meter

$$x_1 = \frac{\epsilon x_1}{n}$$

$\bar{X}_2$ = Average ground water level in meter

$$x_2 = \frac{\epsilon x_2}{n}$$

6_1 = standard deviation of water column.

$$6_1 = \sqrt{\frac{\epsilon x_2^2}{n} - (x_2)^2}$$

6_2 = standard deviation of ground meter level

$$6_2 = \sqrt{\frac{\epsilon x_2^2}{n} - (x_2)^2}$$

Cov (x_1 x_2) = co variance (variation) between x_1 and x_2

Cov (x_1 x_2) = $\frac{\epsilon x_1 x_2}{n} - (x_1\ x_2)$

Corr (x_1 x_2) = r ($\bar{x}_1$ $\bar{x}_2$)= r_{12}

Correlation coefficient

Between (x_1) and (x_2)

$$\mathbf{r}_{12} = \frac{cov(x1\,x2)}{6_1\ 6_2}$$

The linear regressions line of water column (x_1) Ground water level (x_2) is

$$\mathbf{x_1 - x_1} = r12 \left(\frac{6_1}{6_2}\right)(x_2 - x_2)$$

From Table - I

€ x_1 = total of water column = 15.55

€ x_2 = total of ground water level = 13.46

€ x_1^2 = sum of sq of water column = 60.6585

€ x_2^2 = sum of sq of ground water level = 47.0194

$X_1\ x_2$ = sum of product of water column and ground water level = 51.7309

Calculation

$$x_1 = \frac{\epsilon x_1}{n} = \frac{15.55}{4} = 3.8875$$

$$x_2 = \frac{\epsilon x_2}{n} = \frac{13.46}{4} = 3.365$$

$$6_1 = \sqrt{\frac{\epsilon x_1^2}{n} - (x_1)^2}$$

$$= \sqrt{\frac{60.6585}{4} - (3.8875)^2}$$

$$= \sqrt{15.164625 - 15.112656}$$

$$= \sqrt{0.051969}$$

$6_1 = 0.228$

$$6_2 = \sqrt{\frac{\epsilon x_2^2}{n} - (x_2)^2}$$

$$= \sqrt{\frac{47.0194}{n} - (3.365)^2}$$

$$= \sqrt{11.75485 - 11.323225}$$

$$= \sqrt{0.431625}$$

$6_2 = 0.6567$

Cov (x_1 x_2) = $\frac{\epsilon x_1 x_2}{n} - (x_1\ x_2)$

$$= \frac{51.7309}{4} - (3.8875 \times 3.365$$

= 12.932725 – 13.0814375

Cov (x_1 x_2) = - 0.1487

r_{12} = r (x_1 x_2) = $\frac{Cov\ (x1\ x2)}{6_1 6_2}$

$$= \frac{0.1487}{0.228 \times 0.657}$$

$$= \frac{0.1487}{0.149796}$$

r_{12} = 0.9926

These is negative correlation between water column (x_1) and ground water level (x_2) as x_1 increases x_2 decrees

The regression line of x_1 on x_2 is,

$x_1 - x_1 = r12 \left(\frac{6_1}{6_2}\right) (x_2 - x_2)$

(x_1 – 3.8875) = - 0.9926 $\left(\frac{0.228}{n0.6507}\right)$ (x_2 - 3.365)

(x_1 – 3.8875) = - 0.3446 (x_2 - 3.365)

(x_1 – 3.8875) = - 0.3446 x_2 + 1.1595

x = - 0.3446 x_2 + 1.1605 + 3.8875

x = - 0.3446 x_2 + 5.047

x_1 = 5.047 – 0.3446 (x_2

Here if we put x_2 (GWL)we have x_1 (WC)

Table – II

Year	Rain Fall (mm)	Gat no. 395	Gat no. 113	Gat no. 413	Gat no. 15	(GWL) Avg
1996	170	5.5	4.9	6.5	4.8	5.42
1997	276	4.8	6.2	5.8	3.0	4.95
1998	362	3.8	3.9	4.2	4.5	4.1
1999	371	2.9	4.7	3.2	3.8	3.65
2000	250	3.2	4.8	2.7	2.1	3.2

Calculation for water column (W C) x_1

(1) $x_2 = 5.42$

$x_1 = 5.047 - 0.3446 \times 2$

= 5.047 – (0.3446 x 5.42)

= 5.047 – 1.86773

`X_1 = 3.2

(2) $x_2 = 4.95$

$x_1 = 5.047 - 0.3446 \times 2$

= 5.047 – (0.3446 4.95)

= 5.047 – 1.70577

X_1 = 3.4

(3) $x_2 = 4.1$

$x_1 = 5.047 - 0.3446 \times 2$

= 5.047 – (0.3446 x 4.1)

= 5.047 – 1.41286

X_1 = 3.6

(4) $x_2 = 3.65$

$x_1 = 5.047 - 0.3446 \times 2$

= 5.047 – (0.3446 x 3.65)

= 5.047 – 1.25779

X_1 = 3.8

x– $\bar{x}$

(5) $x_2 = 3.2$

$x_1 = 5.047 - 0.3446 \times 2$

= 5.047 – (0.3446 x 3.2)

= 5.047 – 1.10272

X_1 = 3.9

Table 5.11 (II)
(Rainfall – water table relationship)

Year	1996	1997	1998	1999	2000
Rainfall (mm)	170	276	362	371	250
WTGL (x_2)	-5.42	-4.95	-4.1	-3.65	-3.2
Water Column (x_1) m	3.2	3.4	3.6	3.8	3.9

Since ground water level is below the ground hence it is given as negative sign

Water table status

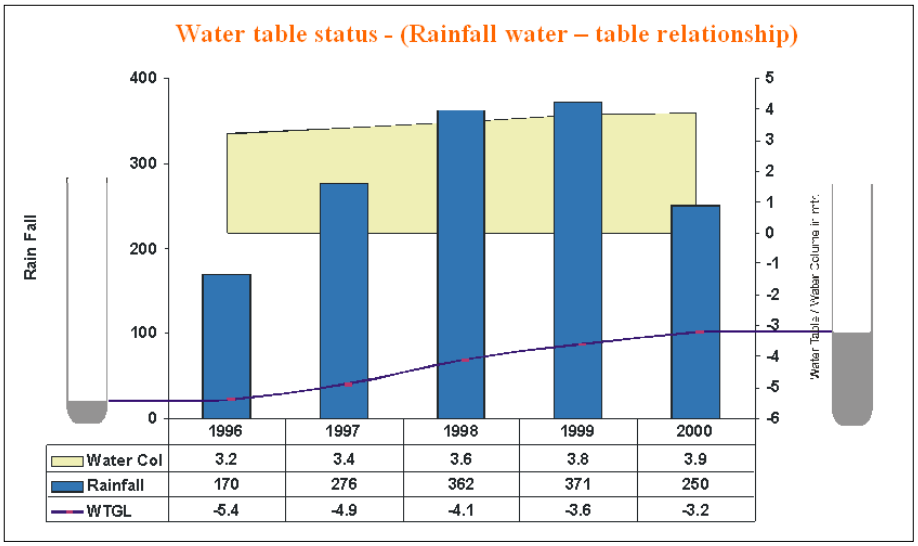


Fig.5.11: Rainfall water table relationship

Above diagram shows the charges in ground water level and water column according time (tear)(i.e. three variable time, GWL wc are represented)

The measurement and observation of wells in Mendhvan watershed area was carried out. The ground water level continuously increased. In 1996 average rainfall was 170.00 mm at that time ground water level was -5.4 m. Ground water level in the year 1998, 1999, 2000 was continually stable i.e. 3.3m. Average rainfall was 170 to 371 mm. Ground water level remained at 4.24 m. there fore average ground water level increased from 0.5 m to 2.20m. during the summer.

The analysis of these tables brings in to light following observation.

a. It is observed that there was a positive improvement in the soil fertility and moisture content in the profile of the soil. Bonding activities, i.e. farm bund and stone bund Continuous Contour Trenches (CCTS), and water absorption trenches (WATS) at the ridge level had facilitated additional infiltration of rainwater enabling the recharge of the ground water down the wells.

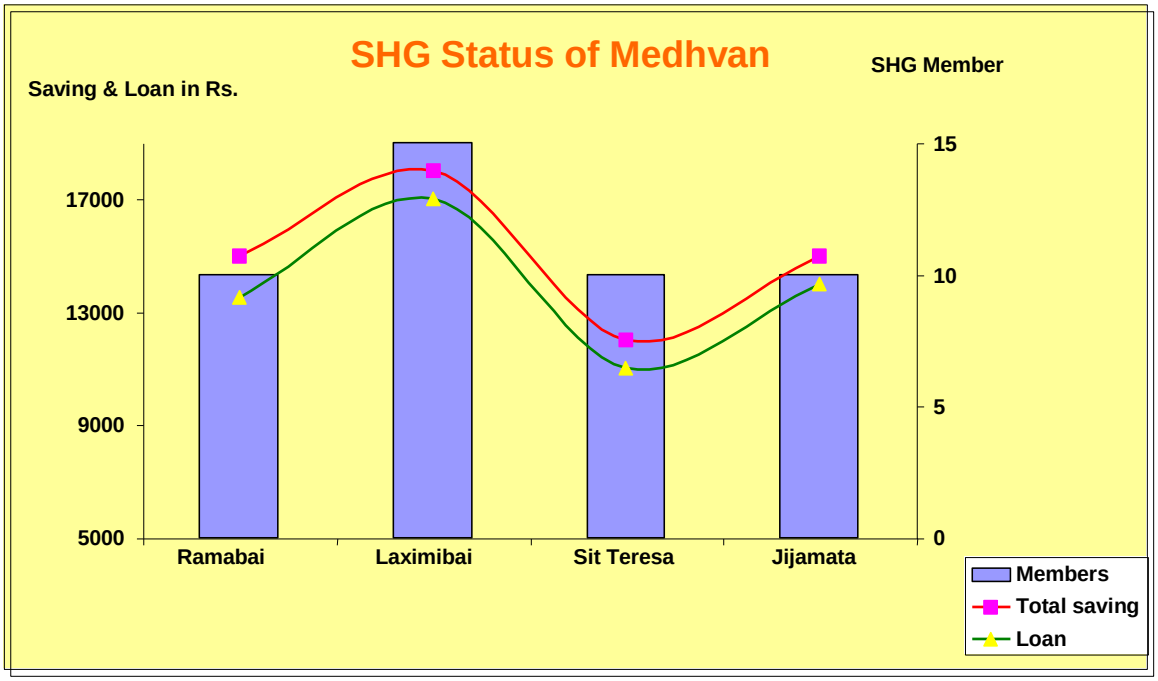
b. Some thumb rules witnessed increase in water levels in the existing wells, water flow from stream / nalls because suspended sediment concentration in water (colour of water / muddywater) Silting in Gully plugs, bunds, gabion and dam etc during the post WDP.

c. It is seen from table 6.1 & 6.2 that in the sample wells, water level have been persistently increased in all the seasons from 1996 to 2000. For example during 1996, the water table depth was 5.4m and it was increased to 3.2 m as on 2000 year. It is observed that that ground water level increased from 2.5 m to 3.2 m during the summer months.

1.2.7 : WOMEN DEVELOPMENT :

Table 5.12 : Watershed development programme through women development programme (SHG)

Sr. No.	Name of SHG	Members	Saving	Total saving	Loan	Loan utilization
1	Ramabai	10	25	15000	13500	Dairy farming Land development Seed, Fertilizers Agri equipments Family function
2	Laximibai	15	20	18000	17000	
3	Sit Teresa	10	20	12000	11000	
4	Jijamata	10	25	15000	14000	



Source: SHG Record - Fig. 5.12 : SHG Status of Medhvan WS.

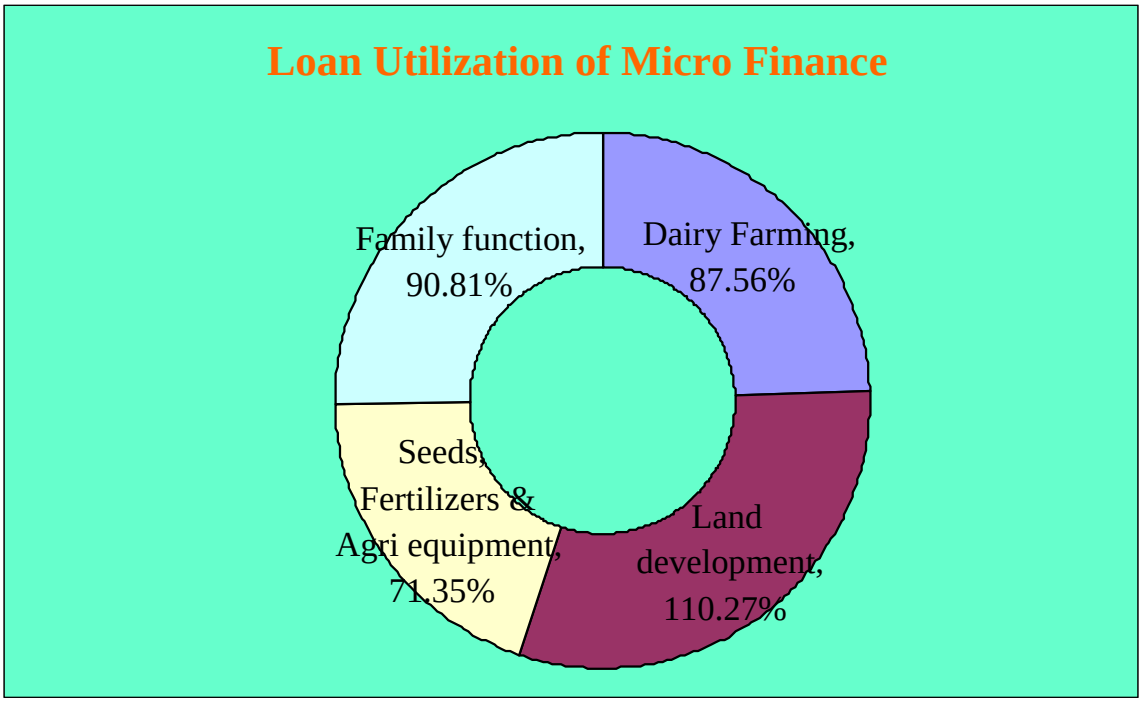


Fig. 5.13 : Loan Utilization Micro Finance.

Women Development (SHG):

The emphasis was given by the NGO on development of women by way of introducing various activities such as Anganwadi, catering, training of adult, income and employment generating activities i.e. nursery, tailoring etc. The Mahila Samaj

Sevika (MSS) provided in the project under IGWDP played a key role in bringing about the awareness. To start with the Mahila Mandal formed a SHG and started nursery activity.

SHGs:-

Four savings groups were organized during the five year involving 45 women with saving of Rs. 60,000. These four groups have been linked with banks in order to build the capacities of self-help groups 08 SHGs took the loan of Rs. 55,500. The loan was utilized for dairy farming, land development, seed, fertilizers and Agri equipment and for the purpose of family functions such as marriage, health treatment, education etc. Table 5.12.

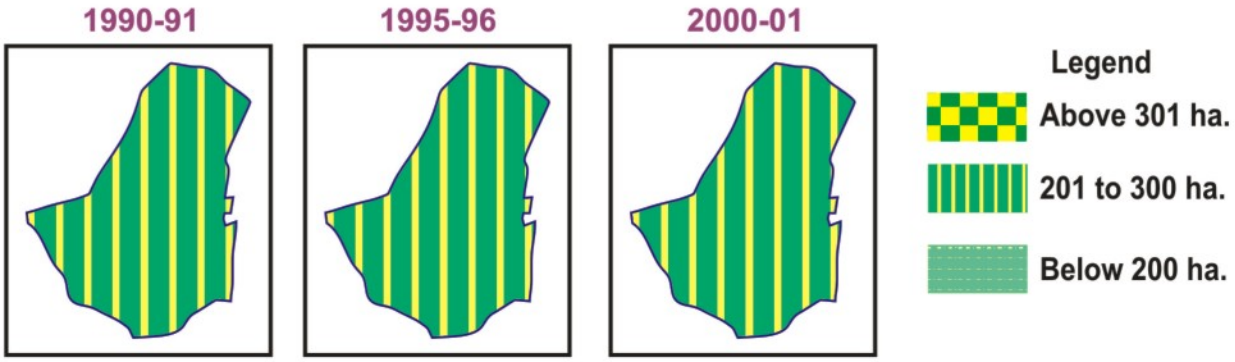
The analysis of this tables brings in to light following observation.

a. With the introduction of IGWDP in the village, the emphasis was given by the NGO on development of women by way of introducing various activities such as Anganwadi, Catering, Training of Adult income and employment generating activities i.e. Nursery, Tailoring etc. The awareness was created among Women by the IGWDP.
b. No permanent Women social worker was found to be employed to provid guidance and training to the women.
c. Most of the Loans taken were used for land development (110.27%) family function (90.81%) Dairy farming (87.56%) seeds fertilizers and Agri equipment (71.35%)

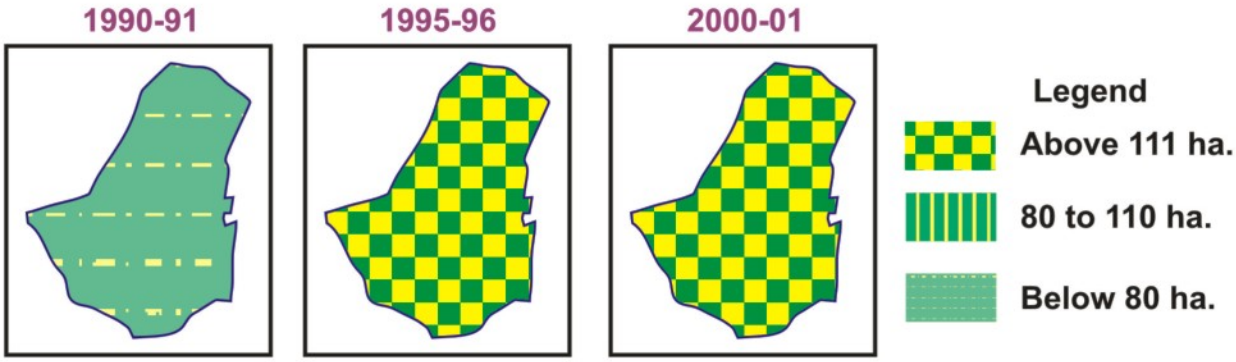
MENDHVAN VILLAGE

CHANGE IN CROPPING PATTERN

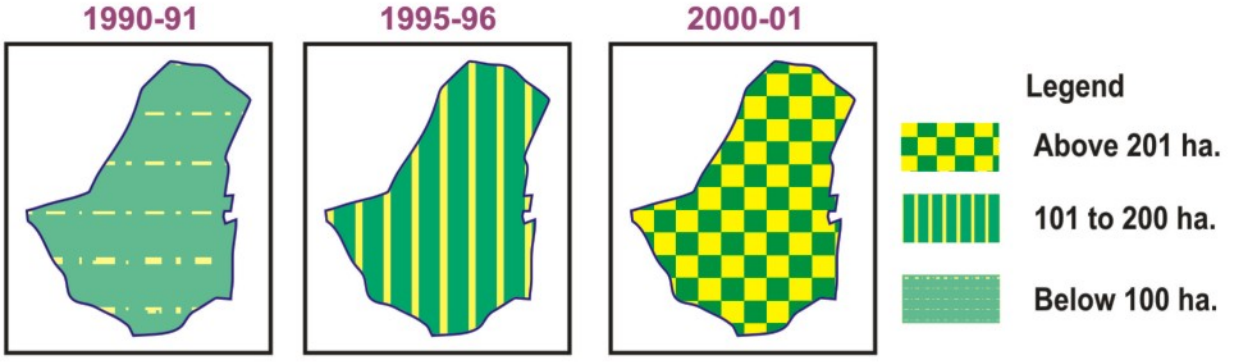
A) AREA UNDER BAJARA (KHARIP SEASON)



B) AREA UNDER WHEAT (RABI SEASON)



C) AREA UNDER ONION (VEGETABLE CROP)

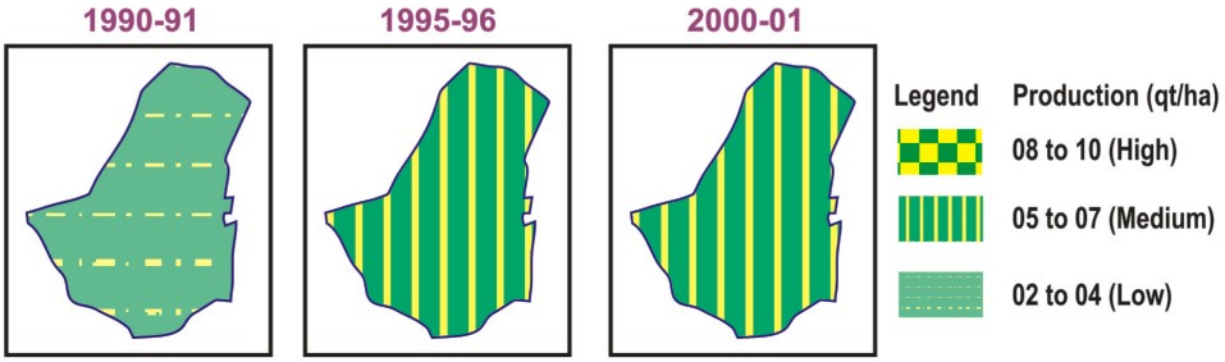


Map No. 5.2

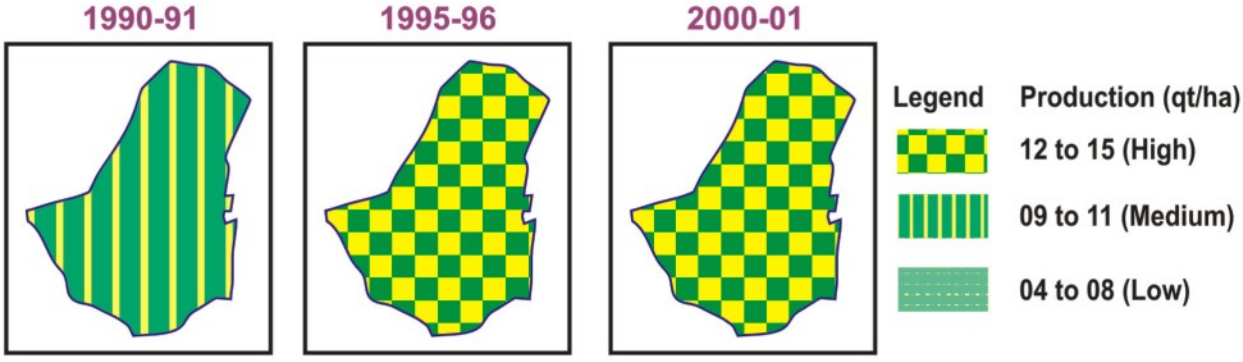
MENDHVAN VILLAGE

CHANGE IN CROP WISE PRODUCTION

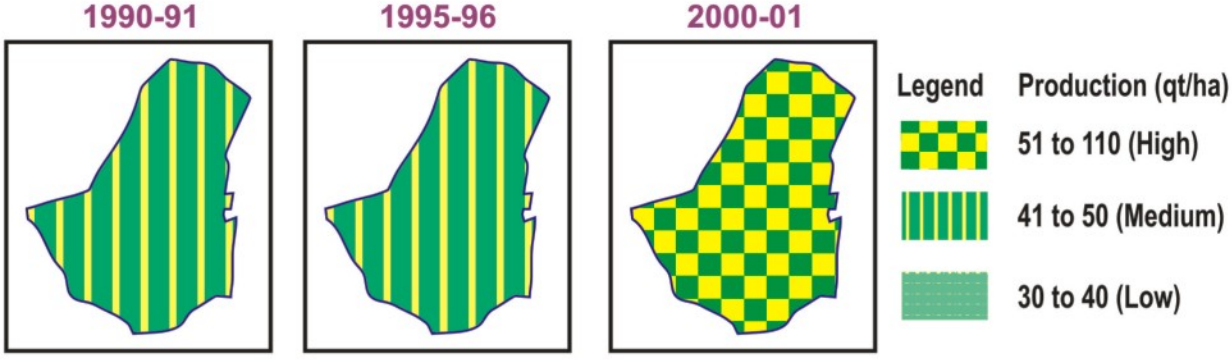
A) BAJARA PRODUCTION (KHARIP SEASON)

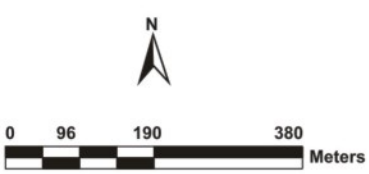


B) WHEAT PRODUCTION (RABI SEASON)



C)ONION PRODUCTION (VEGETABLE CROP)



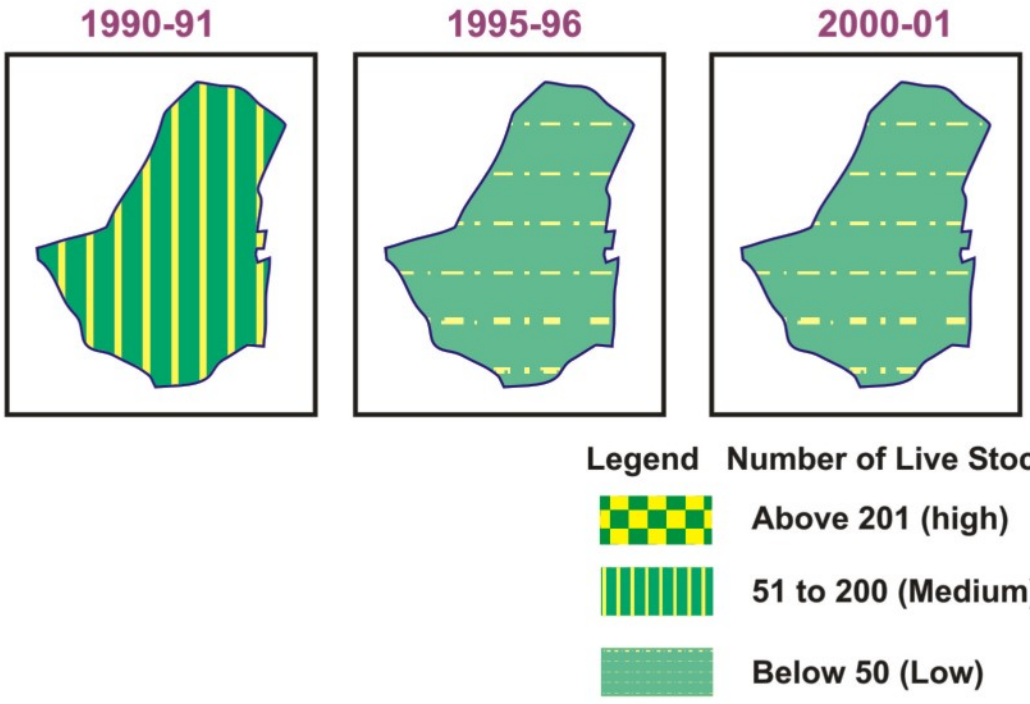


Map No. 5.3

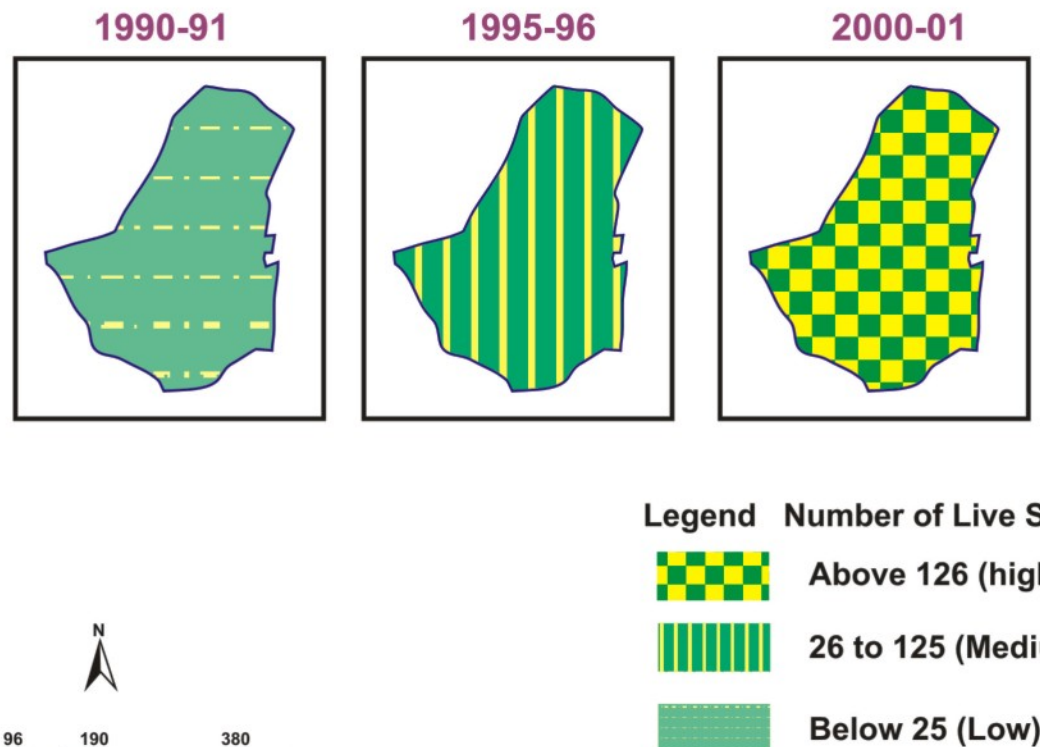
MENDHVAN VILLAGE

CHANGE IN POULATION OF COWS

A) POPULATION OF LOCAL COWS



B) POPULATION OF CROSS-BRED COWS



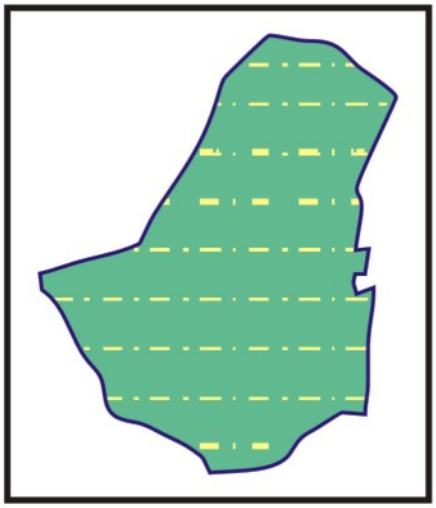
Map No. 5.4

MENDHVAN VILLAGE

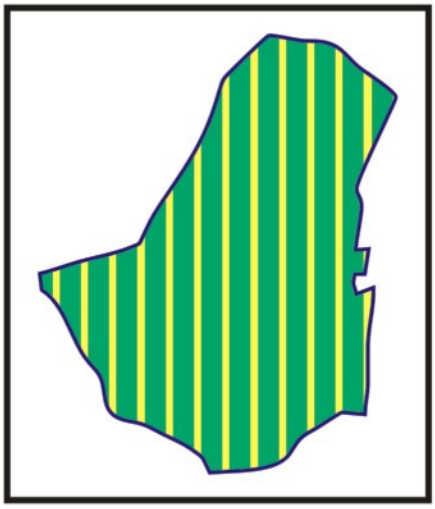
CHANGE IN NUMBER OF WELL'S

NUMBER OF WELL'S

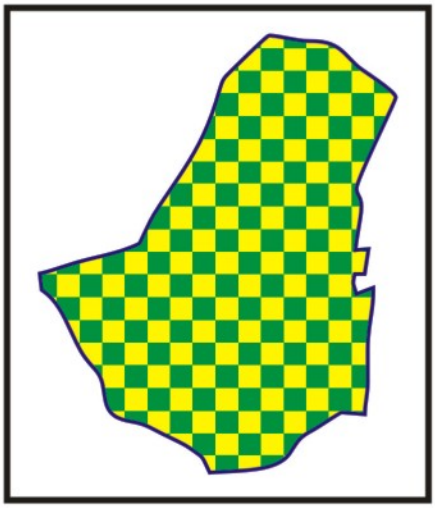
1990-91



1995-96



2000-01



Legend Number of Wells

- Above 91 (high)
- 51 to 90 (Medium)
- Below 50 (Low)

N

0 96 190 380 Meters

Map No. 5.5

2) SAROLE PATHAR

2.2. MAIN TEXT – WATERSHED PROJECT OF SAROLE PATHAR:

- Location: The village Sarole Pathar is located in the Pathar area of Sangamner Taluka., which is 26 km away at south – west of Sangamner. The project area is located at $73^0$9' to $75^0$5' east longitude and $18^0$2' to $19^0$9' north latitude. The village is five km away from the Pune – Nashik (NH-50) highway. The village is situated on the pathar.
- Topography and Drainage: The total geographical area of the watershed is 1453.98 ha. It is situated at the foot hills of the Sahydri range. The watershed is well defined with a North – West to South – East flow. The upper catchment watershed has a highest elevation of 800m above mean sea level. The watershed drains in to river Mula that is the part of Godavari basin. There are three drainage lines from the watershed. One of the major drainage system come from Baleshwar range, which is much useful for this village.
- Climate and Rainfall: The project area falls in the rain shadow region of Sangamner and has an arid climate. The average rainfall is 350.00 mm for 30 to 35 days only. Rainfall is received from south – west monsoon during June to September. The maximum temperature in the range of 40^0C to 45^0C is recorded in the month of May. While the lowest temperature is around 8^0C to 10^0C recorded in the month of December.
- Soil: Watersheds are divided into three distinct soil zones.
    i. Soil on the Pathar: The pathar area have normal soil depth of to 20 cm. The productivity of soil is slightly good. Soil texture is mainly sandy clay to sandy clay loam having good water holding capacity.
    ii. Soil on the slopes – The lands on the slopes have limited soil depth ranging from 0 to 20 cm only. Most of the land on the upper slopes have negligible soil cover. This soil has poor fertility.
    iii. Soils in the valley: The soil in the valley is formed by deposition of the eroded topsoil from the pathar and slopes. This soil is fertile with soil depth ranging from 20 to 30 cm. The texture is mainly clay loams.

SAROLE PATHAR PROJECT AREA

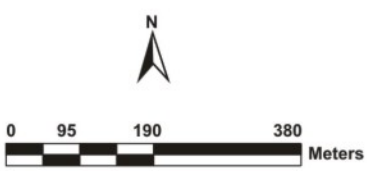
SOIL AND WATER CONSERVATION WORK

A) BEFORE

B) AFTER

Legend

Sym	Particular
	Boundary
	Drainage Line
	Road
	Afforestation
	Agriculture-Work done CCT/FB/SB
	Checkdam
	Gabian
	Percolation Tank
	Nalabund
	Well



Map No. 5.6

2.2. IMPACT TO WATERSHED DEVELOPMENT AT SAROLE PATHAR VILLAGE :

2.2.1 CHANGES IN LAND USE PATTERN :

Table 5.14 Changes in land use pattern

Sr. No.	Particulars	Before WS (ha) (1991-92)	Percentage (%)	After WS (ha) (2001-02)	Percentage change
1	Government forest	279.00	19.18	279.00	19.18
2	Gairan	55.12	03.79	80.12	+ 5.53
3	Gaothan	11.40	00.78	05.46	- 0.30
4	Seasonal irrigation	100.00	06.87	410.00	+ 28.19
5	Perenially irrigation	06.00	00.41	43.00	+ 02.95
6	Rainfed	785.00	53.92	507.42	- 35.92
7	Uncultivable	218.46	15.03	129.46	- 8.90
		1453.98	100.00	1453.46	100.00

Source: V.W.C. Record.

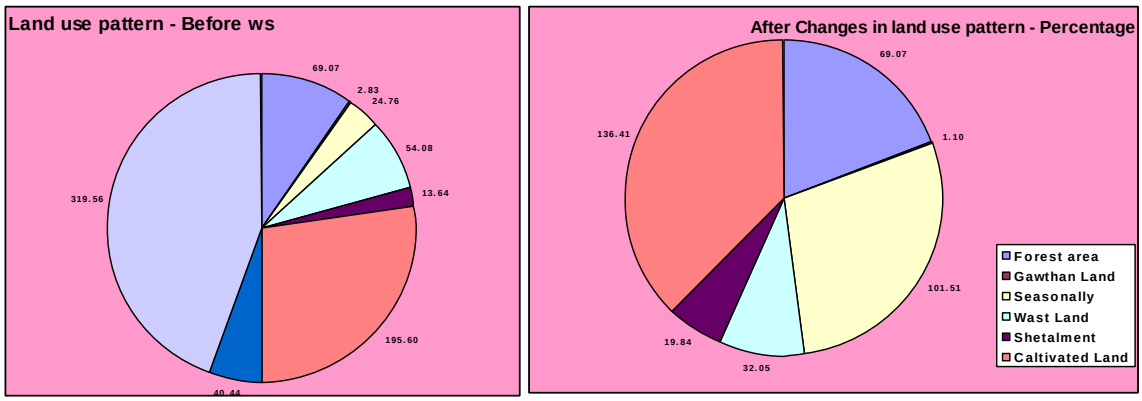


Fig. 5.14: Changes in land use pattern of Sarole Pathar Watershed

The geographical area of the Sarole Pathar watershed is 1453.98 hectors. As a result of watershed development works, are under irrigation has increased from 100 ha in 1991-92 to 410.00 ha area increased in 2001-02 years. The availability of Rainfed cultived area decreased from 790.00 ha in 1991 92 to 550.00 ha area in 2001-02. Details of the changes in land use pattern are presented in the table 5.14.

Instead of cultivating the rainfed crops because of watershed work the farmer shifted towards cultiving cash crop like tomato, onion, peas. Apart from increase in cultivated area and irrigation facilities use of Hyv seeds, fertilizer and pesticides distribution services also contributed to a great extent for achieving agricultural development in the village. Waste land area has decreased from 218.46 ha in 1991-92

to 129.46 ha in 2001-02. Village settlement area increased from 55.12 ha in 1991-92 to 80.12 ha in 2001-02 after 10 year of watershed completion.

- **The analysis of this table brings in to light following observations.**
  a. Area under seasonally irrigation increased by 310ha. during the post WDP.
  b. The average holding size of dry land agriculture is comparatively larger than that of the irrigated agriculture as productivity of land is very low.
  c. The changes in the net sown area, gross cropped area (+28.19ha.) and the irrigated area (+2.95ha.) with increase in the irrigated land, the Rainfed has reduced from 45.00% to 35.39% during the post WDP.
  d. Out of total cultivated land only a negligible portion was perennially irrigated through wells and a sizable portion was entirely dependent on the rainwater in pre development situation.

2.2.2. CHANGES IN CROPPING PATTERN

Table 5.15: Changes in cropping pattern – kharip season

Sr. No.	Crop	Before watershed development (1991-92) ha			After five years of watershed completion (1996-97) ha			After ten year of watershed completion (2001-02) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Bajara	340	05	345	180	10	190	160	20	180
2	Jawar	60	-	60	40	20	60	30	10	40
3	Groundnut	240	05	245	45	25	70	30	20	50
4	Paddy	60	-	60	40	-	40	40	-	40
	Total	700	10	710	305	55	360	260	50	310

Table 5.16: Changes in cropping pattern – Rabi season

Sr.No.	Crop	Before watershed development (1991-92) ha			After five years of watershed completion (1996-97) ha			After ten year of watershed completion (2001-02) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Wheat	10	60	70	40	130	170	60	120	180
2	Gram	90	40	130	120	60	180	130	70	200
3	Jawar	110	05	125	125	20	145	110	30	140
	Total	210	105	315	285	210	495	300	220	520

Table 5.17: Changes in cropping pattern – Vegetable crops

Sr.No.	Crop	Before watershed development (1991-92) ha			After five years of watershed completion (1996-97) ha			After ten year of watershed completion (2001-02) ha		
		Unirri.	Irrig.	Total	Unirri.	Irrig.	Total	Unirri.	Irrig.	Total
1	Onion	60	30	90	140	200	340	140	240	380
2	Tomato	10	30	40	40	55	95	80	70	150
3	Pease	20	20	40	45	30	75	50	40	90
4	Potato	-	10	10	10	20	30	20	10	30
	Total	90	90	180	235	305	540	290	360	650

After implementation of watershed development programme in Sarole Pathar watershed area, there has been a significant shift in cropping pattern of the village. The availability of irrigated land increased. Some new crops like onion, Peas, Tomato have been introduced. Table 5.17 indicates that the gross cropped area has increased. The area under bajara crops decreased from 345.00 ha in 1991-92 to 190.00 ha in 2001-02. Farmers diverted towards other crops. For a long period groundnut cash crop was leading the area covered, but this crop was always in decreasing position from 245.00 ha in 1991-92 to 50.00 ha in 2001-02 (Table 5.15, 5.16)

In Sarole Pathar the area under onion crop increased from 90.00 ha in 1991-92 to 380.00 ha in 2001-02. While the area under Jawar decreased by 60.00 ha in 1991-92 to 40.00 ha in 2001-02 and in case of paddy also there was decrease in its area 60.00 ha in 1991-92 to 40.00 ha in 2001-02 year (Table 5.17)

The area under rabi Jawar increased from 120.00 in 1991-92 to 140.00 ha in 2001-02. The area under Gram Crop increased from 130.00 ha in 1991-92 to 200.00 ha in 2001-02 years. While Tomato fruit crop and Peas were newly introduced in cropping pattern of Sarole Pathar. The area under vegetables increased significantly in the base year. i.e. 1991-92 it was 180.00 ha. After ten years it increased to 650.00 ha. It is observed the area under mix food grain, pulses and oil seeds decreased. Where as the area under cash crops like onion, tomato, Peas in both seasons has enormously increased. Changes in the crop-wise area and unirrigated and irrigated area and season wise cropping pattern are shown in Tables 5.15, 5.16, 5.17.

Fig. 5.15

Changes in cropping pattern area (Kharip season)

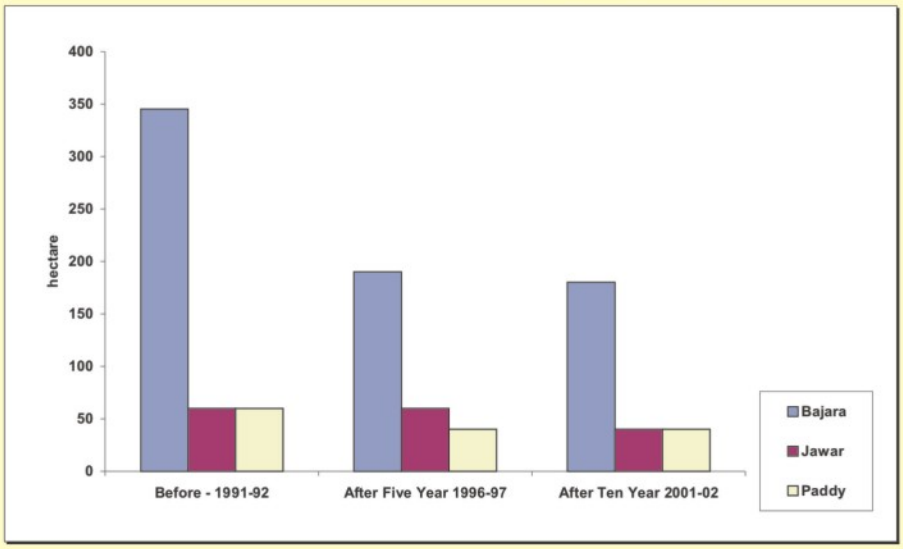


Fig. 5.16

Changes in cropping pattern area (Rabi season)

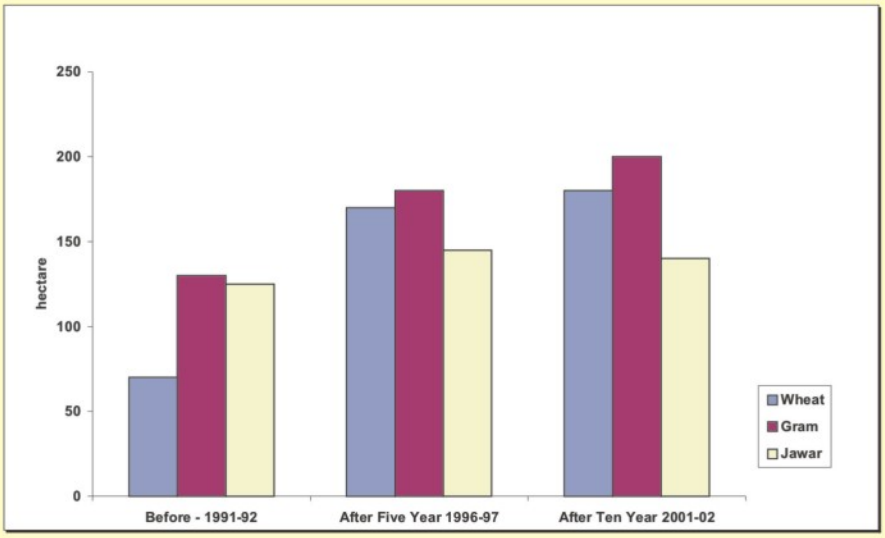
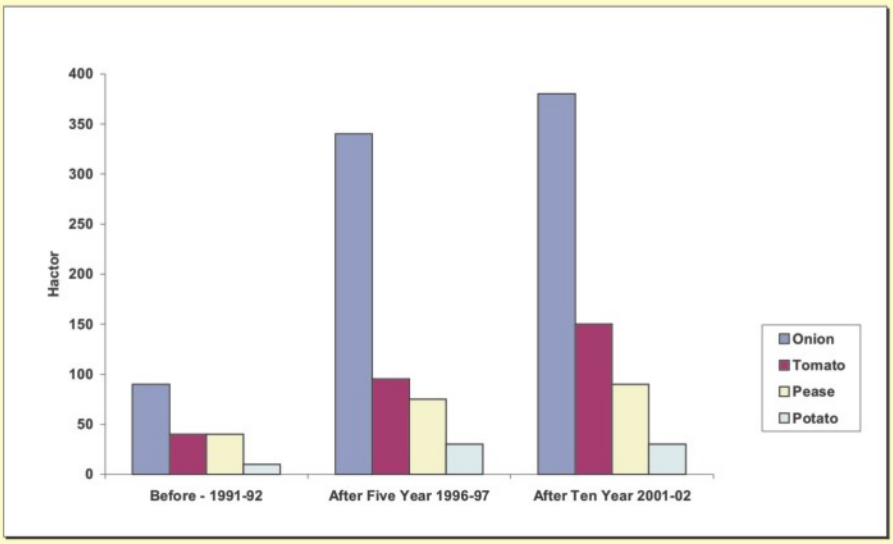


Fig. 5.17

Changes in cropping pattern area (Vegetable Crop)



- **The analysis of these tables brings in to light following observation.**

a. Pre dominance of coarse cereal crops in the cropping pattern is an important peculiarity of dry land agricultural. Shift from coarse cereal crop to high value crop is also diversification of agriculture during the post WDP.

b. The entire bajara crop was grown in the kharif season as a rainfed crop. This was followed by Onion, Wheat, Gram and Jawar in the Rabbi season in the irrigated area with minor area under Tomato, Peas, Potato and Onion during the Rabbi season. There is shift in the cropping pattern in the watershed after implementation of WDP.

c. Most of this shift of area has taken place from the area under Onion in addition to the increase in the cultivable area. The share of Onion was only 380ha. in 2001-02 as compared to 90ha. in the pre development situation.

d. There was an introduction of dry land horticultural crop like Mango, Drum Stick, Amla, Lemon and Custard apple in the watershed perhaps due to the free supply of seedlings as a part of the WDP.

e.

2.2.3 : CHANGES IN PRODUCTION AND INCOME FROM CROPS :

Table 5.18 : Changes Production and income of crops grown during before watershed development period (1991-92)

(Rs. Per ha)

Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	07	700	4900	900	4000
2	G nut	Kharif	12	1400	16800	1250	15550
3	Wheat	Rabi	05	700	3500	1750	1750
4	Gram	Rabi	02	800	1600	800	800
5	Onion	K/R	30	900	27000	1900	25100
6	Tomato	K/R	45	80	18225	3550	14675

Table 5.19 : production and income of crops grown during after watershed completion five year (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	09	800	7200	1050	6150
2	G nut	Kharif	11	1500	16500	1300	15200
3	Wheat	Rabi	08	800	6400	1950	4450
4	Gram	Rabi	03	900	2700	950	1750
5	Onion	K/R	35	1200	42000	2150	39850
6	Tomato	K/R	50	120	30000	4000	26000

Source- V.W.C. and Govt. Office Record

Table 5.20 : Production and Income of crop grown during after ws completion ten year (2001-02) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quntls) Per ha	Price/ Qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	12	900	10800	1200	9600
2	G nut	Kharif	11	1700	18700	1500	17200
3	Wheat	Rabi	10	900	9000	2100	6900
4	Gram	Rabi	3.5	1200	4200	1150	3050
5	Onion	K/R	40	1600	64000	3000	61000
6	Tomato	K/R	63	110	34650	4500	30150

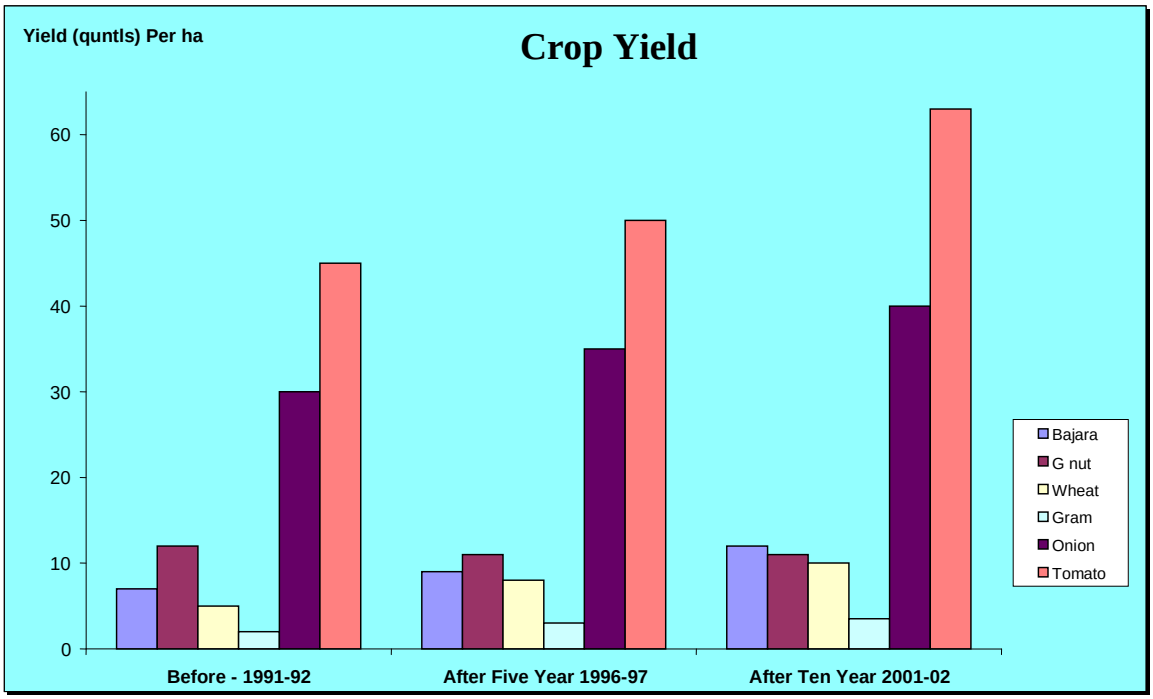


Fig. 5.18, 5.19, 5.20 : Production of crop yield grown during before Watershed, After 5 year and after 10 years completion Watershed.

The production and income of different crops grown during pre and post development situations are presented in Table 5.18, 5.19, 5.20 respectively. In the first instance, it is observed from the tables that the production of the crops has substantially increased over the five to ten year period. But at the same time there is no change in technology.

Per hectarge production of bajra increased from 7 to 9 quintals during the first five years and it increased to 12 quintals after 10 years. There was considerable increase in male, female and bullock labour, use of fertilizers, Hyv Seeds. However the percentage production of groundnut decreased from 12 to 11 quintals with decrease in use of seed rate. The per hectagre production of wheat increased from 05 to 08 and 10 quintals. The production of gram increased from 02 to 03 and 03.5 quintals. The production of onion tremendously increased from 30 to 35 and 40 quintals and the production of tomato increased 45 to 50 and 63 quintals (Table 5.18, 5.19, 5.20).

It was reported by the farmers that the yield rates of the crops were increased primarily because of increase in duration of moisture in the farm which happened due to soil and water conservation work carried out in the region. On the other hand there are no changes in the cost of cultivation for individual crops in both the situations indicated farmers were following the old age methods of cultivation even now. But now a day the farmers are using HYVS of crops for the cultivation of high value crops. Usage of Chemical fertilizers and insecticides was minimum. The increase in production of all crops was also due to irrigation and use of improved varieties.

- **The analysis of this table brings into light following observation.**

a. The availability of in situ moisture and the adoption of modern technology in crop production seem to have contributed to increase in the yield rate of both irrigated and un-irrigated crops in the watershed.
b. The average yield of Bajara the main crop in the watershed was 07 qt/ha in 1991-92, which has gone up to 12 qt/ha during post WDP.
c. The average yield of Ground nut was 12 qt/ha per watershed which deceases to 11 qt/ha. during post WDP.
d. The average yield of commercial crops that have been introduced in watershed areas was also comparatively better. For instance, tomato crop had yield of 45 qt/ha. in pre WDP which was increased to 63 qt/ha. during post WDP.

e. The average cost of cultivation for the main crop Onion was Rs. 1900/- per hector during the pre development situation, which has increased to Rs. 3000/- per hector during post WDP.

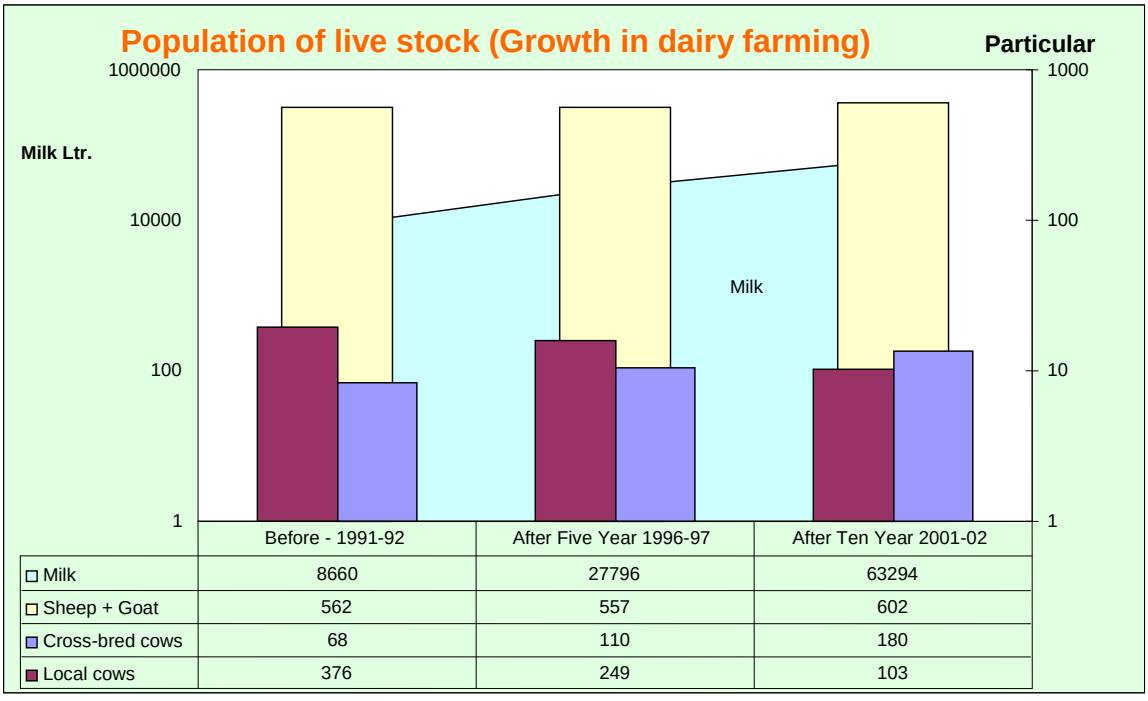
f. The cost of cultivation per hector of Tomato has gone up from Rs. 3550/- per hector to Rs. 4500/- per hector.

g. Area under Onion increased by 290 ha. and net benefit also increased from Rs. 25100/- in pre WDP to Rs. 61000/- during post WDP.

2.2.4: CHANGES IN LIVESTOCK POSITION :

Table 5.21 : Population of livestock (Growth in Dairy farming)

Sr. No.	Particulars	Before WS (1991-92)	After WS Five year completion (1996-97)	After WS 10 Year Completion (2001-02)
1	Local cows	376	249	103
2	Cross – bred cows	68	110	180
3	Sheep & Goat	562	557	602
4	Average yearly milk collection in liters	8660	27796	63294
5	Selling price for milk (in Rs./Lit.)	06	08	10



Source: V.W.C. Record and field observation

Fig. 5.21 : Population of livestock (Growth in Dairy farming)

Livestock in the project area consisted of 376 local cow, 68 cross bred cows, 300 bullocks, 340 sheep, 222 goats, 360 poultry in the pre watershed period i.e. 1991-92 year. At that time the average yearly milk production was about 8660 liters. Availability of green fodder was totally lacking.

Five to 10 year after the completion of watershed the increase in number of crossbred cows was the highest. In the year 1991-92 the number of cross bred cows were 68. After five years the number increased to 110 and after then years i.e. in the year 2001-02 the number of cross bred cows was increased to 180.

In the base year i.e. during 1991-92 the number of goats were 222, which increased to 280 after five years i.e. in to 1996-97. After ten years the number of goats increase to 487 i.e. in the year 2001-02. In the year 1991-92 the number of poultry were 360, which increased to 6000, and 12550 in year 1996-97 and 2001-02 respectively. The yearly milk collection of co-operative dairy was 8660 lit. in the 1991-92 which increased to 27796 and 63294 liter in the year 1996-97 and 2001-02 respectively. Thus, there was increase in almost all live stock, except local cows, and bullocks during the base year. (Table 5.21)

The analysis of this table brings in to light following observation.

a. The increase in various activities especially dairy and poltry activities in the village is visible from the number of crossbreed cattle available in the village. There activity did not exits during Pre WDS.
b. The population of local Cows as compared to the crossbreed Cows was more in the village.
c. The co-operative dairy provides the necessary backward and forward linkages for the dairy activity in the village by their activities of dairy collection of milk and veterinary care services to the needy farmers.

2.2.5 : CHANGES IN SOURCE OF IRRIGATION.

Table 5.22 : Number, depth of well and other irrigation resources

Sr. No.	Details	Before WS (1991-92)	After five years of WS completion (1996-97)	After ten years of WS completion (2001-02)
1	Total number of wells	27	61	83
2	Average depth of wells	21 feet	31 feet	42 feet
3	Wells with parapet wall	19 Nos	49 Nos	64 Nos
4	Total number of tube wells	2	4	-
5	Average depth of tube wells	260 feet	250 feet	-
6	Total number of percolation tanks	01	-	-
7	Total number of checks dam	2	9	-

Source: V.W.C. Record and field work

Irrigation is a rare phenomenon in the dry land agriculture of Sarole Pathar watershed. A little irrigation was available from the wells. Most of which was used during the summer season. There is no other source of irrigation like canal, ponds etc in the village. Wells are the major source of irrigation. But, before 1991-92 these wells were seasonal or totally dry. The watershed development programme has changed this scene to some extent.

Different soil and water conservation activities performed under watershed development programme could help in recharging of the wells in the Sarole Pathar area. Construction works like Nalabunds, check dam, percolation tank and C.C.T. works proved helpful for increasing water level in the wells.

The total numbers of wells were 27 in the pre watershed period i.e. period to 1991-92. The number of wells increased to 61 in 1996-97. In 2001-02 the number of wells increased to 83. In addition the seasonal wells in the watershed are having potential for bi-seasonal (8 months) and annual irrigation. The average depth of wells before watershed was 21 feet. After five years the average depth of wells was 31 feet and that after ten years i.e. 2001-02 it was 42 feet. The total number of tube wells were 03 before watershed. Only 2 tubewells were added after watershed. There is a ban on digging of tubewells in the village. Only one percolation tank is utilized as

irrigation source as well as for domestic purpose. The total numbers of check dams were 02 before watershed. This number increased to 9 after the completion of watershed.

2.2.6 : RAIN-FALL GROUND WATER RELATIONSHIP.

Table 5.23: Water table status

(Rainfall water – table relationship)

Year	1996	1997	1998	1999	2000
Rainfall	415.00	627.00	791.15	631.00	507.55
WTGL	-5.09	-5.6	-5.5	-4.7	-3.9
Water Col	3.3	3.2	3.1	3.4	3.7

Source: V.W.C. Record and field work

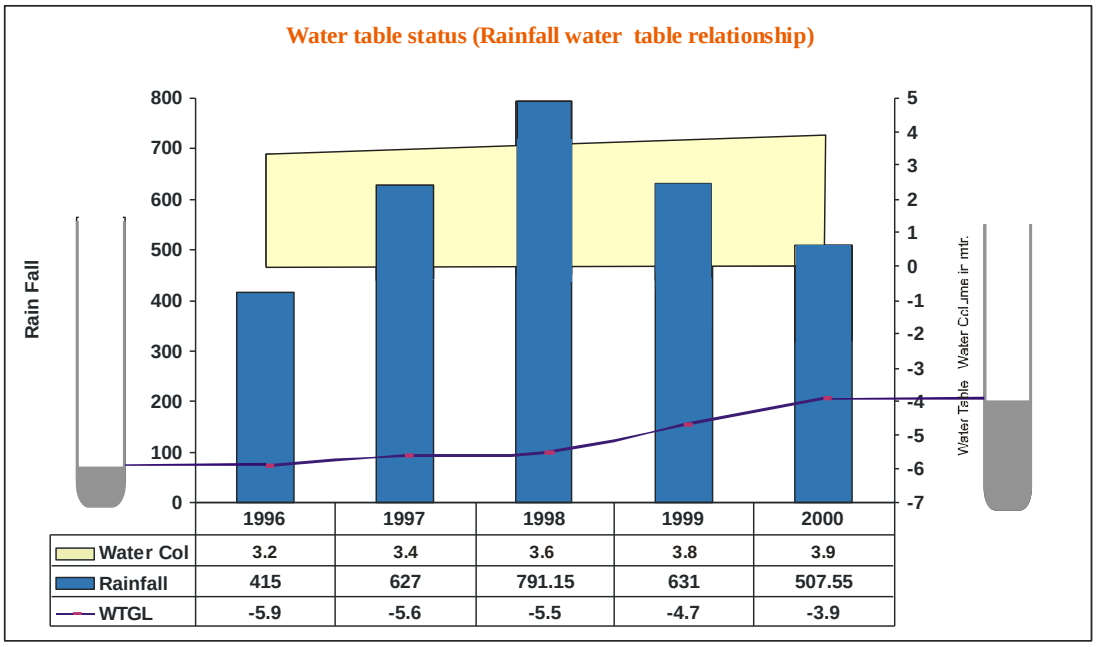


Fig. 5.23 : Rainfall water table relationship

The measurement and observation of wells in Sarole Pathar watershed area was carried out. The ground water level continuously increased in 1996. Average rainfall was 415.00 mm at that time average ground water level was -5.9m. Ground water level in the year 1996, 1997, 1998 was continually stable i.e. 5.6 m. average rainfall was 415 to 791 mm. Ground water level remained at 5.12 m. There fore average ground water level increased from 0.4 to 2. m during the summer month.

- **The analysis of this table brings in to light following observation.**

a. The streams, which in a year of normal rainfall would flow up to November, now flow up to February even in drought years. Soil conservation measures along with water harvesting structures on these streams have increased the groundwater table and this has consequently led to greater water availability for irrigation and domestic purpose.

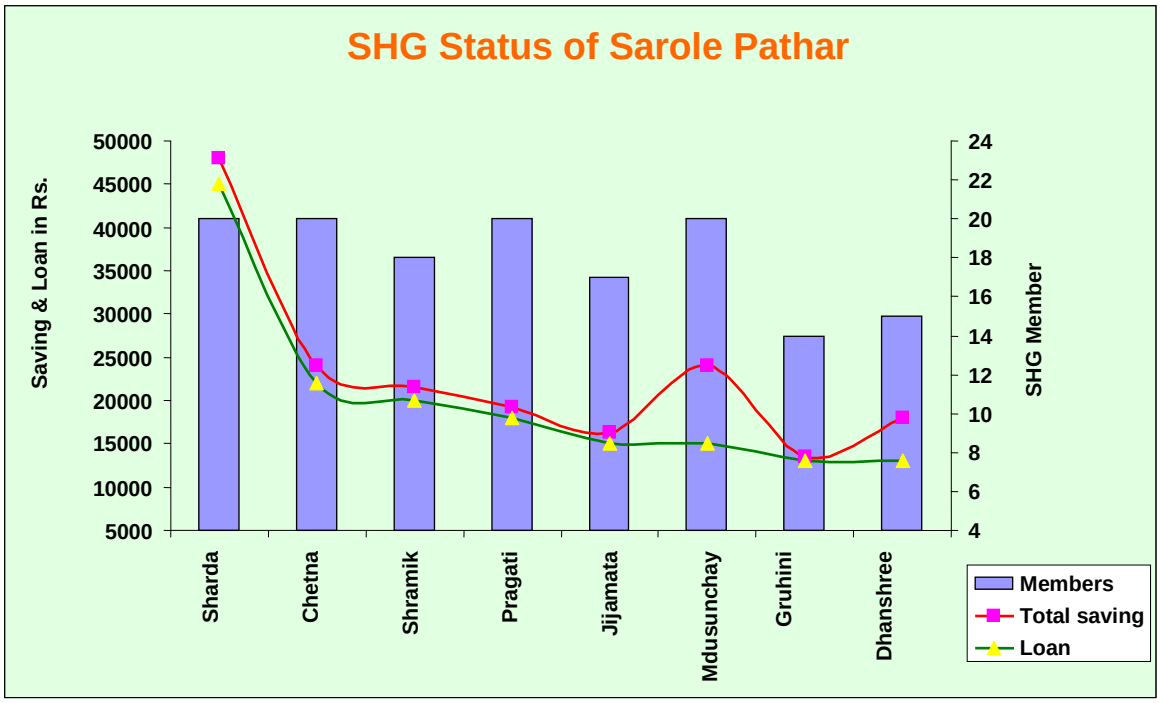
b. In pre WSD program the village had 27 wells, 13 of which had water maximum for seven months. In 1996-97 the village had 61 wells, 20 of which had water for eight to nine month. In 2001-02. The village had 83 wells 32 of which had water for Ten to Eleven months because water table had increased as a result of water harvesting measures and soil conservation work undertaken as part of the WSD program.

c. There is a ban on digging of tube wells in the Sarole Pathar. Ground water level increased from 1.00 to 1.7 m during the summer month.

2.2.7 : WOMEN DEVELOPMENT

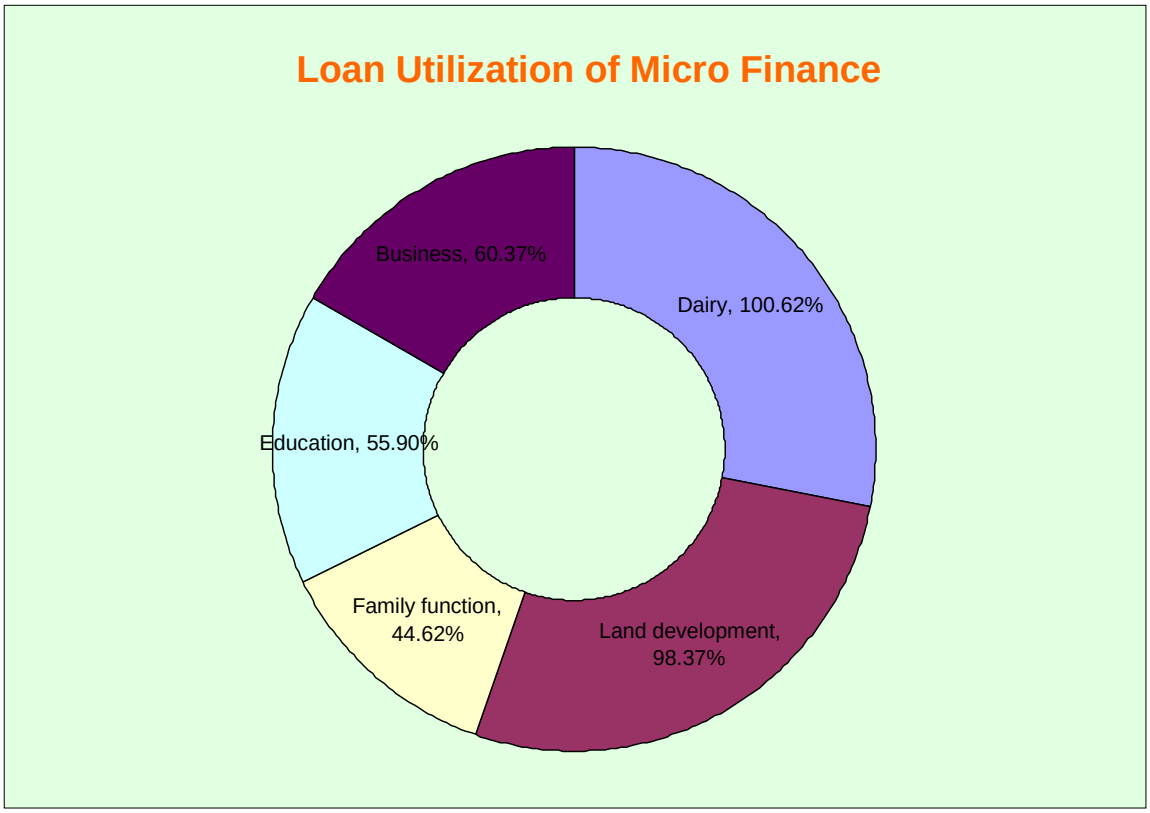
Table 5.24 : Watershed development programme through women development programme (SHG)

Sr.No.	Name of SHG	Members	Saving	Total saving	Loan	Loan utilization
1	Sharda	20	50	48000	45000	Dairy
2	Chetna	20	25	24000	22000	Land development
3	Shramik	18	25	21600	20000	House construction
4	Pragati	20	20	19200	18000	Family function
5	Jijamata	17	20	16320	15000	Education
6	Mdusunchay	20	25	24000	15000	Business
7	Gruhini	14	20	13440	13000	
8	Dhanshree	15	25	18000	13000	



Source: SHG Record

Fig. : 5.24 : SHG status of Sarole Pathar



SHG Status of Sarole Pathar

Fig. : 5.25 : Loan Utilization of Micro Finance.

The women in the watershed are more motivated than men. The "Sharda Mahila Mandal" formed women's SHGs operating in the watershed. During 1998-99. The standard if living of villages, because of introduction of cooking devices, biogas plants, non-formal education, kitchen gardens, latrines, soak pits and health camps. 210 women's initiated income generating activities like rearing cows and goats, dairy, poultry, flourmill, grocery shop, stationary shop. In addition to this is besides their active participation in the local development institution like village watershed committees (VWCS), Gram sabhas (Village meeting) and their own self help groups (SHGS).

SHGs:-

Eight savings groups were organized during the year involving 144 women with of Rs. 1,84,560. These as groups have been linked with banks in order to build the capacity of self-help groups. This year SHGs took the Loan of Rs. 1,61,000. This loan was utilized for Dairy farming, Land development, house construction, business – bangle selling shop, tailoring, grocory shops, stationary, shoe mending, poultry and for the purpose of family functions such as marriage, health treatment, child education etc. (Table 5.24). The SHG's are found very useful in generating social awareness responsibilities and well protected social life.

Observation :

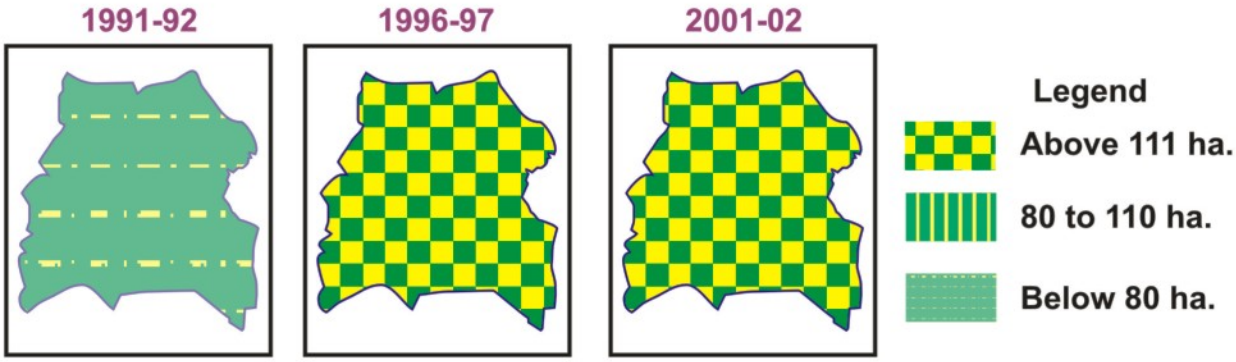
a. The project has enabled women to come out of their homes and participate in the project implementation. The fact that women were member of the VWC & FPC Samiti helped them to influence the decisions making process by participating in the meetings.
b. As a result of this participation process, the women pursued the organizational effort in terms of self help groups. At the middle of the project, there were 08 SHGs in the village having a membership of about 145. In the beginning the per month contribution was Rs. 20 to 25 each which had been raised to 50 to 75 per month.
c. The money circulated in the SHG's was used for productive purpose. Initially the women used the amount for day-to-day needs but it was slowly shifted to capital expenditure, such as repairs of house etc. Most of the loans taken later were used for buying Goats, Cows, Fertilizers, Dairy and land development.

SAROLE PATHAR VILLAGE

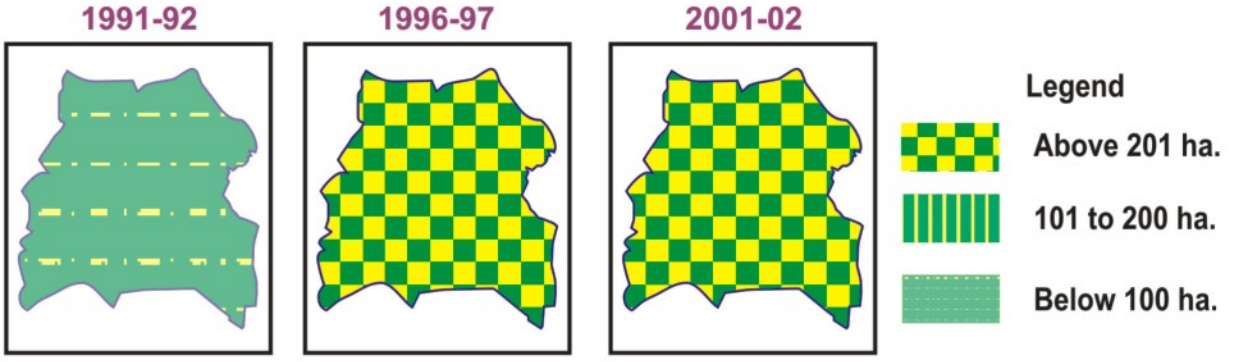
CHANGE IN CROPPING PATTERN

A) AREA UNDER BAJARA (KHARIP SEASON)

B) AREA UNDER WHEAT (RABI SEASON)



C) AREA UNDER ONION (VEGETABLE CROP)

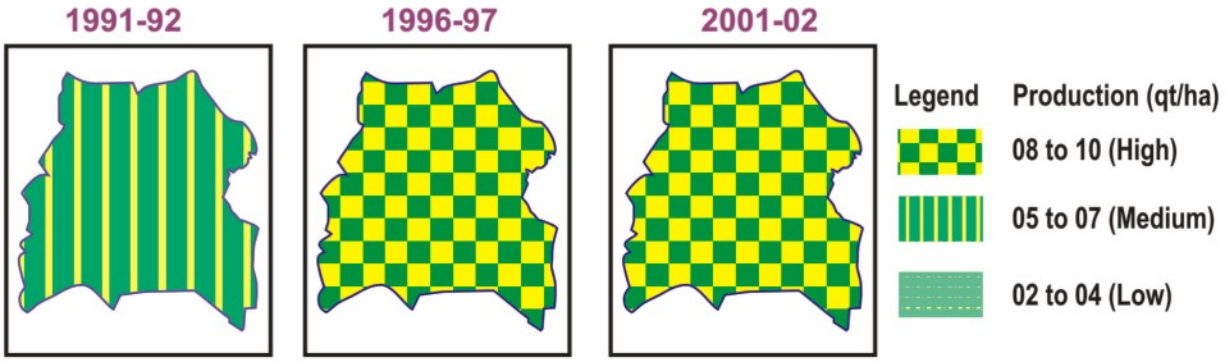


Map No. 5.7

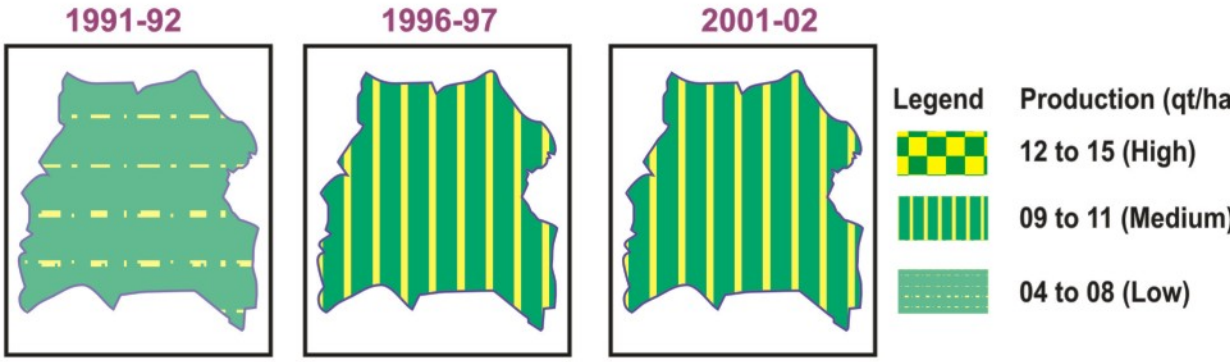
SAROLE PATHAR VILLAGE

CHANGE IN CROP WISE PRODUCTION

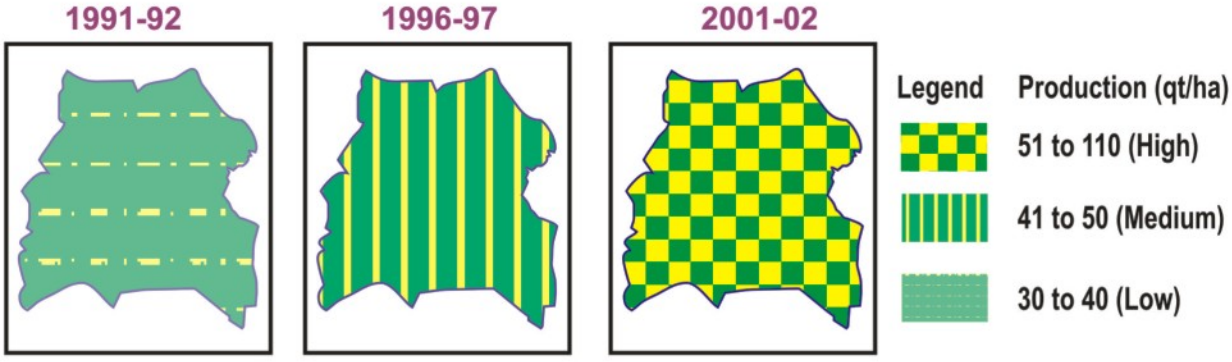
A) BAJARA PRODUCTION (KHARIP SEASON)



B) WHEAT PRODUCTION (RABI SEASON)



C)ONION PRODUCTION (VEGETABLE CROP)



Map No. 5.8

SAROLE PATHAR VILLAGE

CHANGE IN POULATION OF COWS

A) POPULATION OF LOCAL COWS

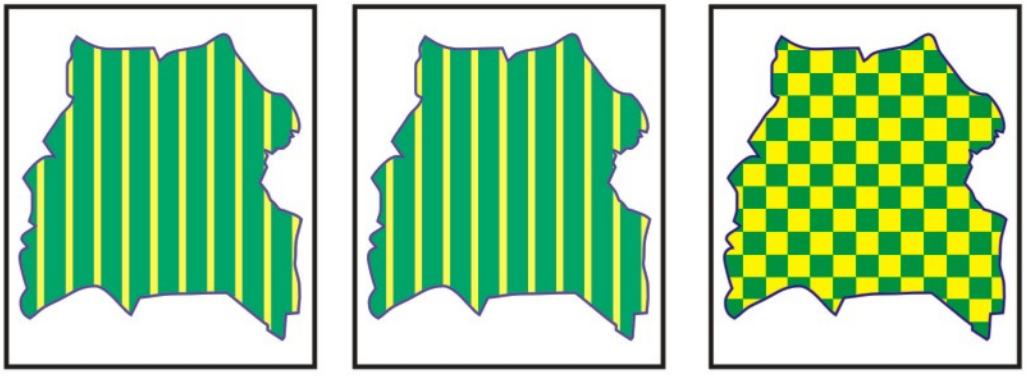
1991-92 1996-97 2001-02

Legend Number of Live Stock

- Above 201 (high)
- 51 to 200 (Medium)
- Below 50 (Low)

B) POPULATION OF CROSS-BRED COWS

1991-92 1996-97 2001-02



Legend Number of Live Stock

- Above 126 (high)
- 26 to 125 (Medium)
- Below 25 (Low)

N

0 96 190 380 Meters

Map No. 5.9

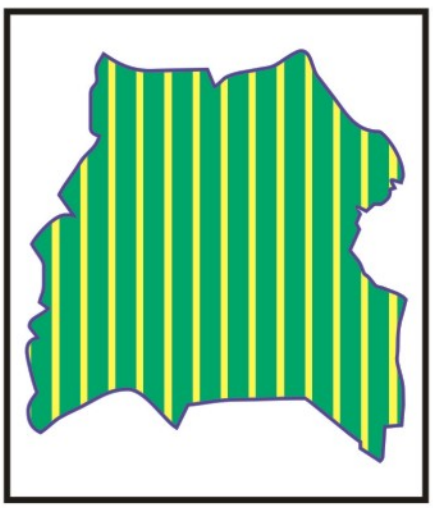
SAROLE PATHAR VILLAGE

CHANGE IN NUMBER OF WELL'S

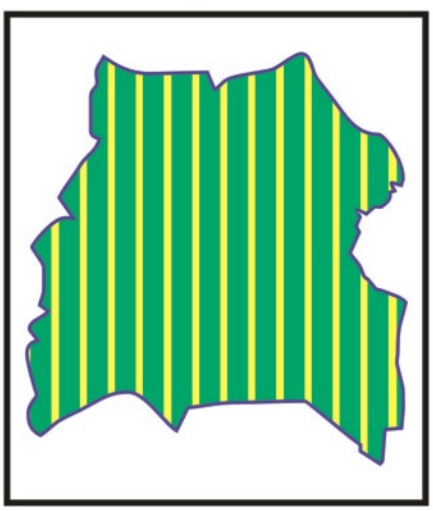
NUMBER OF WELL'S

1991-92

1996-97



2001-02



Legend Number of Wells

Above 91

51 to 90

Below 50

N

0 96 190 380 Meters

Map No. 5.10

3. MHASWANDI

3.1. MAIN TEXT – WATERSHED PROJECT OF MHASWANDI :

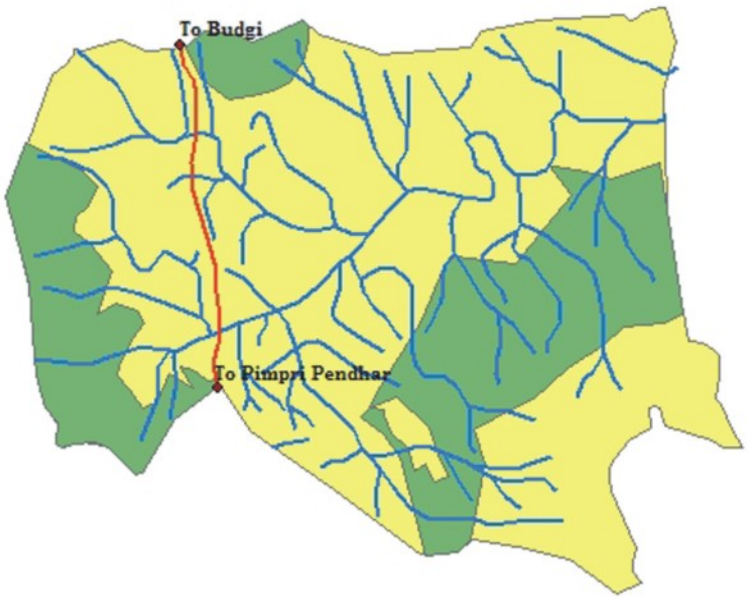
- **Location:** Mhaswandi village is located in remote area at the foothills of Sahayadri ranges of western Maharashtra in Sangamner Taluka of A. Nagar District. It is situated at distance of 50 km. from the Taluka head quarters and is approachable by partially tar road from village Bota. The village falls between of $19^0$13' & $19^0$17' north latitude and of $74^0$2' & $74^0$6' East longitude/

- **Topography and Drainage:** Village Mhaswandi is situated on highly desiccated plateau, which forms a part of the Sahyadri range. The topography of the area is undulating with the slope at the upper exceeding 25 % while at the lower reaches below 3 %. The highest point of the watershed is at an elevation of above 1050 m. The drainage pattern of the watershed is dentritic. The area is well drained emptying into one main stream flowing west to east.
- **Climate and Rainfall:** Monthly rainfall pattern is very erratic and unpredictable in the study area. The average annual rainfall is varying from 320.44 mm (August) to 582 mm in September. Rainfall is received from south west monsoon. The maximum temperature in the range of 38^0C to 41^0C is recorded in the month of May. While the lowest temperature is around 9^0C to 12^0C recorded in the month of December.
- **Soil:** The soil texture varies from shallow medium deep clay soil of the messa (plateau) to the shallow gravelly sandy loam soil of the escarpments (Under forest area) and the medium to deep sandy loam soil of the pediment where most of the agricultural production takes place. The soil colour is predominantly black. The overall fertility is poor. Overall soil depth is good in relation to the undulating topography of the watershed. The average soil depth is between 7.5 to 22 cm.

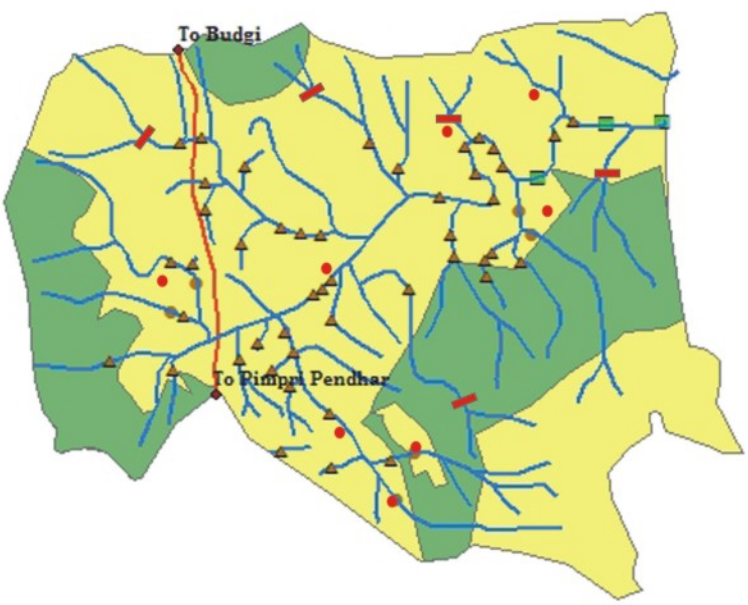
MHASWANDI PROJECT AREA

SOIL AND WATER CONSERVATION WORK

A) BEFORE



B) AFTER



Legend

Sym	Particular
	Boundary
	Drainage Line
	Road
	Afforestation
	Agriculture-Work done CCT/FB/SB
	Checkdam
	Gabian
	Percolation Tank
	Nalabund
	Well

N

0 95 190 380 Meters

Map No. 5.11

3.2. : IMPACT OF WATERSHED DEVELOPMENT PROJECT AT MHASWANDI VILLAGE.

3.2.1 : CHANGES IN LAND USE PATTERN :

Table 5.26 : Changes in land use pattern

Sr. No.	Particular	Before ws (ha) 1994-95	Percentage (%)	After ws (ha) 2004-05	Percentage (%)
1	Forest area	502.10	43.85	502.10	43.85
2	Uncultivable land	231.50	20.21	90.00	-07.86
3	Cultivable waste land	20.75	1.81	08.28	-00.07
4	Revenue land & panchayat land	13.16	1.14	35.16	+03.07
5	Cultivated land	377.49	32.96	509.46	+44.47
a)	Pernial irrigated	29.00	7.68	90.00	+17.68
b)	Seasonal irrigated	35.00	9.27	215.00	+42.23
c)	Rain fed	313.49	83.04	204.00	+40.07
6	Total Geographical area	1145.00	100.00	1145.00	100.00

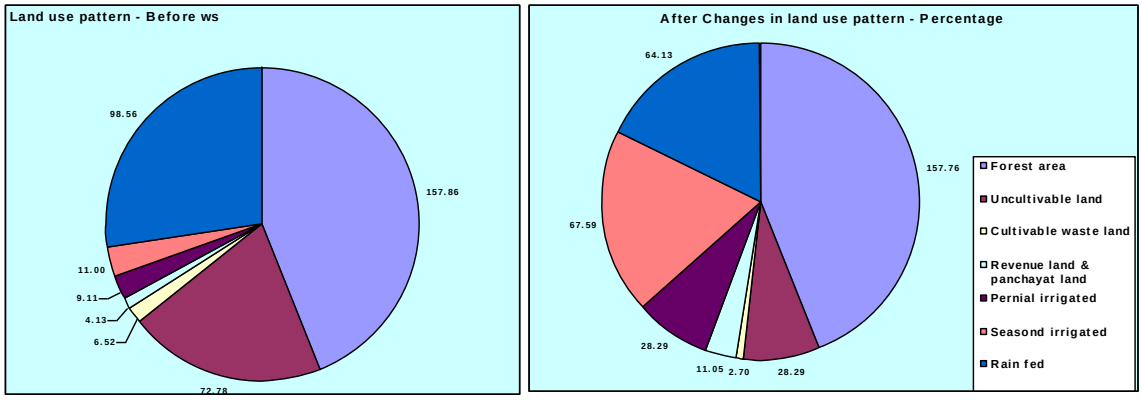


Fig. 5.26 : Changes in Land use Pattern

The total geographical area of Mhaswandi watershed is 1145 ha of which 502.10 ha comes under the forest department. Area under perennial irrigation is increased from 29.00 ha in 1994-95 to 90.00 ha area increased in 2004-05. Area under seasonal irrigation is increased from 35.00 ha in 1994-95 to 215.00 ha area increased in 2004-05 year. The availability rainfed cultivated area decreased from 313.49 ha in 1994-95 to 204.00 ha in 2004-05. Un-cultivable wasteland area decreased from 231.50 ha (20.21%) in 1994-95 to 90.00 ha (-07.86) in 2004-05. Village settlement area increased from 13.16 ha (01.14 %) in 1994-95 to 35.16 (+3.07) in 2004-05 after 10 year of watershed completion.

There is good scope for improving crop production and yields through improved agricultural practices such as contour cultivation crop rotation, inter cropping with pulses, green manuring. Such practices along with mechanical measures such as contour bunding resulted in increased soil moisture availability and fertility ultimately resulted in increased yields.

The analysis of this table brings in to light following observation.

a. The net cropped area for the village as a whole increased from 377.49 ha. before the WSD programme to 509.46ha. during post WDP.
b. The net area of seasonally irrigated land in the village increased from 35 (9.27%) ha. in pre watershed development situation, which has increased 215 ha. (+42.23%) after implementation of watershed development programme.

3.3.2 : CHANGES IN CROPPING PATTERN

Table 5.27 : Changes in Cropping pattern- Kharif Season

Sr. No.	Crops	Before (1994-95)			After completion five year (1999-2000)			After to year of ws completion (2004-05)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Bajara	120	20	140	109	30	139	90	40	130
2	Ground nut	55	15	70	45	22	67	40	30	70
3	Paddy	43	20	63	38	15	53	30	15	45
	Total	218	55	273	192	67	259	160	85	245

Table 5.28 : Changes in cropping patter- Rabi Season

Sr. No.	Crops	Before (1994-95)			After complition five year (1999-2000)			After to year of ws complition (2004-05)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Wheat	18	52	70	42	68	110	60	90	150
2	Gram	35	25	60	54	80	134	70	110	180
	Total	53	77	130	96	148	244	130	200	330

Table. 5.29 : Changes in Cropping pattern- Vegetable Crop

Sr. No.	Crops	Before (1994-95)			After complition five year (1999-200)			After to year of ws complition (2004-05)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Onion	20	35	55	60	50	110	80	90	170
2	Potato	10	25	35	20	40	60	35	60	95
3	Vegetable	20	45	65	35	54	89	50	70	120
	Total	50	105	155	115	144	259	165	220	385

Fig. 5.27

Changes in cropping pattern area (Kharip season)

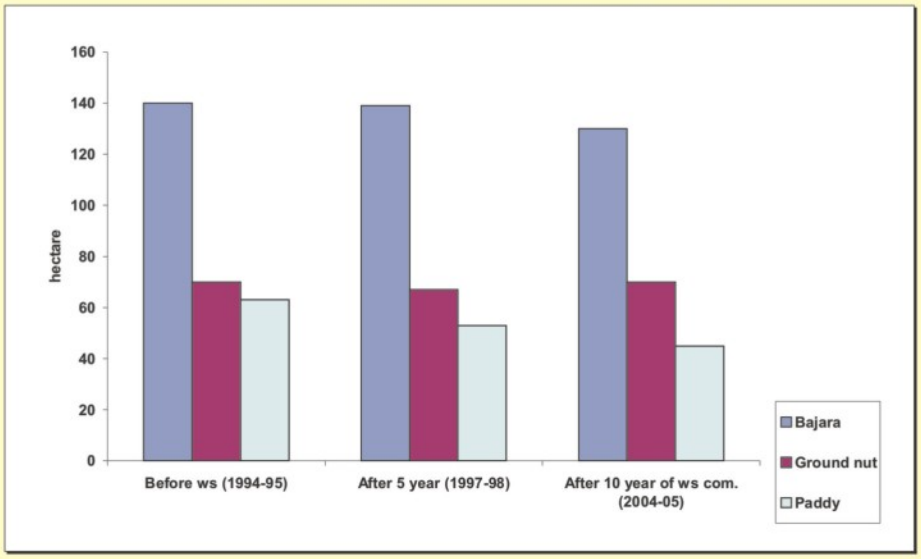


Fig. 5.28

Changes in cropping pattern area (Rabi season)

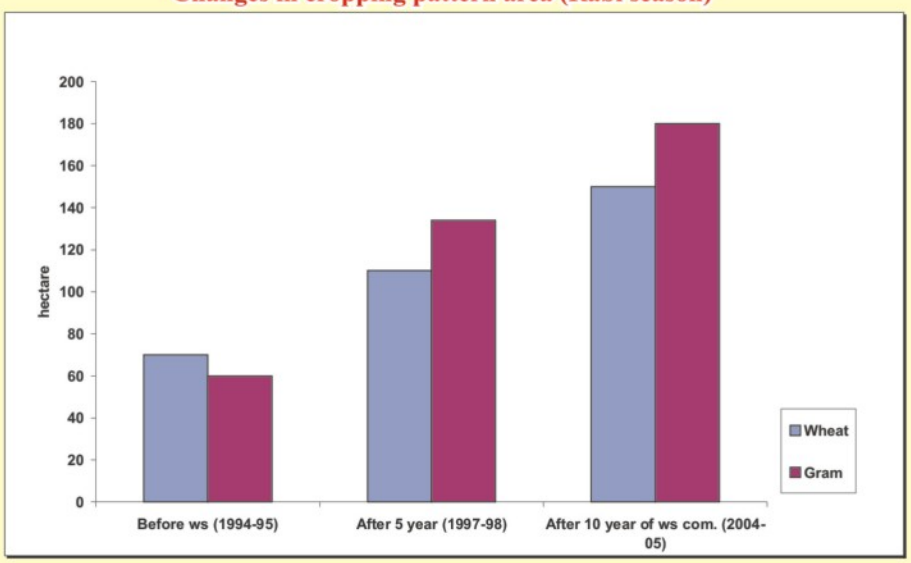
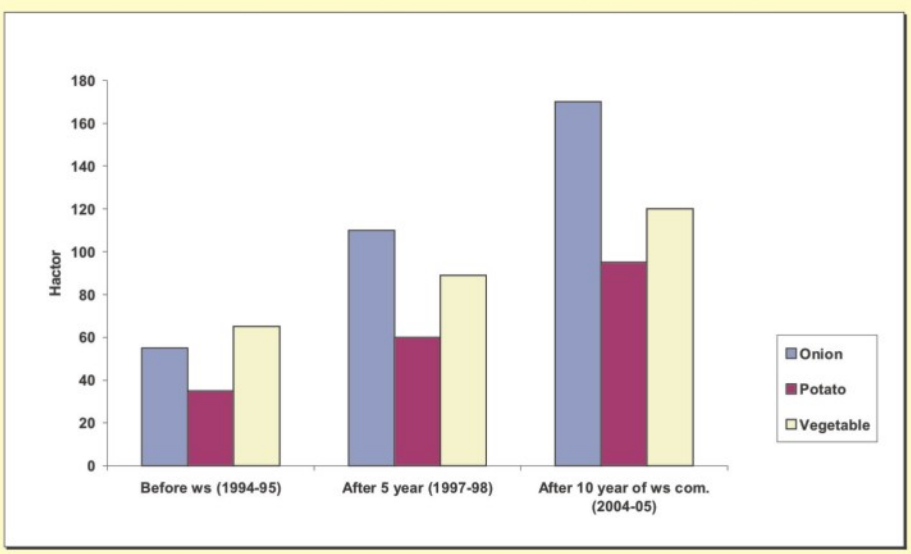


Fig. 5.29

Changes in cropping pattern area (Vegetable Crop)



There is pre-dominance of common cereal crops in the cropping pattern and it is an important characteristic of dry land agriculture. There is shift from cereal crop to high value crops and this is a diversification of Agri. The cropping pattern in the watershed during 1994-95, 1999-00 and 2004-05 for different crops in the three periods are shown in Table 5.27, 5.28, 5.29. The area under Bajara crop decreased from 140.00 ha in 1994-95 to 130.00 ha in 2004-05. The area under wheat crop increased from 70.00 ha in 1994-95 to 150.00 ha in 2004-05 years. The area under gram crop increased from 60.00 ha in 1994-95 to 180.00 ha in 2004-05 year. Area under vegetable crop onion increased from 55.00 ha in 1994-95 to 170.00 ha in 2004-05 year. Area under vegetable crops increased from 65.00 ha in 1994-95 to 120.00 ha in 2004-05 year. These crops have been during in kharif and rabi season. While Potato, Tomato, Pease crops were newly introduced in cropping pattern of Mhaswandi.

The analysis of this table brings in to light following observation.

a. The cropping pattern has also changed. Before the WS programme Bajara, Ground Nut, Paddy was the main crop, grown on 273 ha. After implementation of WDP the area under these main crops decreased to 245 ha. (2004-05). This change was not only because of the increase in irrigated area, but also because of the availability of adequate soil moisture as a result of soil conservation work.
b. The area cultivating local Groundnut variety decreased from 70ha. to 67ha. during post WDP.
c. The area under Potato cultivable in increased from 35 ha. to 95ha. after implementation of WDP.

3.3.3. : CHANGES PRODUCTION AND INCOME FROM CROPS.

Table 5.30 : Production and income from crops grown before watershed development period (1994-95) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	7.5	700	5250	750	4500
2	G. Nut	Kharif	9.5	1200	11400	1250	10150
3	Wheat	Rabi	4.5	800	3600	1450	2150
4	Gram	Rabi	3.4	1050	3570	800	2770
5	Onion	K/R	37	900	33300	1850	31450
6	Vegetable	K/R	36	800	28800	1900	26900

Table 5.31 : Production and income from crop grown 05 years after completion of watershed (1999-2000)) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	9.00	800	7200	850	6350
2	G. Nut	Kharif	10.00	1300	13000	1300	11700
3	Wheat	Rabi	08	850	6800	1550	5250
4	Gram	Rabi	06	1100	6600	850	5750
5	Onion	K/R	42	950	35700	1950	33750
6	Vegetable	K/R	40	900	36000	2000	34000

Table No. 5.32 : Production and income from crop grown to years after completion of watershed (2004-05)) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	9.5	850	8075	950	7125
2	G. Nut	Kharif	11.00	1400	15400	1350	14050
3	Wheat	Rabi	12.00	950	11400	1650	9750
4	Gram	Rabi	08	1250	10000	900	9100
5	Onion	K/R	48	1150	55200	2000	53200
6	Vegetable	K/R	45	950	42750	2100	40650

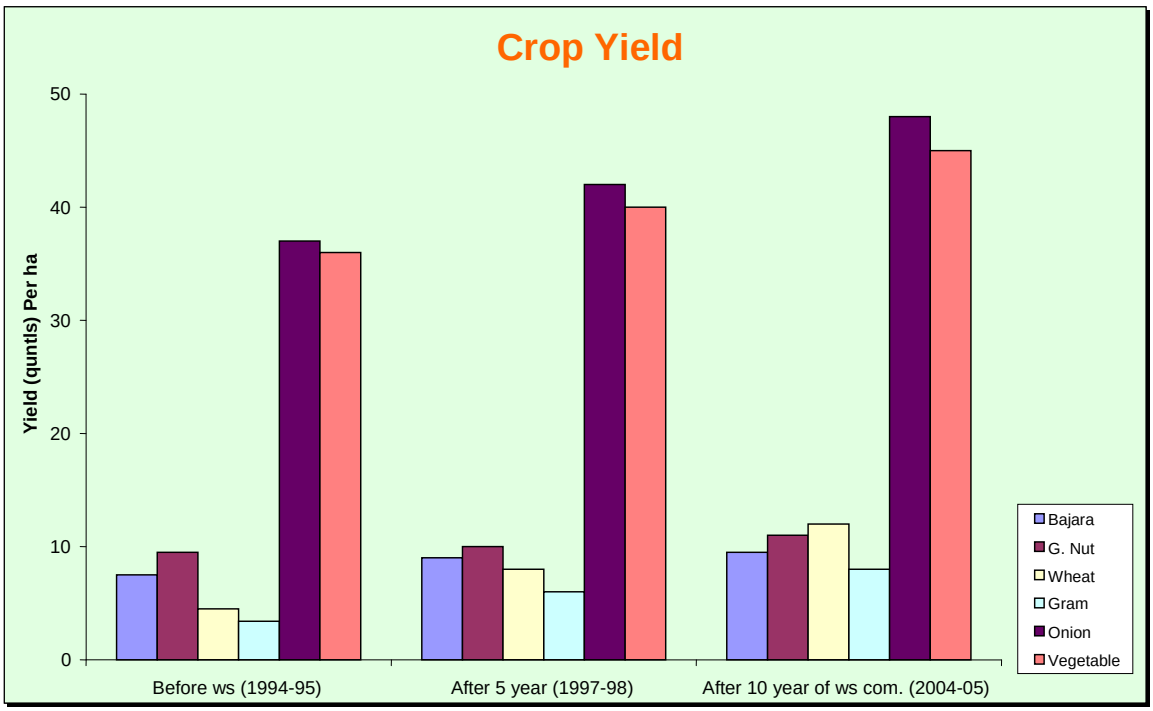


Fig. 5.30, 5.31, 5.32 : Production and income from crops yield grown during before WS, After five year and after ten year completion of WS.

The production and income of different crops grown during pre and post development situation are presented in Table 5.30, 5.31, 5.32 respectively. The average yield of bajara the main crop in the watershed was 7.5 quintals in 1994-95. Which increased up to 09 quintals in 1999-00 and 9.5 quintals in 2004-05 after ten year. The per hectarage production of wheat increased from 4.5 to 08 and 12 quintals. The production of onion also tremendously increased from 37 to 42 and 48 quintals during the above-mentioned period. The average yield of commercial crops that have been introduced in the watershed area was also comparatively better.

The cost of cultivation per hectare for different crops is an indicator of the level of technology used in crops cultivation. The average cost of cultivation for the main crop of bajara was Rs. 700 per hectare during pre development situation which was increased to Rs. 800 in 1998-99 and Rs. 850 in 2004-05. The cost of cultivation per hectare of vegetable has increased from Rs. 1900 in 1994-95 to Rs. 1950 in 1999-00 and Rs. 2000 in 2004-05. The difference in the cost of cultivation is more apparent in the irrigated crops as compared to the un irrigated crops.

- **The analysis of this table brings in to light following observation.**

a. The yield of wheat increased from 4.5qt/ha. in pre WDP to 12.00 qt/ha. during post WDP and net benefit also increased from Rs. 10150 to Rs. 14050 during post WDP.
b. Area and income from cultivation of vegetables increased but the cost of cultivation of Bajara marginally increased to yield of marginal income in post WDP.
c. It is observed from tables that the productivity of crops substantially increased over the period but at the same time there are marginal changes in crops quintiles and prices.
d. Yield and net income from Onion improved during post WDP. Many improved varieties were introduced there by increasing the net income of the farmers.

3.3.4. : CHANGES IN LIVESTOCK POSITION.

Table 5.33 : Population of live stock (Growth in dairy farming)

Sr. No.	Particulars	Before ws (1994-95)	After 5 year (1997-98)	After 10 year of ws com. (2004-05)
1	Local cows	312	213	49
2	Cross-bred cows	08	85	177
3	Sheep + Goat	271	163	93
4	Average daily milk collection (in liter)	190	545	790
5	Selling price for milk (in Rs/lit)	7.5	10.5	11.50

Source : V.W.C. record & field observation.

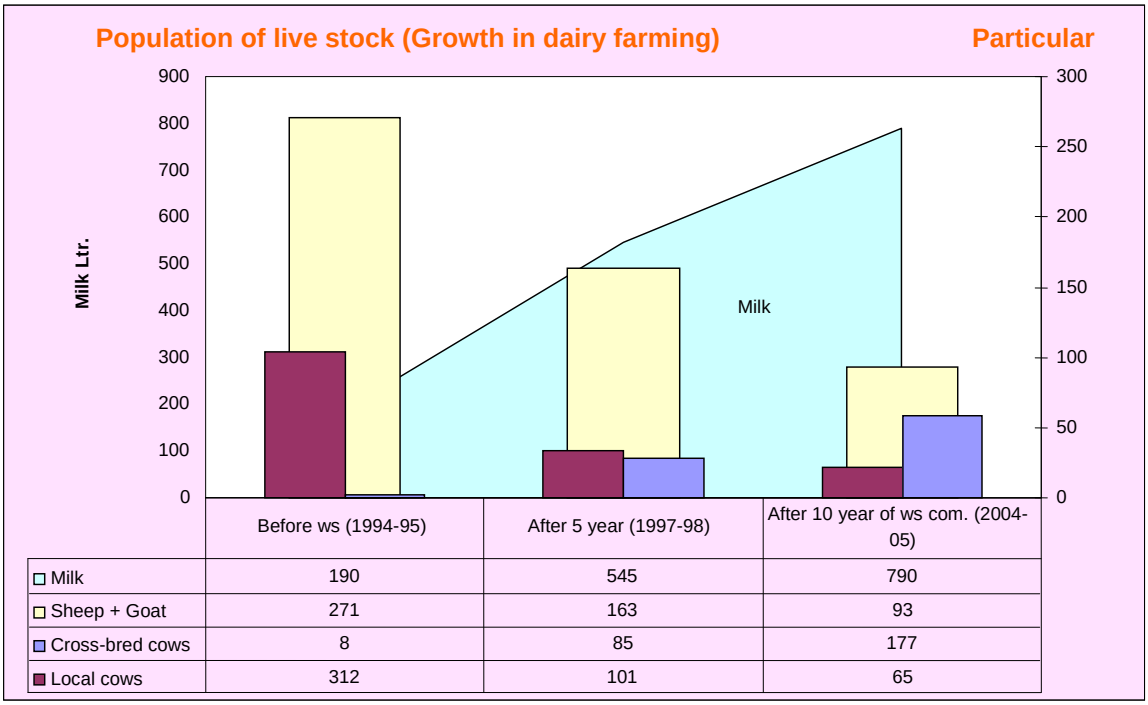


Fig. 5.33 Population of live stock

Live stock in the project area consisted of 312 local Cows, 08 Cross bred cows 271 sheep and goat at that time average daily milk collection was about 190 liter in the pre watershed period i.e. 1994-95 year.

Five to ten years after the competition of watershed the increase in number of cross bred cows was the highest and the number of local cows decreased continuously. In the year 1994-95 the number of cross bred cows were only 8 after five year the number increased to 85 and after ten year i.e. in the year 2004-05 the number of cross-bred cows was increased to 177. In the base year i.e. during 1994-95

the number of sheep and goat were 271. Which decreased to 163 after five year i.e. in to 1999-00. After ten year the number of sheep and goat decreased to 93 i.e. in the year 2004-05. The daily milk collection of co-operative dairy was only 190 lit in the before WS year 1994-95 which increased to 545 and 790 liters in the year 1999-00 and 2004-05 respectively.

The analysis of this table brings in to light following observation.

a. Due to watershed development works carried out in the village. Availability of nutritious green fodder has increased tremendously. This has enabled the villagers to maintain more live stock and diversify their income earning activity to cover small scale dairy farming also scale dairy farming also.
b. The milk yield has increased from 7.5 liters that was in per watershed situation to 11.5 liters per day during post WDP. Average daily milk collection increased from 190 liter in the year 1994-95 to 790 liter in the year 2004-05
c. Before 1985 dairy development to be a neglected sector in the village and due to lack of adequate fodder and veterinary facilities, it was difficult for villagers to sustain livestock. However, with the implementation of WDP there was increase in dairy development activities in a big way.

3.3.5 : CHANGES IN SOURCE OF IRRIGATION :

Table 5.34 : Number, depth of well and other irrigation resources

Sr. No.	Details	Before ws 1994-95	After 5 year of com ws 1999-00	After to year of ws competition 2004-05
1	Total number of wells	46	59	83
2	Average depth of wells	30 feet	34 feet	40 feet
3	Wells with parapet wall	22	27	30
4	Total number of tube well	4	6	-
5	Average depth of tube well	200 feet	215 feet	-
6	Total number of cheeks dam	1	2	3
7	Total number of percolation dam	2	1	-

Source: V.W.C. Record field work

Sources of Irrigation:-

A little irrigation was available from the wells. Most of which was used during the summer season. There was no other source of irrigation in the village. Before WS i.e. in 1994-95 these wells were seasonal or totally dry. The watershed development

programm has change this scene to some extent. The details of the number of wells, average of depths, the number of tube wells, checks dam is given in Table 5.34.

3.3.6 : RAINFALL GROUND WATER RELATIONSHIP :

Table 5.35 : Water table status (rainfall-water table relationship)

Sr. No.	Year	1999	2000	2001	2002	2003
1	Rainfall	700	490	610	590	543
2	WTGL	-7.62	-7.32	-7.11	-6.60	-6.10
3	Water col	2.5	2.6	2.7	2.8	3.0

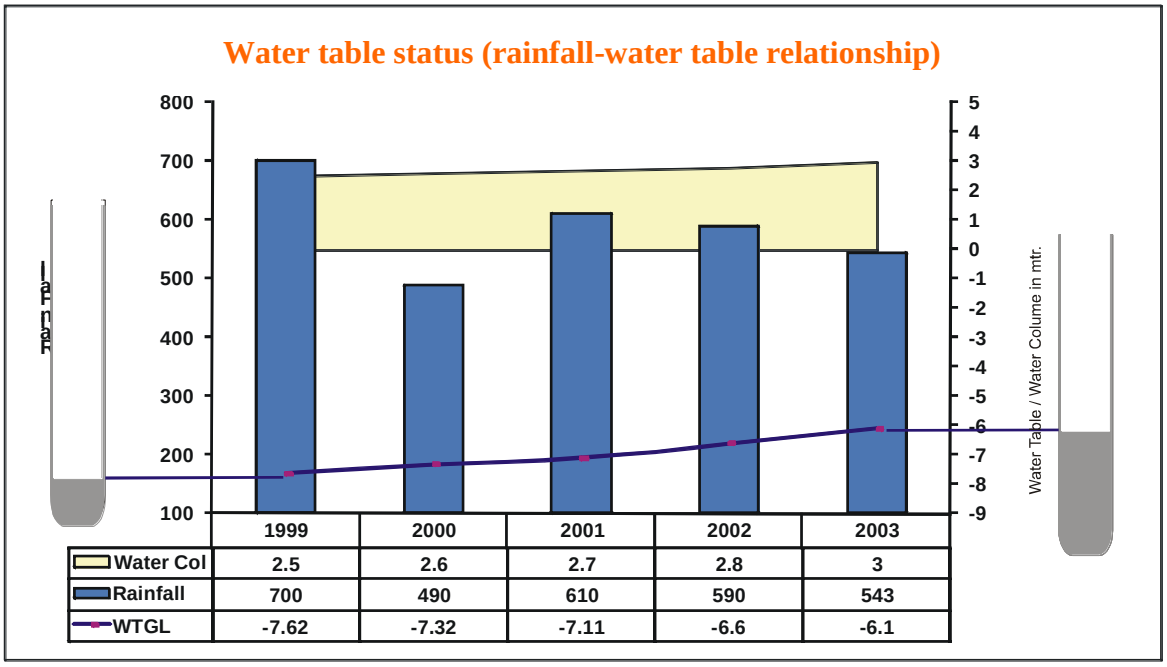


Fig. 5.35 : Water table status (rainfall water-table relationship)

The measurement and observation of wells in Mhaswandi watershed area was carried out. The ground water level continuously increased. In 1999 average rainfall was 700.00 mm at that time average ground water level was 07.62 m. Ground water level in the year 1999, 2000, 2001 was constantly stable i.e. 7.35m. Average rainfall was 490 to 610 mm. Ground water level remained at 6.95 m. Therefore average ground water level increased from 0.3 to 1.52 m during the summer months.

- **The analysis of this tables brings in to light following observation.**

a. Before the watershed development period these wells were seasonally or totally dry, but after the implementation of soil and water conservation work from ridge to valley level most rainwater was made infiltrate, which, increased the under ground water level.

b. In pre WSD program, the village has 46 wells 17 of which had water for a maximum of eight months by 1994-95. The village had 59 wells 29 of which had water for eight to nine month. In 2004-05 the village had 83 wells 44 of which had water for nine to ten month because water table had increase as a result of water harvesting measures and soil conservation work under taken as part of the WSD program.

3.3.7 : WOMEN DEVELOPMENT :

Table 5.36 : Watershed development programme through women development programme (SHG)

Sr. No.	Name of SHGS	Member	Saving	Total saving	Loan	Loan utilization
1	Shramsafalya	20	50	29326	28000	Seeds Fertilizer Education Family function
2	Maladevi	20	25	24301	23500	
3	Ahilyadevi	20	25	19084	18500	
4	Adharstambh	20	20	26831	25000	
5	Yashodeep	60	20	97102	95000	
6	Shwaiamsfurtti	20	25	9480	9000	

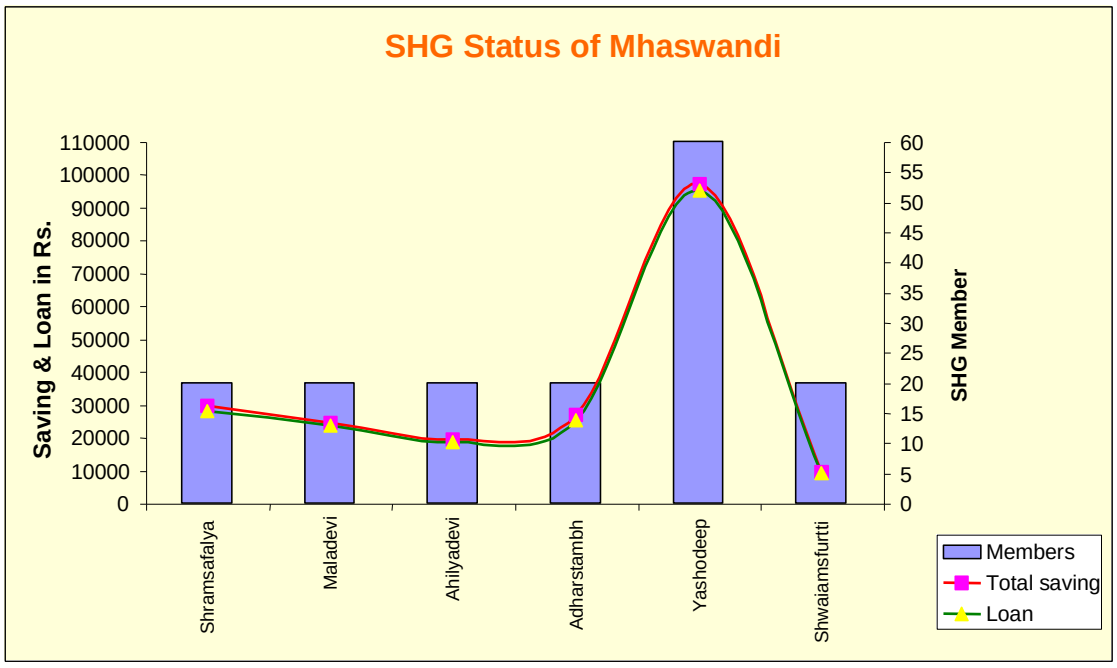


Fig.5.36 : SHG status of Mhaswandi.

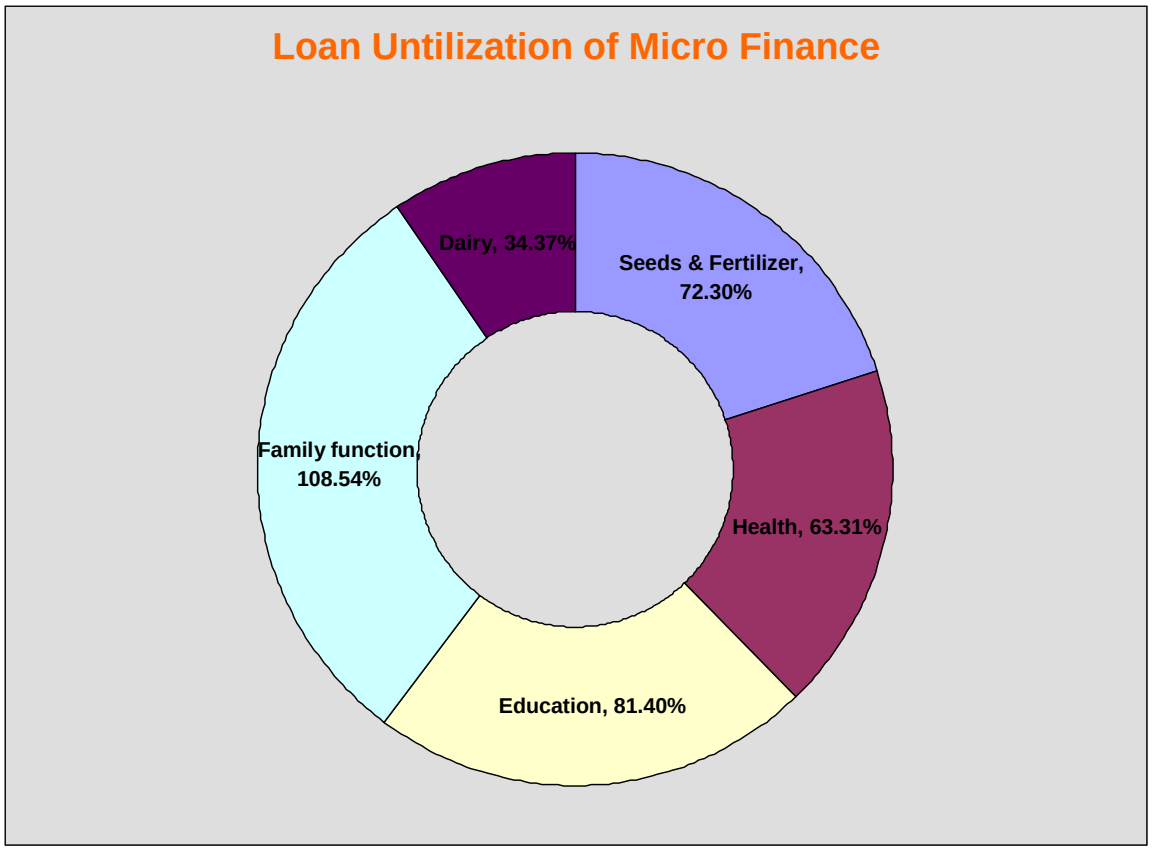


Fig. 5.37 : Loan Utilization of Micro Finance.

Women development:

Women have a major role to play in the rural development. To encourage their active participation in all aspects of the development of the village community, 'Maladevi' Mahila Mandal was established in 1994 in this village. Women from this Mahila Mandal are provided training in leadership, health, sanitation and income generation activity. This Mahila Mandal has also started nursery, dairy poultry activities.

SHG:-

Six Savings Groups were organized during the year 1996-97 involving 160 women with saving of Rs. 206124.00. These 06 groups gave link with national banks in order to build the capacities of self-help groups. 06 SHGs took the loan of Rs. 199000.00. This loan was utilized for seeds & fertilizer (72.30 %), Health (63.31 %) Education (81.40 %) family function (108.54 %) and Dairy (34.37 %) etc (Table 5.36)

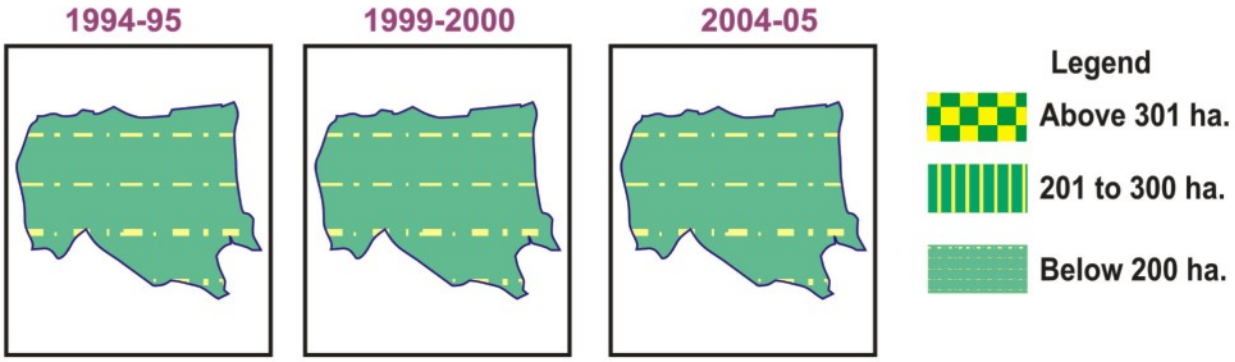
- **The analysis of this table brings in to light following observation.**

a. High level of illiteracy among women farmers resulted in their inability to understand there significance and their role in participation for carrying development activities envisaged under the watershed development project.
b. One of the major achievements of this WSD project has been the total involvement of women.
c. Women have been involved as active members of VWC, FPC, SHG committee in decision-making and execution of work.

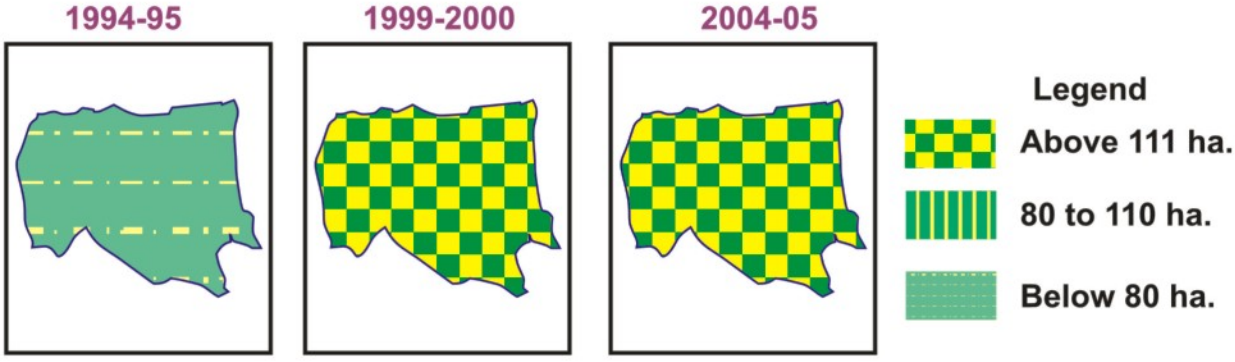
MHASWANDI VILLAGE

CHANGE IN CROPPING PATTERN

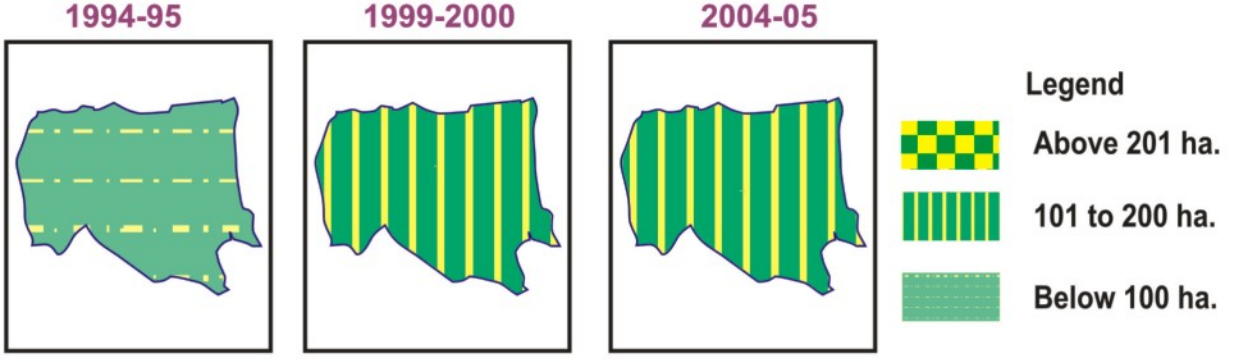
A) AREA UNDER BAJARA (KHARIP SEASON)



B) AREA UNDER WHEAT (RABI SEASON)



C) AREA UNDER ONION (VEGETABLE CROP)

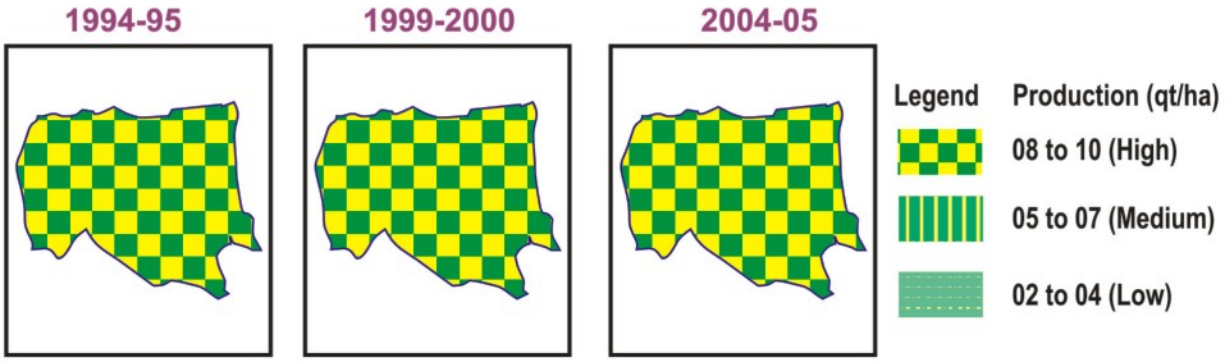


Map No. 5.12

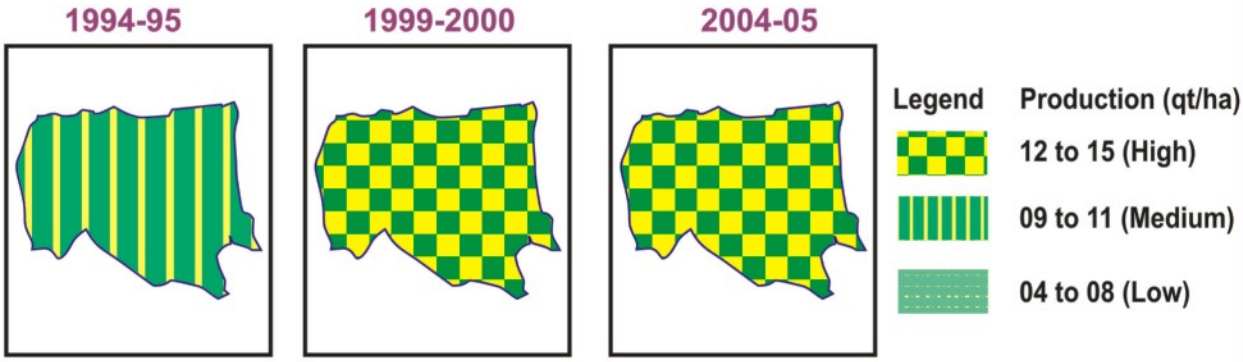
MHASWANDI VILLAGE

CHANGE IN CROP WISE PRODUCTION

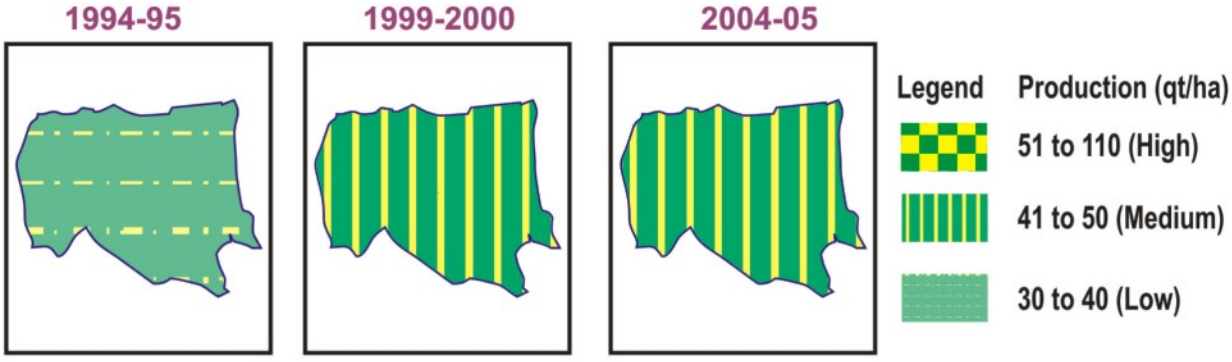
A) BAJARA PRODUCTION (KHARIP SEASON)



B) WHEAT PRODUCTION (RABI SEASON)



C)ONION PRODUCTION (VEGETABLE CROP)

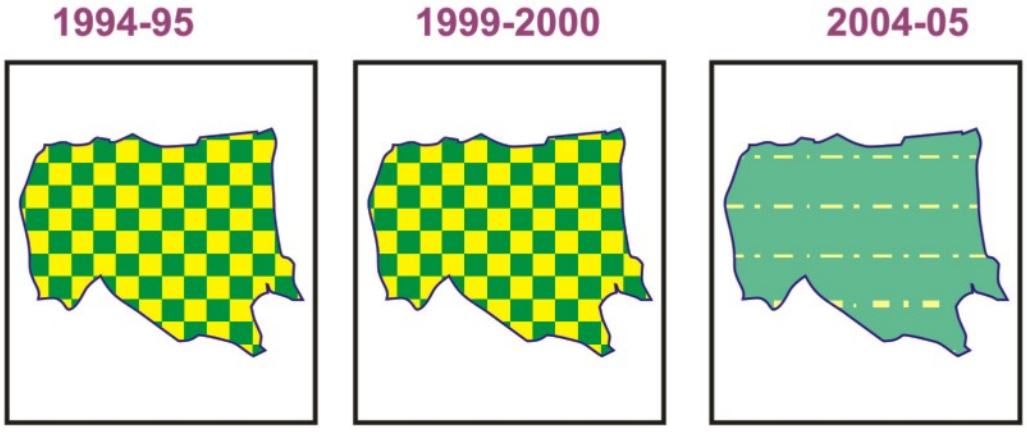


Map No. 5.13

MHASWANDI VILLAGE

CHANGE IN POULATION OF COWS

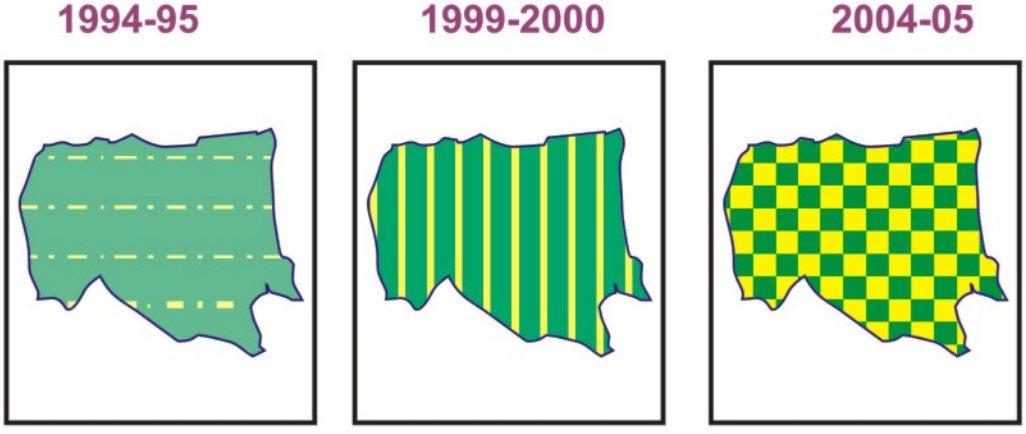
A) POPULATION OF LOCAL COWS



Legend Number of Live Stock

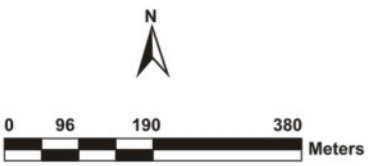
- Above 201 (high)
- 51 to 200 (Medium)
- Below 50 (Low)

B) POPULATION OF CROSS-BRED COWS



Legend Number of Live Stock

- Above 126 (high)
- 26 to 125 (Medium)
- Below 25 (Low)



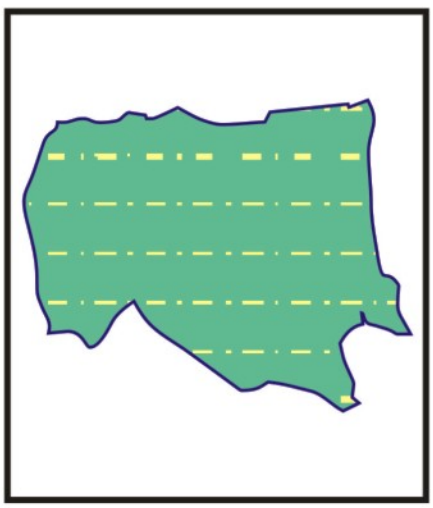
Map No. 5.14

MHASWANDI VILLAGE

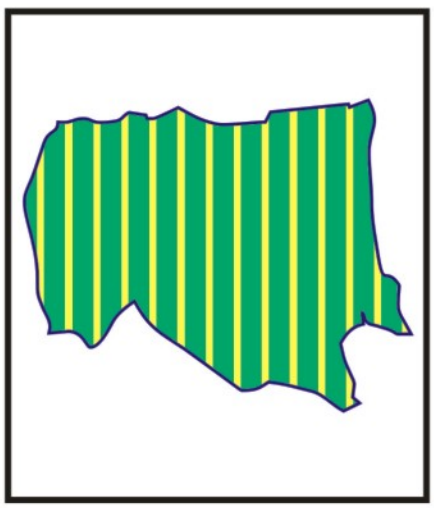
CHANGE IN NUMBER OF WELL'S

NUMBER OF WELL'S

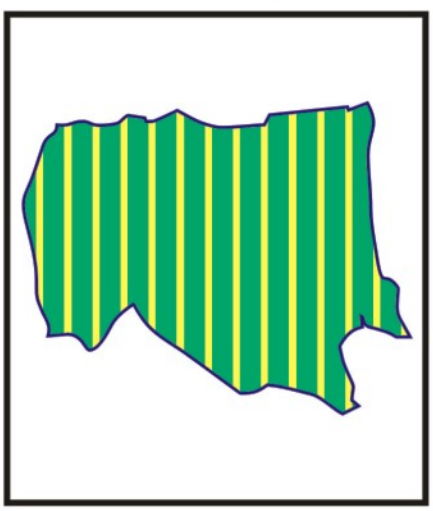
1994-95



1999-2000



2004-05



Legend Number of Wells

Above 91

51 to 90

Below 50

N

0 96 190 380 Meters

Map No. 5.15

4 : DAREWADI – SHELKEWADI

4.1. MAIN TEXT–WATERSHED PROJECT OF DAREWADI–SHELKEWADI :

- **Location:** Darewadi- Shelkewadi watershed is located in Sangamner Taluka of Ahmednagar district. The selected watershed of Darewadi- Shelkewadi is located around 28 km. away on the south-west side of Sangamner and around 12 km off the Pune- Nashik highway. It lies between $74^0$18' to $74^0$22' east longitude and $19^0$23' to $19^0$27' north latitude.

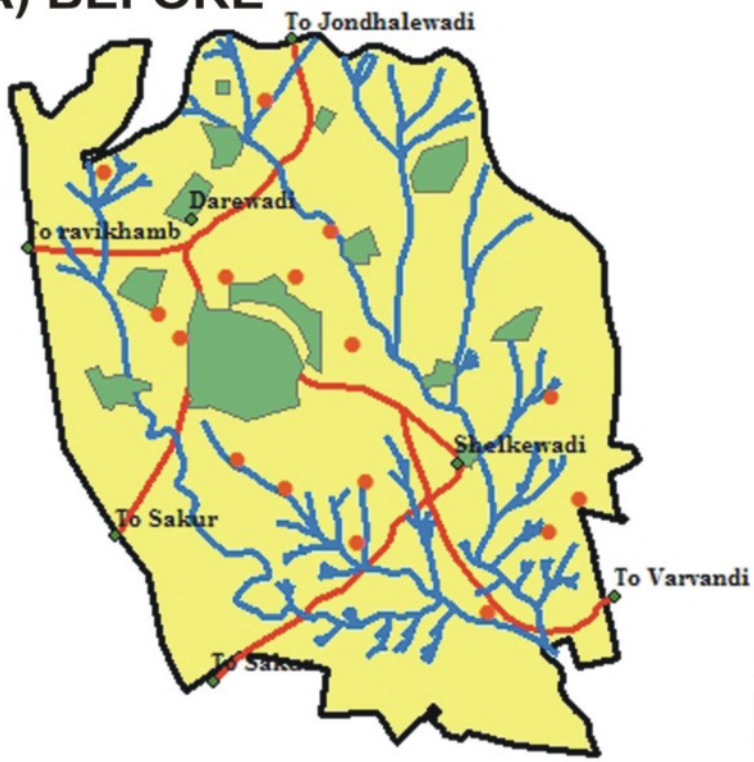
- **Topography**: Darewadi-Shelkewadi area 1535.24 ha is situated the at foothills of the Sahyadri range. The watershed is well defined with a north-west to south-east flow. Two distinct zones are observed viz. the upper catchment of comprising of steep slopes which give the watershed its distinctive ridge line along western, northern and eastern sides and mildly undulating areas lying within the slopes which form the middle and lower catchments.

  The watershed has a highest elevation of 780 m. above mean sea level. The slopes are steep ranging from 20 to 40 %. The watershed drains into the river Mula which is a part of Godavari basin. These major drainage lines within the watershed both originating in the north. Western upper catchments of Darewadi.
- **Climate and Rainfall**: The project area falls in the rain shadow region of Sangamner and has arid climate. The area receives all of its annual precipitation from the south west monsoon. The rainy season normally starts in the last week of June and is over by the beginning of October. The normal average annual rainfall is 282.54 mm. In the project area 80 percent to 95 percent of annual rainfall occurs during the monsoon period and that occurs in 30 to 35 days only. As per data during, the winter minimum temperature goes down to about 7.3^0C while in summer, maximum temperature is in the range of 40^0C to 44^0C.
- **Soil**: The soils of Darewadi- Shelkewadi watershed are divided into three distinct soil zones 1) Soils on the Pathar- The Pathar area have normal soil depth 10 to 20 cm. The Productivity of soil is slightly good. Soil texture is mainly sandy-clay to sandy clay loamy. There is a layer of hard murum having low infiltration and water-holding capacity. 2) The soil on the slopes- The lands on the slopes have limited soil depth ranging from 0 to 20 cm only. Most of lands on the upper slopes

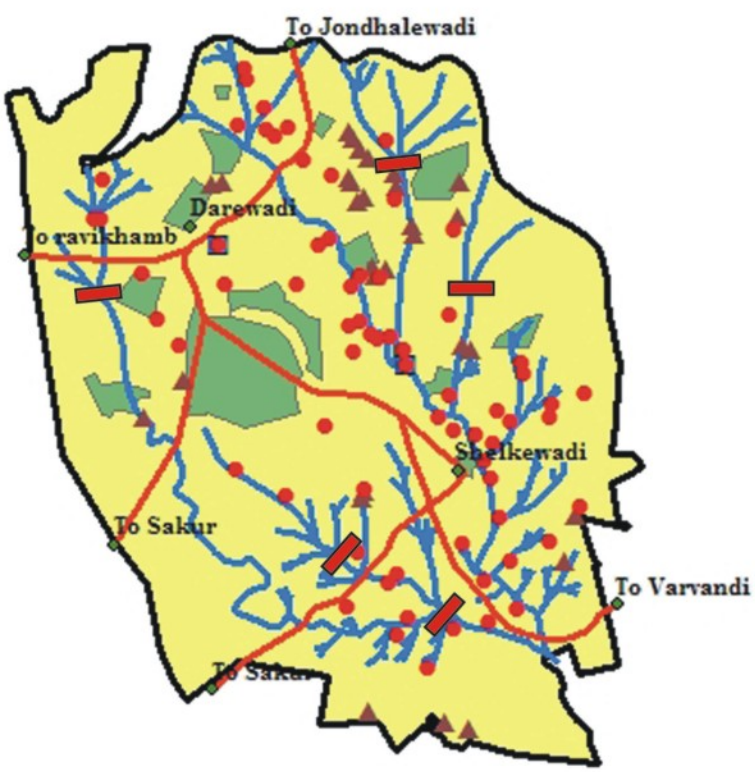
DAREWADI PROJECT AREA

SOIL AND WATER CONSERVATION WORK

A) BEFORE

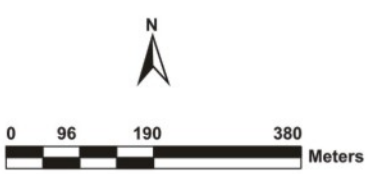


B) AFTER



Legend

Sym	Particular
	Boundary
	Drainage Line
	Road
	Afforestation
	Agriculture-Work done CCT/FB/SB
	Checkdam
	Gabian
	Percolation Tank
	Well



Map No. 5.16

have negligible soil cover. Soil texture ranges from gravely sand to gravely loamy sand. 3) Soils in the valley- this soil is formed by deposition of the eroded top soil from the pathar and slopes. The data indicates the soil is fertile with soil depth from 20 to 90 cm. The texture is mainly sandy clay loam. These area are well suited for cultivation of different profitable crops.

4.2 : IMPACT OF WATERSHED DEVELOPMENT AT DAREWADI-SHELKEWADI.

4.2.1 : CHANGES IN LAND USE PATTERN.

Table 5.38: Changes in land use pattern

Sr. No.	Particular	Before ws (ha) 196-97	Percentage (%)	After ws (ha) 2006-07	Percentage (%)
1	Govt. land	306.53	64.96	306.53	64.96
2	Panchayat land	7.30	1.54	4.30	0.91
3	Gaothan, settlement road, tanks	10.39	02.20	30.39	06.44
4	Revenue land	147.59	31.28	130.59	27.67
	Total A	471.81	100 %	471.81	100 %
5	Land Privately ownerd	Darewadi	Shelkewadi	Total	+29.16
A	Seasonally irrigated B	142.52	54.71	197.23	
	%	22.34	12.85	18.54	
	A	180.00	74.00	254.00	
	%	28.21	17.39	23.88	
B	Perennially irrigated B	-	-	-	
	%	-	-	-	
	A	18.40	10.00	28.40	
	%	2.88	2.35	2.67	
C	Rainfed B	429.13	308.49	737.62	
	%	67.27	72.49	69.36	
	A	443.00	322.00	765.00	
	%	69.44	75.67	71.93	
D	Fallow Area B	53.35	44.33	97.68	
	%	8.36	10.41	9.18	
	A	5.28	5.30	10.55	
	%	8.23	1.24	0.99	
E	Unculturable waste area B	12.90	18.00	30.90	
	%	2.02	4.23	2.90	
	A	2.48	3.00	5.98	
	%	3.88	0.70	0.5	
	B	637.90	425.53	1063.43	
	Total A + B	471.81	1063.43	1535.24	

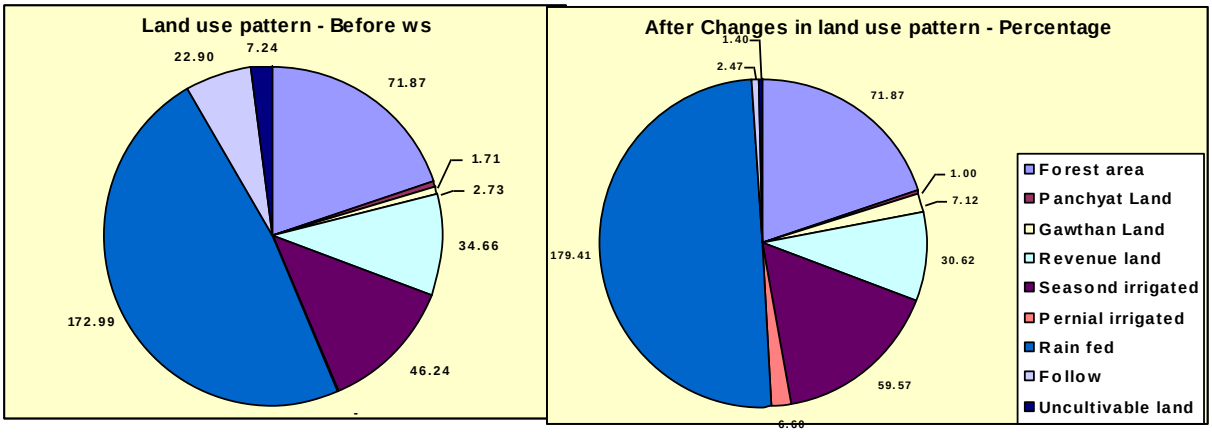


Fig. 5.38 : Changes in land use pattern

The total area of Darewadi Shelkewadi watershed having area of 1535.81 ha. and having different usage before and after implementation of watershed project is presented in Table 5.38. Area under seasonal irrigation has increased from 197.23 ha. in 1996-97 to 254.00 ha area increased 2006-07 year. The availability rainfed cultivated area increased from 737.62 ha in 1996-97 to 765.00 ha in 2006-07. Perennially irrigated area increased from 28.40 ha in 2006-07. Uncultivable waste land area decreased from 30.90 ha (2.90 %) in 1996-97 to 5.98 ha (0.50 %) in 2006-07. Village settlement, road, drainage line area increased from 10.39 ha (2.20 %) in 1996-97 to 30.39 ha (+ 6.44 %) in 2006-07 after 10 year of watershed completion.

- **The analysis of this table brings in to light following observation.**

a. It has been observed from the land utilization pattern that the watershed development has brought 44.33ha. of fallow area under cultivation land.

b. Area under seasonally irrigated increased by 56.77ha. during the post WDP's.

c. Area under perennially irrigated non to pre WDP's increased by 28.40ha. during the post WDP's

d. Though additional land has come under cultivation due to the development of watershed the Goathan, settlement road and tank land increased by 20ha. during the post WDP's.

D.2.2. : CHANGES IN CROPPING PATTERN.

Table 5.39 : Changes in cropping pattern- Kharif Season

Sr. No.	Crops	Before (1996-97)			After completion five year (2001-02)			After to year of ws completion (2005-06)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Bajara	307	51	358	340	80	420	348	82	430
2	Ground Nut	29	-	29	40	32	72	55	22	77
3	Mix Crop Bajara, Kulith Math, Mug	40	-	40	25	10	35	40	10	50
	Total	376	51	427	405	122	527	443	114	557

Table 5.40 : Changes in cropping patter- Rabi Season

Sr. No.	Crops	Before (1997-98)			After completion five year (2002-03)			After to year of ws completion (2007-08)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Wheat	63	10	73	29	68	97	30	92	122
2	Gram	36	03	39	68	12	80	160	32	192
3	Jawar	172	39	211	130	28	158	100	19	119
	Total	271	52	323	227	108	335	290	140	433

Table 5.41 : Changes in Cropping pattern- Vegetable Crop

Sr. No.	Crops	Before (1996-97)			After completion five year (2001-02)			After to year of ws completion (2005-06)		
		Uni	Irr	Total	Uni	Irr	Total	Uni	Irr	Total
1	Onion	20	19	39	45	32	77	59	45	104
2	Vegetable	11	15	26	16	30	46	28	60	88
	Total	31	34	65	61	62	123	87	105	192

After Implementation of watershed development programme in Darewadi-Shelkewadi watershed area there is shift from cereal crop to high value crop is an example of diversification of agriculture. The area under Kharif Season bajara crop increased from 358 ha in 1996-97 to 430 ha 2005-06. Cash crop ground nut increased from 29 ha in 1996-97 to 77 ha in 2006-07, Table 5.39.

The area under Rabi season wheat crop increased from 73.00 ha in 1996-97 to 122 ha in 2006-07 years. The area under Jawar crop decreased from 211.00 ha in 1996-97 to 119.00 ha in 2006-07, Table 5.40. The area under vegetable crop onion increased from 39.00 ha in 1996-97 to 104.00 ha in 2006-07. The area under mix vegetable crop like tomato, potato, fingertips, and flower increased from 65.00 ha in

Fig. 5.39

Changes in cropping pattern area (Kharip season)

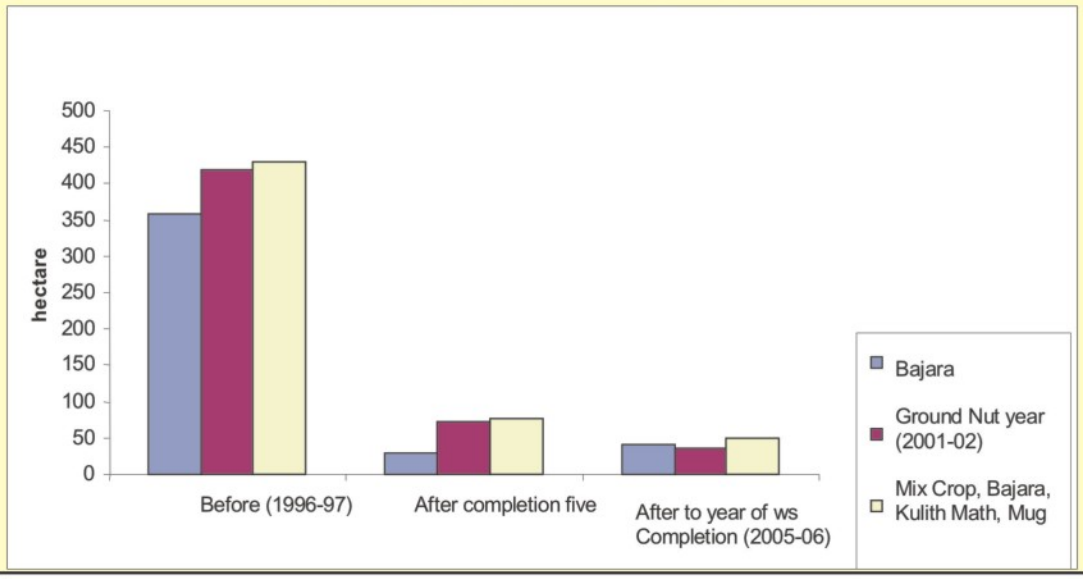


Fig. 5.40

Changes in cropping pattern area (Rabi season)

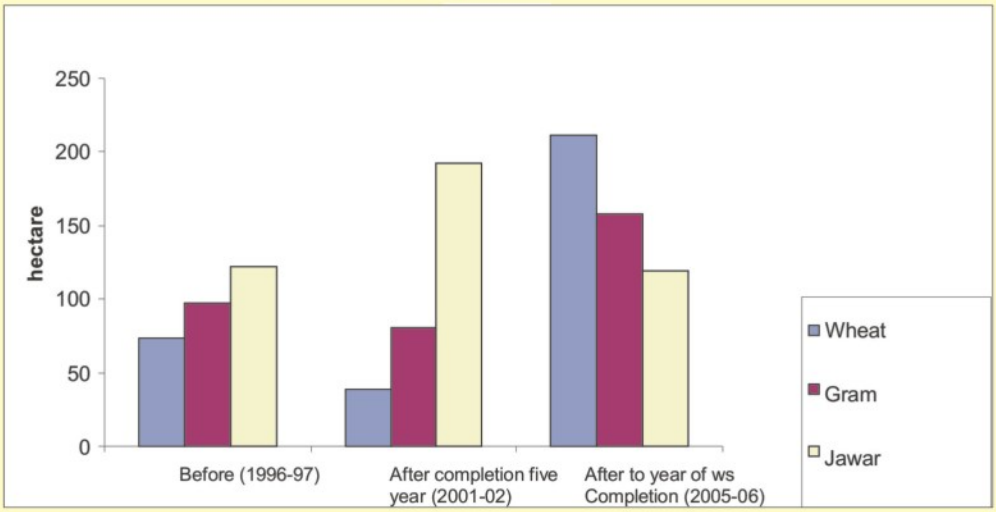
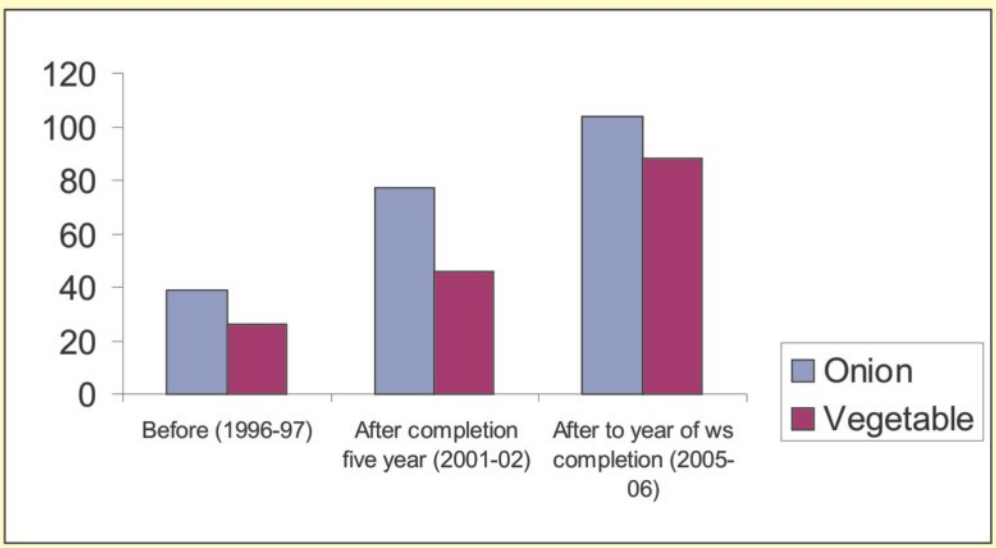


Fig. 5.41

Changes in cropping pattern area (Vegetable Crop)



1996-97 to 192.00 ha in 2006-07, Table 5.41. These crop have been taken under minor irrigated area during Kharif and Rabi season. The area under vegetable crop increased significantly.

- **The analysis of this table brings in to light following observation.**

a. Area under Bajara increased by 123ha. during the post WDP's.
b. Area under Mix Crop decreased by 05 ha. after completion of five years WDP and area under Mix Crop increased by 15 ha. after completion Ten years WDP.
c. Area under Jawar decreased by 92 ha. during the post WDP.
d. Area under Onion tremendously increased by 65 ha. during the post WDP.
e. Improved varieties of vegetable crops were introduced in village Darewadi watershed. This crop area increased by 62 ha. during the post WDP.

4.2.3. : CHANGE IN PRODUCTION IN INCOME FROM CROP :

Table 5.42 : Production and income from crops grown before watershed development period (1995-96) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	3.00	550	1650	900	750
2	G. Nut	Kharif	5.00	1300	6500	1300	5200
3	Wheat	Rabi	8.00	675	5400	1600	3800
4	Gram	Rabi	4.00	1100	4400	1100	3300
5	Onion	K/R	50	350	17500	2000	15500
6	Mix vegetable	K/R	45	650	29250	2200	27050

Table 5.43 : Production and income from crop grown 05 years after completion of watershed (2001-02) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	6.00	800	4800	1000	3800
2	G. Nut	Kharif	8.00	1600	12800	1600	11200
3	Wheat	Rabi	11.00	750	8250	2000	6250
4	Gram	Rabi	6.00	1400	8400	1400	7000
5	Onion	K/R	60.00	450	27000	2500	24500
6	Mix vegetable	K/R	70	750	52500	2700	49800

Table 5.44 : Production and income from crop grown 10 years after completion of watershed (2006-07) (Rs. Per ha)

Sr. No.	Crops	Season	Yield (quints) per ha	Price qunt	Gross value of production	Cost of cultivation	Net income
1	Bajara	Kharif	8.5	1000	8500	1100	7400
2	G. Nut	Kharif	11.00	2000	22000	1800	20200
3	Wheat	Rabi	15.00	1000	15000	2200	12800
4	Gram	Rabi	8.00	2000	16000	1600	14400
5	Onion	K/R	110.00	800	88000	3000	85000
6	Mix vegetable	K/R	80.00	900	72000	3200	68800

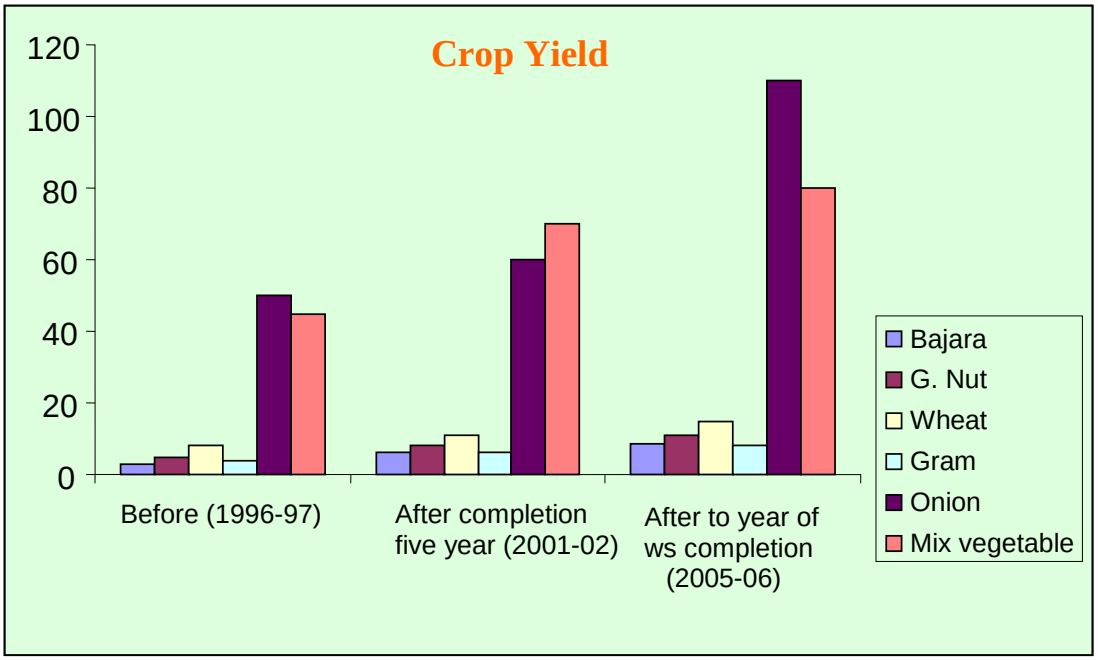


Fig. 5.42 5.43, 5.44 : Production and income from crops yield grown during before WS, After five year and after ten year completion of WS.

The production and income of different crops grown during pre and post development situation are presented in Tables 5.42 5.43, 5.44 respectively. The average yield of bajara the main crop in the watershed was 3 quintals in 1996-97. Which increased up to 6 quintals in 2001-02 and 8 quintals in 2006-07 after 10 year. The Per hectarage production of wheat increased from 8 to 11 and 15 quintals. The production of onion increased from 50 to 60 and 110 quintals. The production of mix crop increased from 45 to 70 and 80 quintals during the above mentioned period. The average yield of commercial crops that have been introduced in the watershed area was also comparatively better.

The cost of cultivation per hectarage for different crops is an indicator of the level of technology used in crop cultivation. The average cost of cultivation for the main crop Ground Nut was Rs. 1300 per hectarage during the development situation which was increased to Rs. 1600 in 2001-02 and Rs. 1800 in 2006-07. The average cost of cultivation for mix vegetable Crop was Rs. 2200 per hectarage during the development situation, which was increased to Rs. 2700 in 2001-02 and Rs. 3200 in 2006-07. The difference in the cost of cultivation is more apparent for the irrigated crop as compared to the unirrigated crops.

As evident from the above table, the net income from the cultivation of 60 varieties of crop fluctuated between minimum of Rs.750/- for Bajara to the maximum of Rs. 27050/- for Mix Vegetable in pre WDP. Crop wise net income in descending order where from Bajara where (Rs.7400/-), Wheat (Rs.12800), Gram (Rs.14400) Ground Nut (Rs.20200). Mix vegetable (Rs.68800) and Onion (Rs.85000). from Bajara, Wheat, Gram and Ground Nut the pre watershed income crossed diminished level and marginal profits occurred in post WDP's.

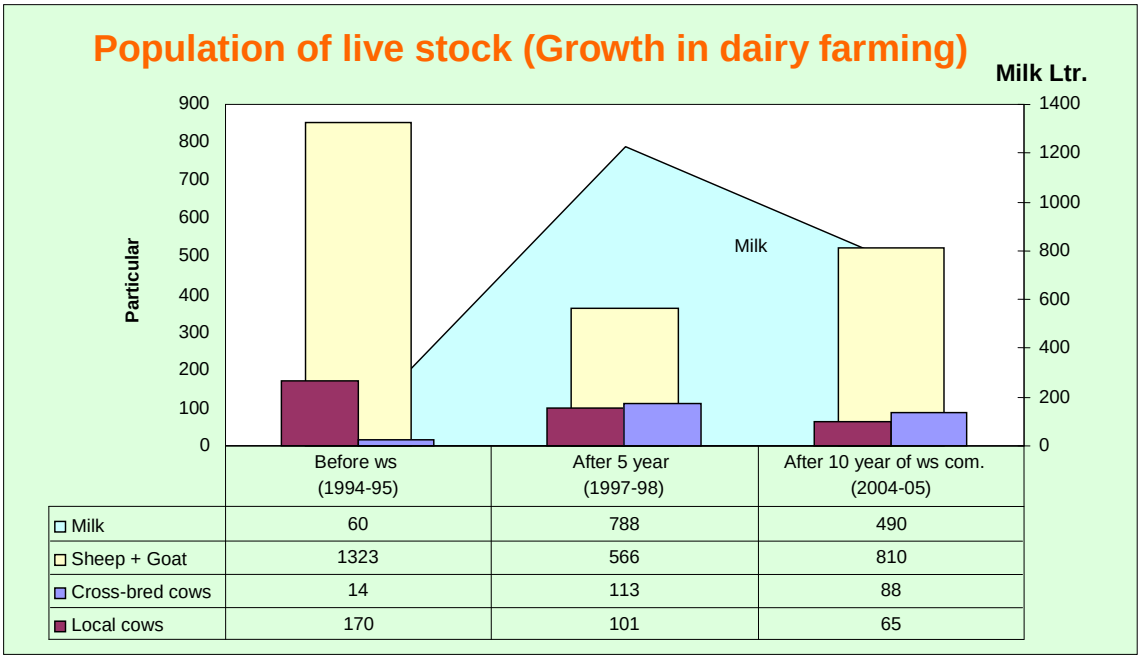
- **The analysis of this brings into light following observation.**

a. The yield of Bajara increased from 03.00 qt/ha. in pre WDP to 8.5 qy/ha during post WDP and net income also increased from Rs. 750 in pre WDP to Rs. 7400 during post WDP.
b. Income from Onion increased significantly in the village in post WDP.
c. Income from cultivation of vegetable increased but the cultivation of wheat yielded marginal income in post WDP.
d. It is observed from three tables that the productivity of the crops substantially increased over the period, but at the same time there was no change in the technology.
e. Productivity in respect of major crops in post WDP increased noticeably as compared to pre WDP.

4.2.4 : CHANGES IN LIVESTOCK POSITION :

Table 5.45 : Population of live stock (Growth in dairy farming)

Sr. No.	Particulars	Before ws (1997-98)	After 5 year (2002-03)	After 10 year of ws com. (2007-08)
1	Local cows	170	101	65
2	Cross-bred cows	14	110	88
3	Sheep + Goat	1323	566	810
4	Average daily milk collection (in liter)	60	788	490
5	Selling price for milk (in Rs/lit)	07	10	11



	Before ws (1994-95)	After 5 year (1997-98)	After 10 year of ws com. (2004-05)
Milk	60	788	490
Sheep + Goat	1323	566	810
Cross-bred cows	14	113	88
Local cows	170	101	65

Fig. 5.45 : Population of live stock.

Live Stock in the project area consisted of 170 local cross bead cows. 1323 ships & goats & at that time average daily milk collection was about 60 liters in the pre watershed period i.e. 1996-97 year. Five to Ten years after the completion of watershed the increase in number of crossbred Cows was the highest the number of local Cows decreased continuously. In the year 1996-97 the number of crossbred Cows were only 14. After five year the number increased to 113 and after 10 year i.e. in the year 2006-07 the number of crossbred Cows decreased to 88.

In the base year i.e. during 1996-97 the number of Sheep and Goats were 1323, which decreased to 566 after five year i.e. into 2001-02. After ten year the number of Sheep and Goats increased to 810 i.e. the year 2006-07. The daily milk collection of Co-Operative dairy was only 60 liters before WS year 1996-97, which increased to 788 in 2001-02 i.e. after five year completion of WS and then decreased to 490 liters in 2006-07 year.

- **The analysis of this brings into light following observation.**

a. Number of local cows decreased from 170 in pre WDP to 65 during post WDP and at that time crossbred cows increased from 14 in pre WDP to 88 during post WDP.

b. Number of Sheep and Goats decreased from 1323 in pre WDP to 810 during post WDP.

c. Average daily milk collection of co-operative dairy increased from 60 liters in pre WDP to 788 liter during post WDP

d. 40 percent to 60 percent of livestock owners are using veterinary services.

4.2.5 : CHANGES IN SOURCE OF IRRIGATION :

Table 5.46 : Number, depth of well and other irrigation resources

Sr. No.	Details	Before ws 1996-97	After 5 year of com ws 2001-02	After to year of ws competition 2006-07
1	Total number of wells	84	110	122
2	Average depth of wells	15 Feet	28 Feet	42 Feet
3	Wells with parapet wall	40	62	78
4	Total number of tube well	02	10	22
5	Average depth of tube well	250	270	300
6	Total number of cheeks dam	03	--	--
7	Total number of perculation dam	01	04	--

Sources of Irrigation:-

Little irrigation was available from the wells and most of which was used during the summer season. There was no other source of irrigation in the village before WS in 1996-97. These wells were seasonal. The watershed development programme has changes this scene to some extent. The details of the number of wells, average of depth, the number of Tube wells, check dam is given in table 5.46.

4.2.6 : RAINFALL GROUND WATER RELATIONSHIP :

Table 5.47 : Water table status (rainfall-water tube relationship)

Sr. No.	Year	2003	2004	2005	2006	2007
1	Rainfall	510	420	560	580	460
2	WTGL	-6.5	-5.8	-4.5	-3.5	-3.1
3	Water col	2.9	3.1	3.5	3.8	3.9

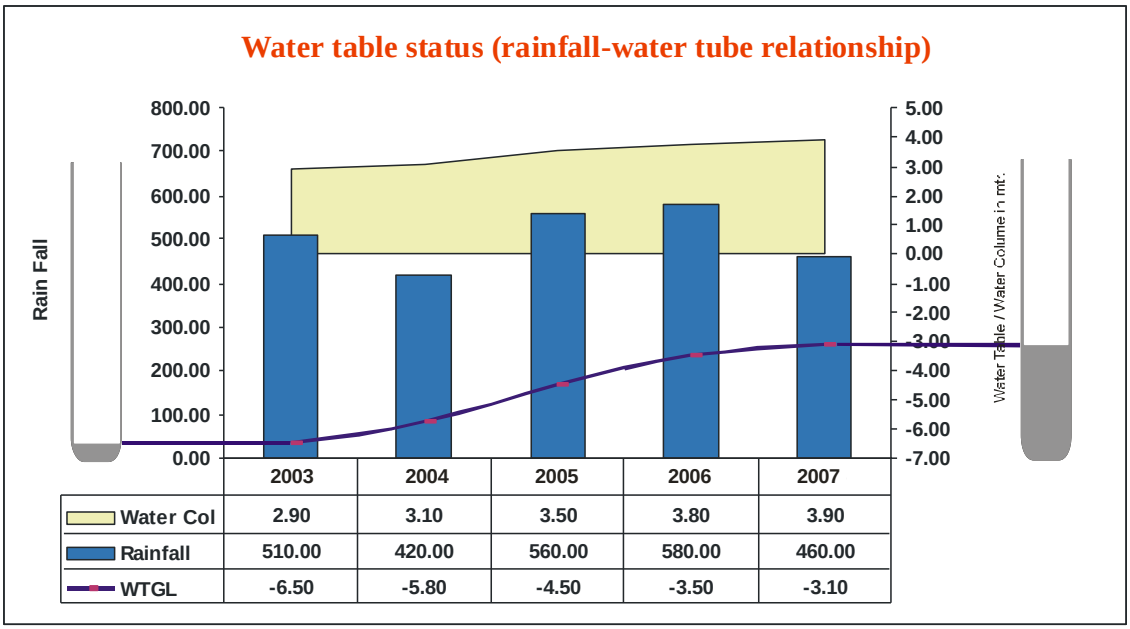


Fig. 5.47 : Water table status.

Rainfall-ground water relationship:-

The measurement and observation of wells in Darwadi, Shelkewadi watershed area was carried out. The ground water level continuously increased in 2003. Average rainfall was 510.00 mm and at that time average ground water level was -6.50m. Ground water level in the year 2005, 2006, 2007 was continually stable i.e. 3.00m. Average rainfall was 420.00 to 580.00 mm. Ground water level remained at 4.68 m. There fore average ground water level increased from 0.7 to 3.40m. during Summer.

The analysis of this table brings into light following observation.

a. A large amount of water required during April-May, which was not available earlier, however, now there is availability of water all year around, particularly during the summer months, during post WDP.
b. Very high rainfall retention (510.00, 580.00, 560.00 mm) i.e. most rainfall is allowed to infiltrate because of soil and water conservation work.
c. Project focuses on rainwater harvesting. The area irrigated by wells increased substantially in Darewadi Watershed.
d. In village Darewadi, Shelkewadi soil and water conservation work supported recharge and consequently, the benefits were visible in terms of double cropping, and ground water level had increase in that area after WDP.
e. The water storage structures are used for drinking water, for cattle, for agriculture domestic purposes. Ground water is free from pollution.

4.2.7. : WOMEN DEVELOPMENT :

Table 5.48 : Watershed development programme through women development programme (SHG)

Sr. No.	Name of SHGS	Member	Saving	Total saving	Loan	Loan utilization
1	Sitabai	20	20	24000	23000	Dairy Farming Agri Deve. Education Businee Health
2	Bayja	15	20	18000	17000	
3	Laxmi	25	25	37500	36500	
4	Samukta	18	20	21600	21000	
5	General Group	32	20	38400	38000	

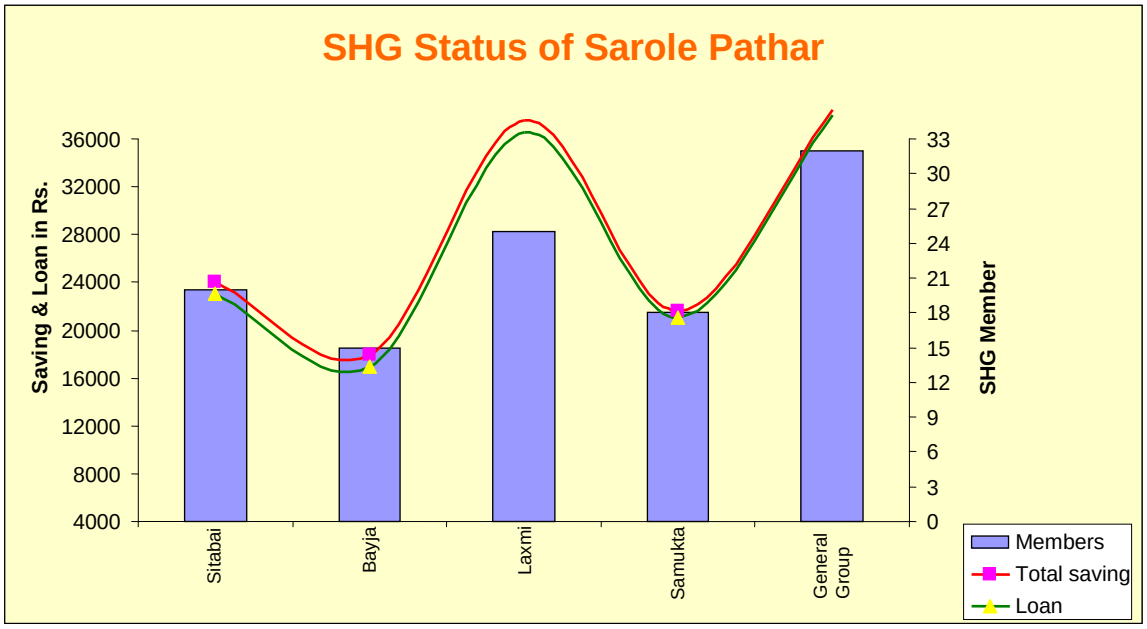


Fig 5.48 : SHG status of Darewadi.

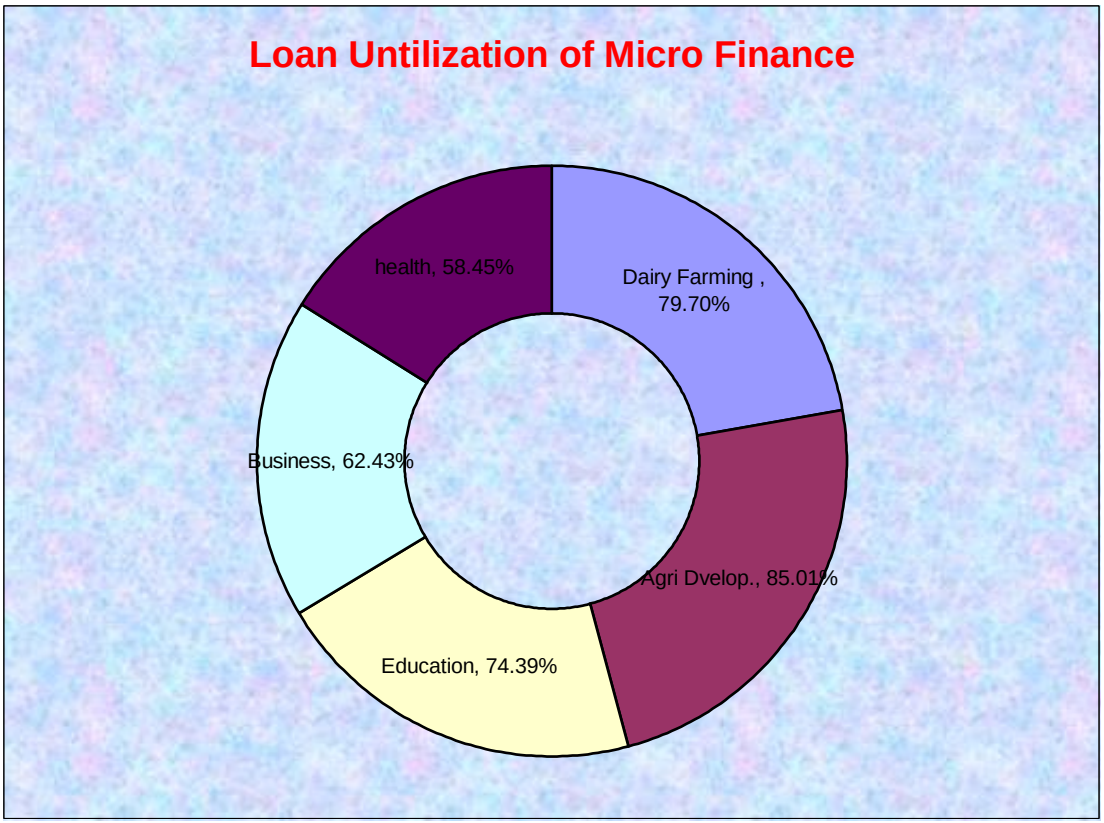


Fig 5.49 : Loan utilization of Micro Finance.

Women development:

The women are co partners and active contributors in the management of their watershed and integrated development of their village. "Samyukta Mahila Samiti (SMS) was established in 1999. They have undertaken a number of activities for drudgery reduction and enhancement of the quality of their lives by using facilities, such as soak pits, kitchen gardens, cleaner cooking fuels. Water supply system, toilet construction etc. A number of income generation activities like dairy, nursery, fishery etc, have also been under taken. Most important of all, they managed savings and credit group with internal lending, which provides immediate loans for their basic needs, Through Micro –finance support provided by WOTR, the women group has started a dairy

SHG:-

Five savings groups were organized during the year 2000 involving 110 women with Rs. 105500/-. These five group have been linked co- operative banks in order to build the capacities of self-help groups. 05 SHG's took the loan of Rs.

135500/-. This loan was utilized for dairy farming (79.70 %), Agri Development (85.01%), education (74.39 %) Health (58.45 %), Business (62.43%) etc (table 5.49)

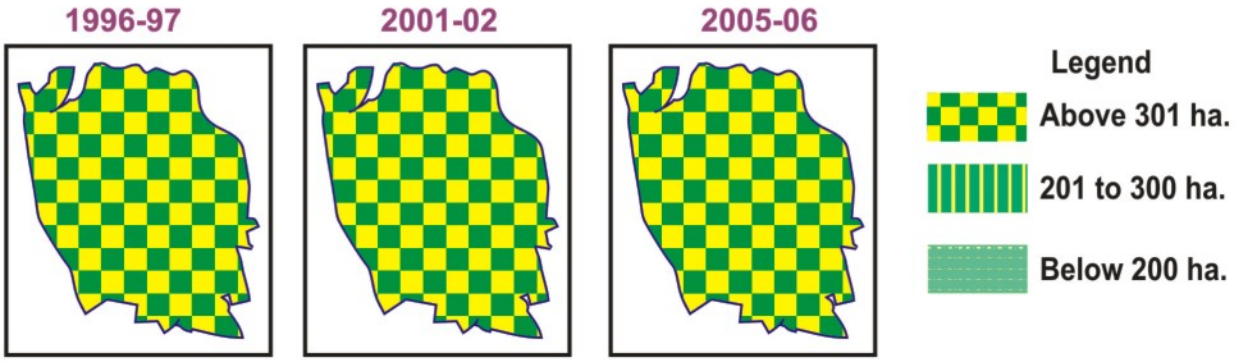
- **The above analysis of this table brings in to light following observation-**

a. Self Help Groups (SHG) were found to be more popular as they provide direct benefit to respondents besides satisfying their participation needs.
b. Mahila Mandal Proved to be less effective in awareness generation and motivation because of limited participation of women owing to scattered fields, illiteracy and poverty.
c. Most of the loans taken later were used for agriculture development, dairy farming, education and business.
d. The self Help Group contributed construction of private toilets, soak pits, kitchen gardens, etc. A number of income generation activities like dairy, nursery etc have also been undertaken.
e. "Women in the village are uneducated, dependant, untrained under Male dominated Society, it is very difficult to work with them".

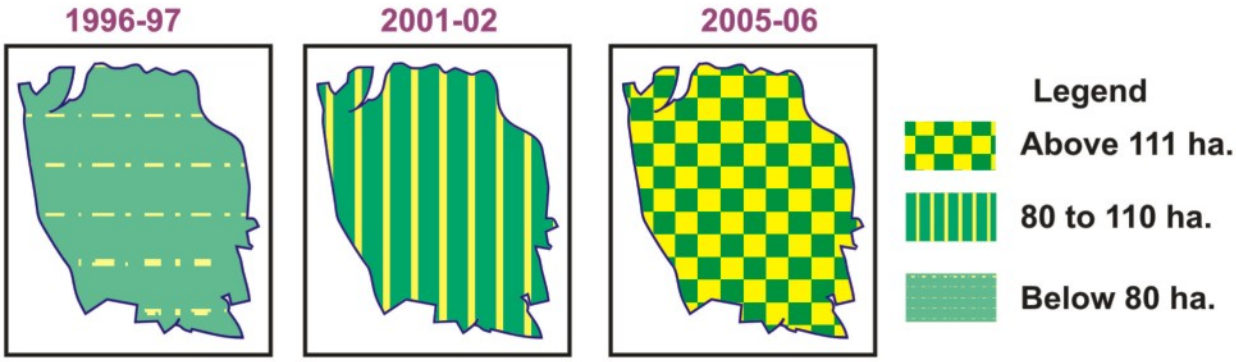
DAREWADI VILLAGE

CHANGE IN CROPPING PATTERN

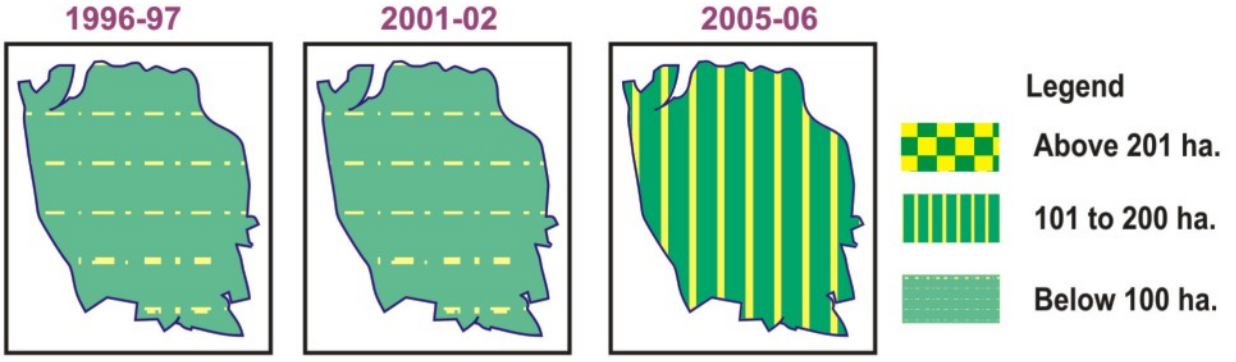
A) AREA UNDER BAJARA (KHARIP SEASON)

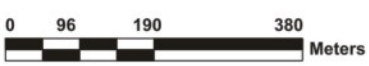


B) AREA UNDER WHEAT (RABI SEASON)



C) AREA UNDER ONION (VEGETABLE CROP)



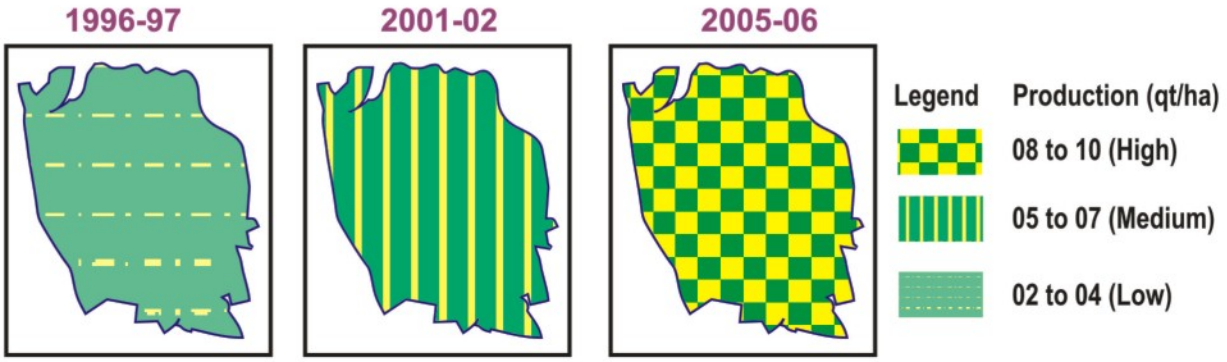


Map No. 5.17

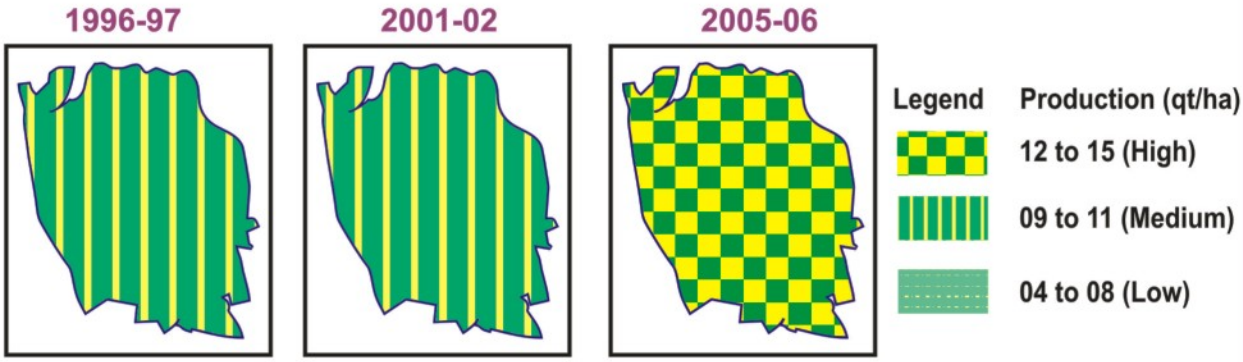
DAREWADI VILLAGE

CHANGE IN CROP WISE PRODUCTION

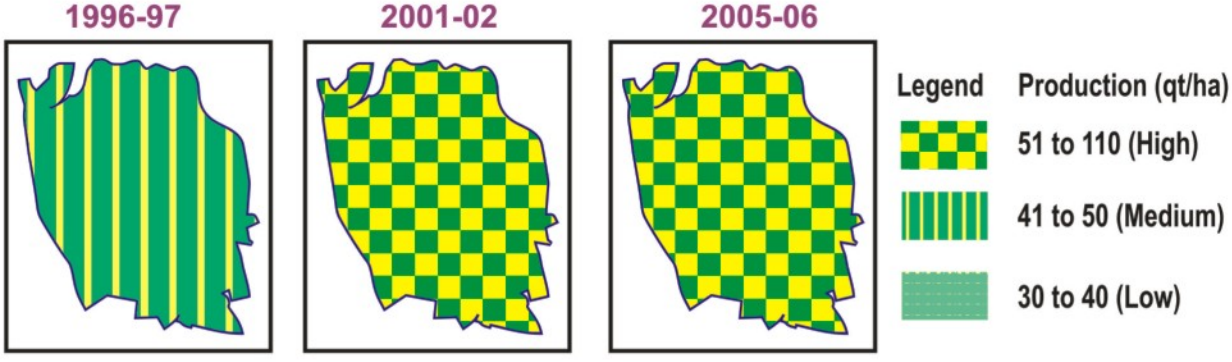
A) BAJARA PRODUCTION (KHARIP SEASON)



B) WHEAT PRODUCTION (RABI SEASON)



C)ONION PRODUCTION (VEGETABLE CROP)

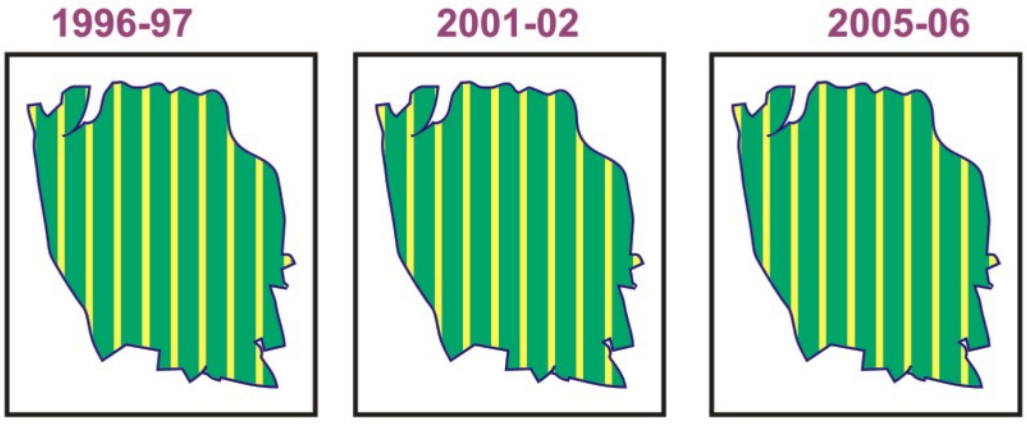


Map No. 5.18

DAREWADI VILLAGE

CHANGE IN POULATION OF COWS

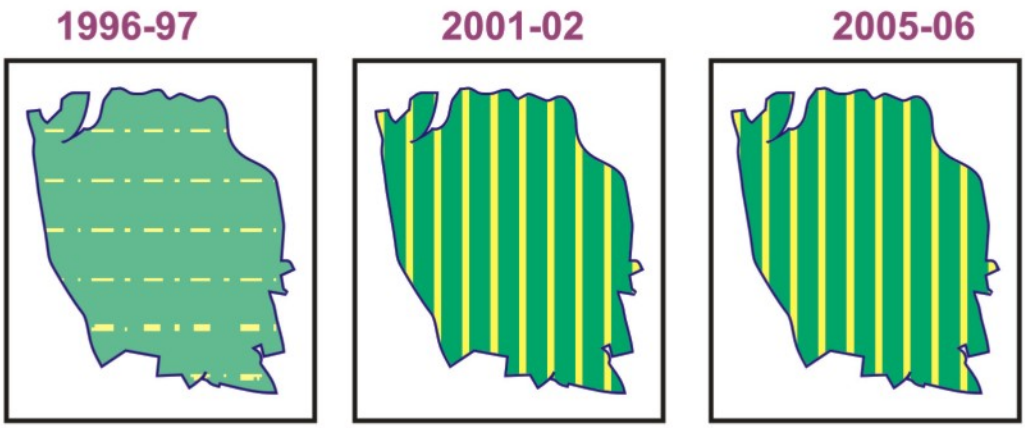
A) POPULATION OF LOCAL COWS



Legend Number of Live Stock

- Above 201 (high)
- 51 to 200 (Medium)
- Below 50 (Low)

B) POPULATION OF CROSS-BRED COWS



Legend Number of Live Stock

- Above 126 (high)
- 26 to 125 (Medium)
- Below 25 (Low)

N

0 96 190 380 Meters

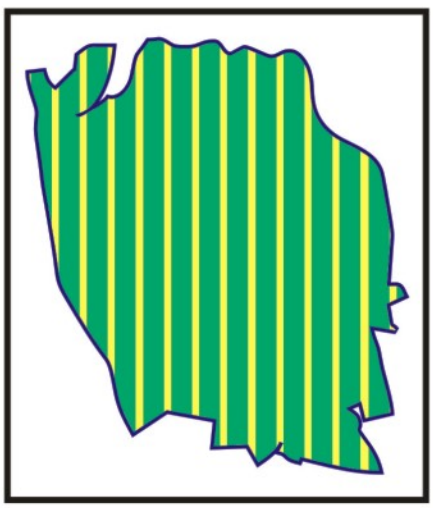
Map No. 5.19

DAREWADI VILLAGE

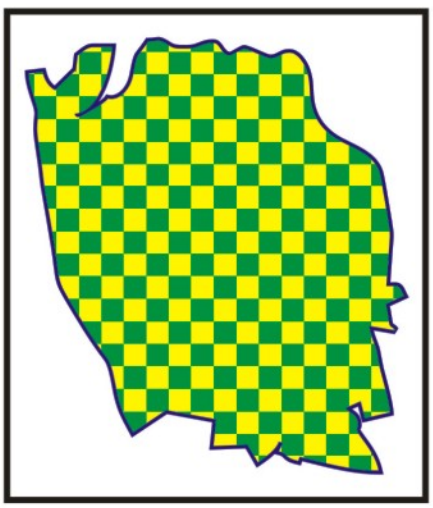
CHANGE IN NUMBER OF WELL'S

NUMBER OF WELL'S

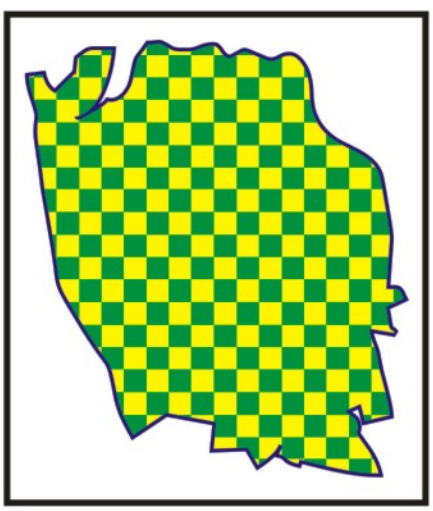
1996-97



2001-02



2005-06



Legend Number of Wells

Above 91

51 to 90

Below 50

N

0 96 190 380 Meters

Map No. 5.20

CHAPTER VI

COMPARATIVE ANALYSIS OF THE WATERSHED DEVELOPMENT PROJECT IN STUDY AREA.

6.1 Introduction

6.2. Comparative Analysis of the WDPs of Sangamner Taluka.

6.2.1 Pre-Project Physical and Socio-Economical condition in the project area.

6.2.2 Land use pattern.

6.2.3 Cropped Area.

6.2.4 Crop Yield

6.2.5 Net Income increase / decrease in income

6.2.6 Live Stock

6.2.7 Number of Wells & Water Table.

6.2.8 Agri Employment & Agri Wage Rate

6.2.9 Land Value.

6.2.10 Growth of Service Sector Unit.

6.2.11 SHG Status of WDP's

6.2.12 Loan Utilization.

6.2.13 Watershed Development Technology

6.2.14 NGO, Planning & implementation Process.

6.2.15 Villager's Opinion about the Changes in Terrain Future due to WDP.

6.2.16 Villager's Opinion about the Changes in Land Utilization in WS area.

6.2.17 Villager's Opinion about the Changes in Water Availability in WS area.

CHAPTER VI
COMPARATIVE ANALYSIS OF THE WATERSHED DEVELOPMENT PROJECT IN STUDY AREA.

6.1 INTRODUCTION :

Sangamner taluka of ahmednagar distric in Maharashtra state has more than 60 percent area under dryland Agriculture. The taluka had been identified for integrated watershed Development programme under "Indo Graman Watershed Development Programme" (I G W D P) in 1990-91 with the main objectives for increasing production and availability of food, fodder, fuel, fiber, fertilizer, restoration of ecological balance, improvement in the economic status of farmers and rural communities and generation of sustainable rural employment opportunities.

The fifteen projects namely- Mendhvan, Sarole Pathar, Mhasvandi, Gunjalwadi, Bhojdari, Malegaon Pathar, Karule, Kasare, Kumbharwadi, Shivapur, Darewadi, Kuthe Kambleshwar, Sawarchol, Vankute, & Sattyachiwadi, were selected for comparative analysis. They show striking similarities. An attempt in made to bring out the similarities amongst the fifteen cases, so that fruitful conclusions could be drown regarding the factors contributing to successes and suggestions could be made for successful replication of these cases in other area.

6.2 COMPARATIVE ANALYSIS OF THE WATERSHED PROJECT :

6.2.1. PRE- PROJECT PHYSICAL AND SOCIO-ECONOMIC CONDITION IN THE PROJECT AREA.

All the fifteen projects in Sangamner Taluka Dist Ahmednagar located in the central part of Maharashtra are declared as drought prone region. It is marked by scanty and erratic rainfall. The fifteen project areas are drained by first order primary streams either having their origin in the hilly areas of the same village or in the adjoining village, and contributed by the smaller streams. None of the project is located on, or very near to river banks. The permanent vegetative cover comprises of only sparse bushes in hilly regions and few tries in the fields. The soils are highly eroded.

Selection of Sample villages

Geographical & Socio, Economic Condition

Sr.	Particular	Mendhavan	Sarolepathar	Mashwandi	Gujalwadi	Bhojdari
1	Location	Drought Prone areas of Sangamner Taluka, Talegaon Circule	Drought Prone areas of Sangamner Taluka, Ghargaon Circule	Drought Prone areas of Sangamner Taluka, Ghargaon Circule	Drought Prone areas of Sangamner Taluka, Ghargaon Circule	Drought Prone areas of Sangamner Taluka, Ghargaon Circule
2	Average Rainfall	249.00 mm	350.00 mm	320.44 mm	355.50 mm	378.95 mm
3	Population	1620 (1981)	2307 (1981)	1460 (1981)	1222 (1981)	1818 (1981)
4	No. of Hoseholds	255 Families	367 Familes	210 Familes	182 Familes	311 Familes
5	Total Geographical Area (H)	1355.00 Ha.	1453.98 Ha	1145.00 Ha	1351.46 Ha	1374.47 Ha
6	Sail Types	45% land more than 20 cm thickness	70% land more than 20 cm thickness	30% land more than 20 cm thickness	33% land more than 20 cm thickness	75% land more than 20 cm thickness

Sr.	Particular	Malegaon Pthar	Kasare	Darewadi	Sawarchol	Vankute
1	Location	Drought Prone areas of Sangamner Taluka, Ghargaon Circule	Drought Prone areas of Sangamner Taluka, Talegaon Circule	Drought Prone areas of Sangamner Taluka, Sakur Circule	Drought Prone areas of Sangamner Taluka, Dhandarphal Circule	Drought Prone areas of Sangamner Taluka, Ghargaon Circule
2	Average Rainfall	323.80 mm	240.40 mm	282.54 mm	317.73 mm	280.34 mm
3	Population	952 (1981)	1491 (1981)	1206 (1981)	1973 (1991)	1968 (1991)
4	No. of Hoseholds	87 Familes	251 Familes	192 Familes	316 Familes	309 Familes
5	Total Geographical Area (H)	912.22 Ha	990.17 Ha	471.81 Ha	849.93 Ha	1486.63 Ha
6	Sail Types	34% land more than 20 cm thickness	72% land more than 20 cm thickness	35% land more than 20 cm thickness	24% land more than 20 cm thickness	48% land more than 20 cm thickness

Source - Field work and V.W.C. Record

6.2.2. LAND USE PATTERN (HECTARE):

Table 6.2.2. Comparative Analysis of the WDP Project in study area.

Land use pattern (Hectare)

Table 6.2.2.1. Comparative Analysis – Land use

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Perennial Irrigation	31.00	64.00	6.00	43.00	29.00	90.00	0.00	19.00	11.00	67.00
2	Seasonal Irrigation	104.80	250.80	100.00	410.00	35.00	215.00	54.03	443.14	41.00	135.00
3	Waste Land	238.75	130.75	218.00	129.00	231.50	90.00	117.44	35.44	123.43	50.43

Table 6.2.2.2. Comparative Analysis – Land use

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Perennial Irrigation	-	5.00	-	28.00	-	8.00	-	3.00	-	4.00
2	Seasonal Irrigation	7.75	178.78	147.78	343.78	201.00	402.00	96.14	171.14	43.63	136.63
3	Waste Land	34.60	26.60	174.00	13.00	72.73	30.73	3.80	3.80	20.19	8.81

Table 6.2.2.3. Comparative Analysis – Land use

Sr.	Particular	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Perennial Irrigation	-	18.40	-	2.76	-	5.00	5.00	22.00	-	2.00
2	Seasonal Irrigation	197.23	329.00	36.52	602.52	24.45	95.45	83.00	189.00	5.00	40.00
3	Waste Land	30.90	12.90	241.94	60.94	51.13	31.00	165.53	120.53	5.47	2.47

Sourse - Field Work

Table 6.2.2. shows comparative pre-post land use pattern of perennial irrigation, Seasonal irrigation and waste land for fifteen watershed development project areas. Area under perennial irrigation area was nil in pre watershed development period. in Gunjualwadi, Malegaon Pathar, Karule, Kasare, Kumbharwadi, Shivapur, Darewadi, Savarchol & Sattyachiwadi. The perennial irrigation area has increased from 02.00 ha. to 90.00 ha. in post watershed development of fifteen villages.

Seasonally irrigation has increased from 40.00ha. to 602.52ha in post watershed development period in Kauthe Kamleshwar, Sarole Pathar, Gunjalwadi, Kasare, Karule, Darewadi, Mendhavan, Mhasvandi, Shivapur & Sattyachiwadi WDP's respectively. Wasteland area has decreased from 130.75ha. to 02.47ha in post watershed development period in Sarole Pathar, Kauthe Kamleshwar, Medhavan,

Fig. 6.2.2.1

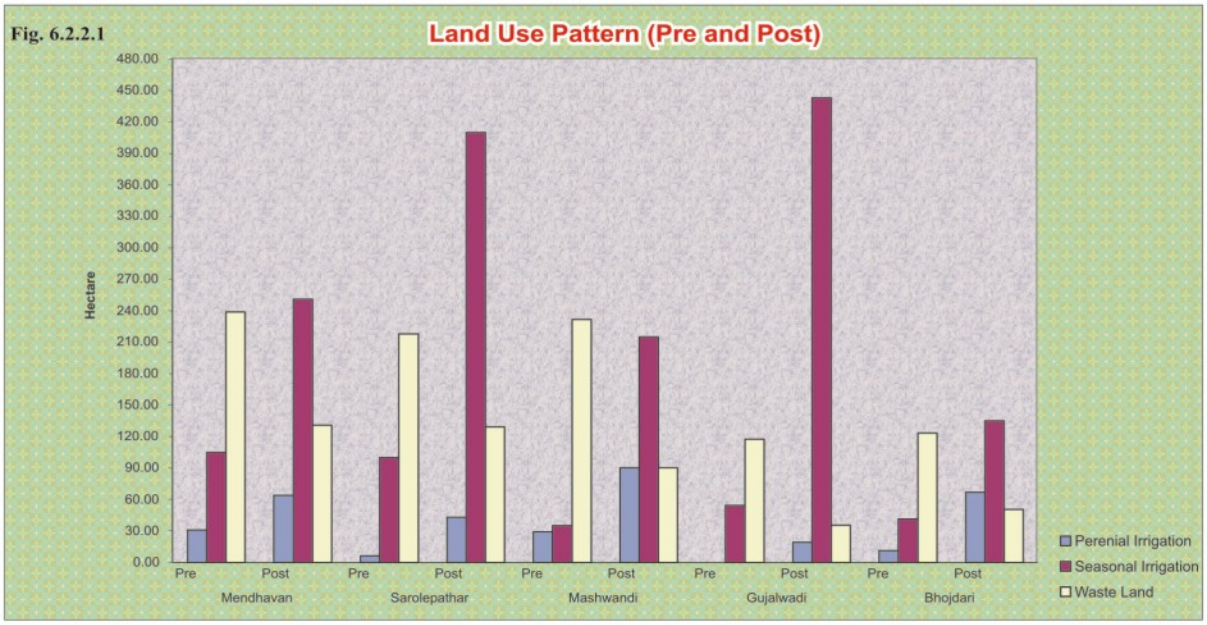


Fig. 6.2.2.2

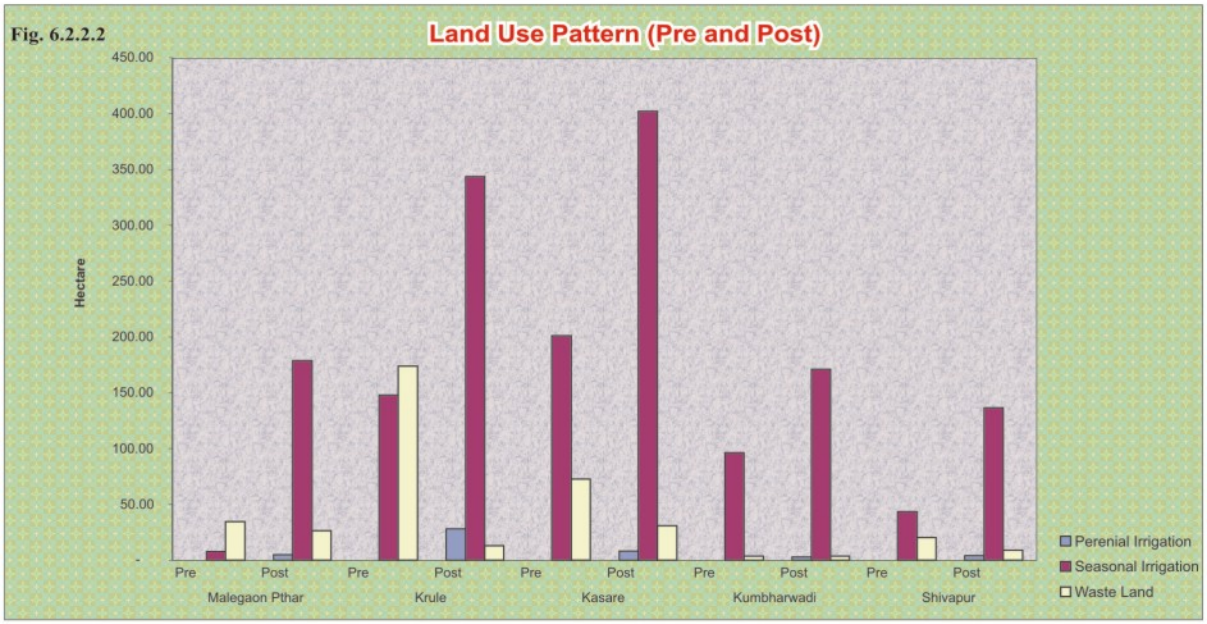
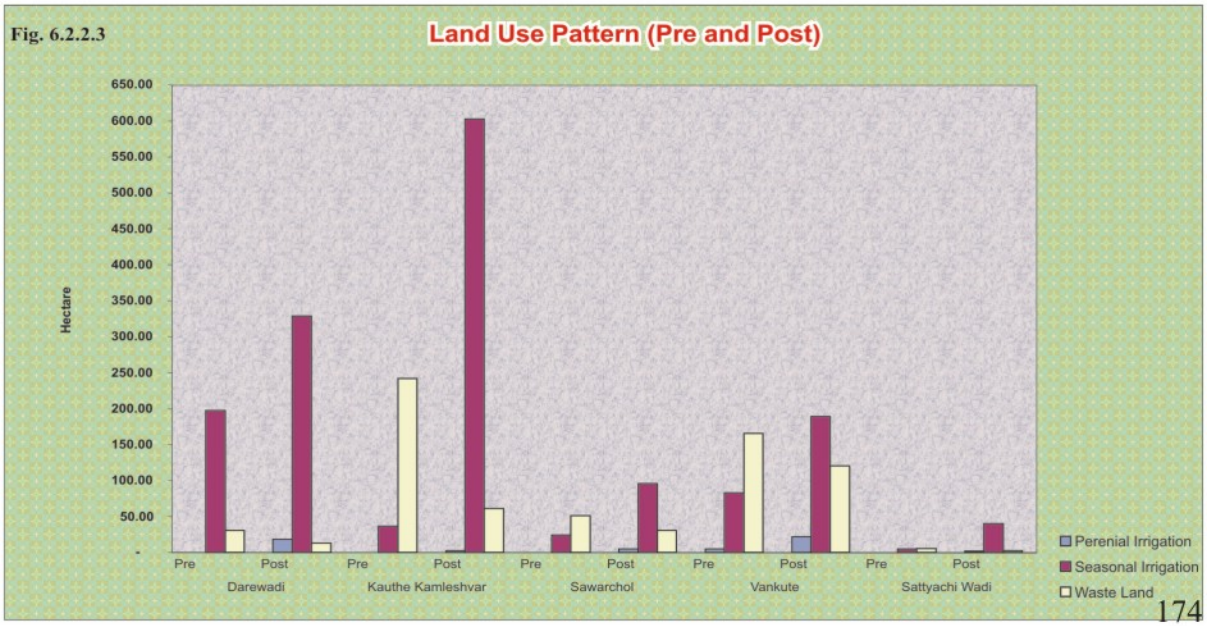


Fig. 6.2.2.3



Vankute, Darewadi, Mhasvandi, Gunjalwadi, Karule, Kasare, Savarchol, Kumbharwadi & Sattyachiwadi WDP's respectively. The changes in land use pattern are presented in the Table 6.2.2. Apart from increase in cultivated area and irrigation facilities, use of HYV seeds, fertilizer and pesticides distribution services also contributed largely for achieving agriculture development in these villages.

6.2.3 CROP AREA :

Table 6.2.3 Comparative Analysis of the WDP Cropped Area (Ha)

Table 6.2.3.1 Comparative analysis - Crop area

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Kharip	378.00	386.00	710.00	310.00	273.00	245.00	693.00	569.00	617.00	597.00
2	Rabi	213.00	520.00	315.00	520.00	130.00	330.00	170.00	461.00	108.00	199.00
3	Vegetable	159.00	430.00	180.00	650.00	155.00	385.00	124.00	281.00	107.00	260.00
4	Main Crop (Cropping Pattern)	Bajara Jawar Wheat	Wheat Onion Tomato Chilies	Bajara G.Nut Gram	Wheat Onion Tomato	Bajara Jawar Gram	Onion Patoto Wheat	Bajara G.Nut Wheat	Onion Wheat Tomato	Bajara Jawar Gram	Wheat Onion Tomato

Table 6.2.3.2 Comparative analysis - Crop area

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Kharip	354.00	257.00	685.00	615.00	834.00	505.00	368.00	345.00	290.00	198.00
2	Rabi	89.00	192.00	128.00	278.00	126.00	249.00	125.00	187.00	105.00	100.00
3	Vegetable	95.00	289.00	113.00	256.00	149.00	289.00	88.00	151.00	103.00	265.00
4	Main Crop (Cropping Pattern)	Bajara G.Nut Wheat	Wheat Onion Tomato	Bajara G.Nut	Wheat Gram Tur Onion	Bajara Mix Crop	Wheat Onion Vegetable	Bajara G.Nut Wheat	Onion Vegetable Gram	Bajara Jawar Wheat	Onion Pease Vegetable

Table 6.2.3.3 Comparative analysis - Crop area

Sr.	Particular	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Kharip	427.00	557.00	1,278.00	1,058.00	252.00	273.00	786.00	777.00	173.00	158.00
2	Rabi	323.00	433.00	295.00	549.00	94.00	134.00	74.00	97.00	10.00	44.00
3	Vegitable	65.00	192.00	70.00	340.00	48.00	180.00	72.00	173.00	39.00	86.00
4	Main Crop (Cropping Pattern)	Bajara Gram Jawar	Onion Tomato Vegetable	Bajara Gram Jawar	Wheat Onion Vegetable	Bajara Mix Crop G.Nut	Wheat Tomato Vegetable	Bajara Wheat Gram	Tomato Patato Onion G.Nut	Bajara Jawar G.Nut	Wheat Onion Gram

Source V .W. C. Record & Field Work

Table 6.2.3 shows comparative pre-post cropped area for fifteen WDP's. After implementation of watershed development programme in fifteen watershed area, there has been significant shift in cropping pattern of these villages. The availability of irrigated land increased. Some new crops like Onion, Pease, Tomato, Chilies has been

Fig. 6.2.3.1

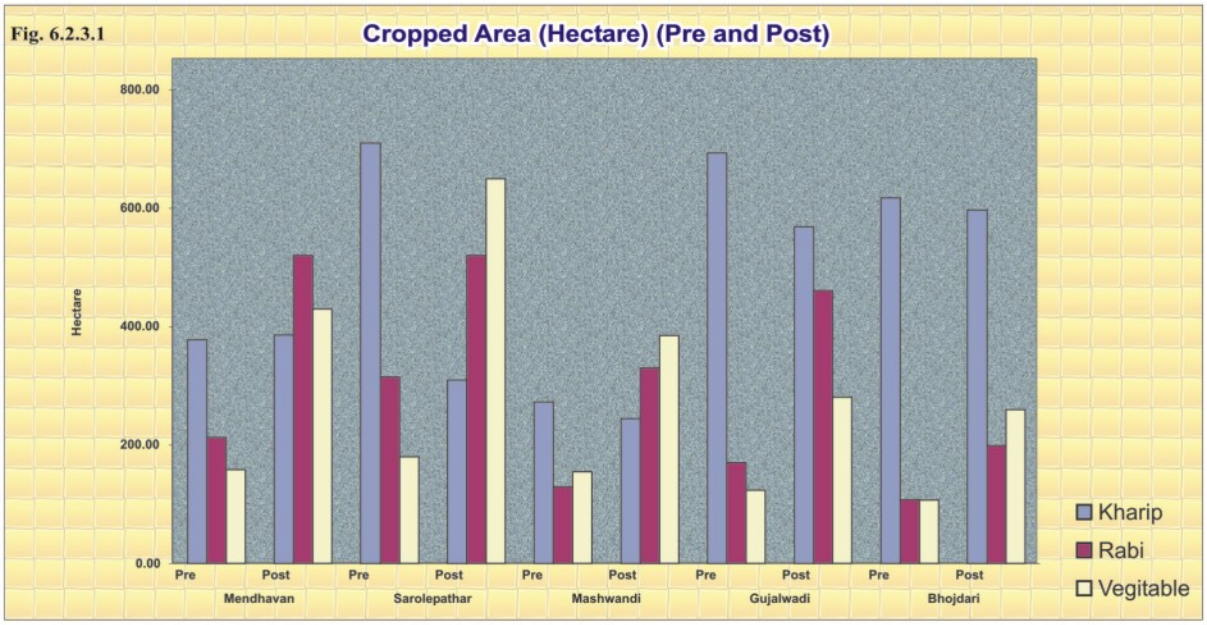


Fig. 6.2.3.2

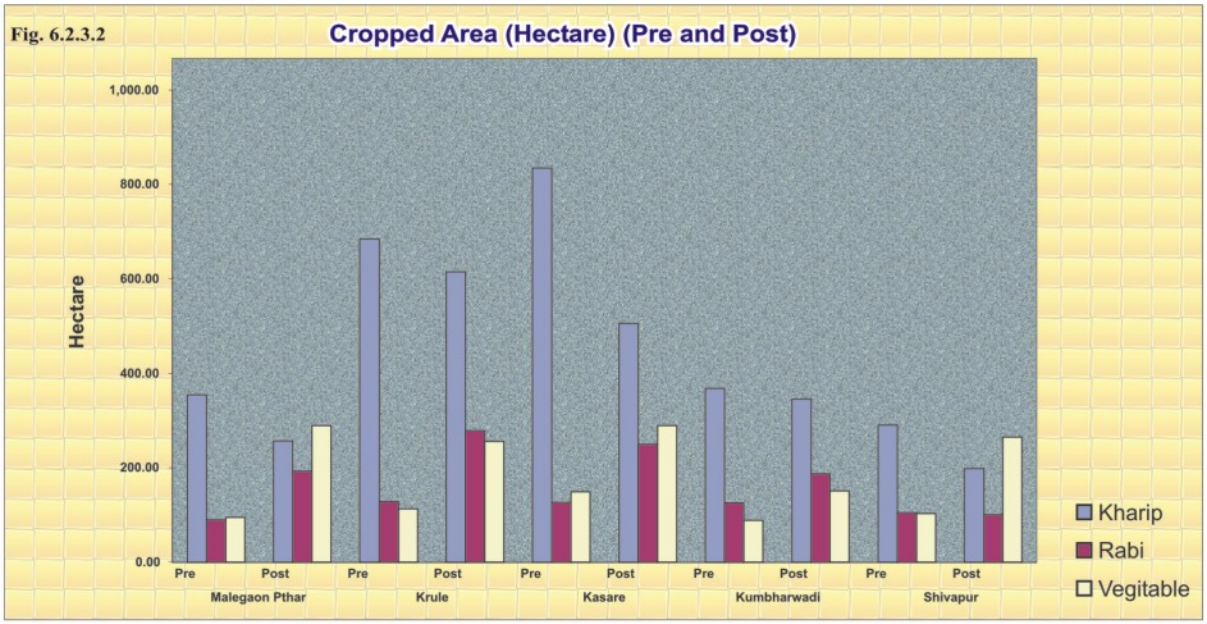
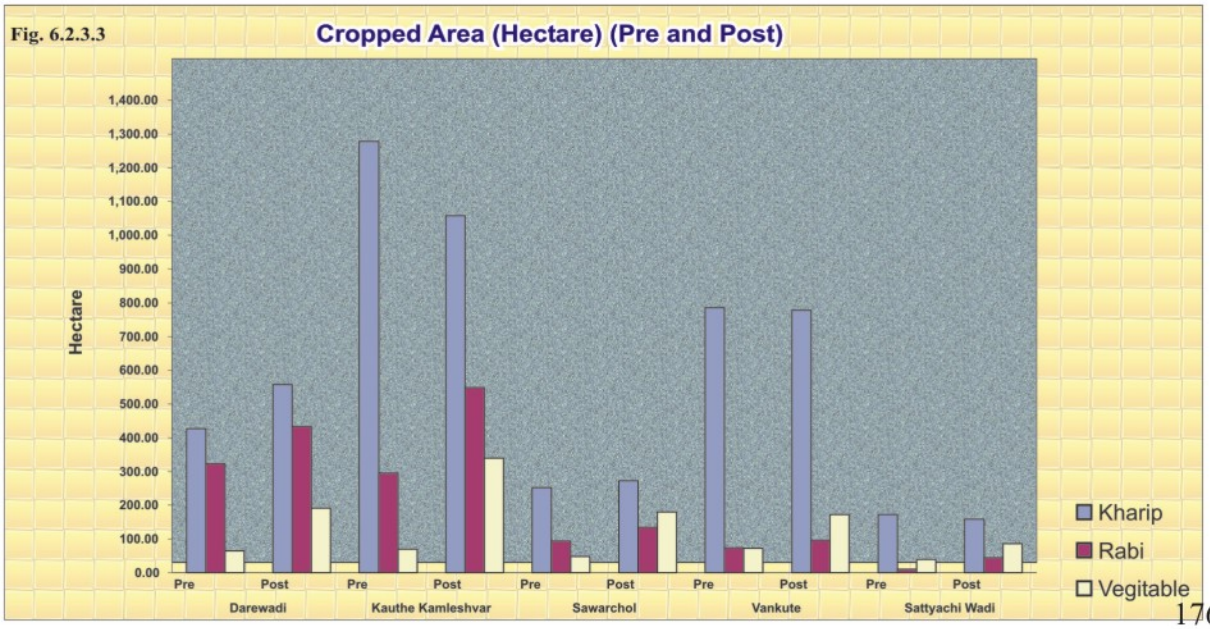


Fig. 6.2.3.3



introduced Table 6.3 indicates that the Kharip Crop area has decreased in Mendhavan, Sarole Pathar, Malegaon, Darewadi, Kumbharwadi, Vankute, Mhasvandi, Gunjalwadi, Bhojdari Karule, Kasare, Kauthe Kamleshwar, WDP's respectively. But in Savarchol the Kharif crop area increased & the area under Bajara, Jawar, G. Nut and other Cereal Crops decreased.

The area under Rabi Crops area increased from 44.00ha. to 549.00 ha.. in Kauthe Kamleshwar, Sarole Pathar, Medhavan, Gunjalwadi, Darewadi, Karule, Kasare, Vankute, Bhojdari, Sattyachiwadi & Shivapur WDP's respectively. The area under vegetable crop increased from 39.00ha. to 650.00 ha. in Sarole Pathar, Medhavan, Mhasvandi, Kauthe Kamleshwad, Gunjalwadi, Darewadi, Kasare, Karule, Shivapur, Malegaon Pathar, Savarchoil WDP's respectively.

It is observed that the area under mix food Grains, Pulses and oil seed slightly decreased. Whereas the area under cash crops like Onion, Tomato, Pease, Wheat, Chilies, Vegetables become possible in both seasons and has enormously increased. Changes in the crop wise area of Kharif crop area Rabi crop area & Vegetable crop area & Pre & Post cropping pattern are shown in Table 6.2.3.

6.2.4 : CROP YIELD

Table 6.2.4 : Comparative Analysis of the WDP's
Crop Yield (Increase Quintals / Hectare)

Table 6.2.4.1 : Comparative Analysis of the WDP's - Crop Yield

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	3.00	6.00	7.00	12.00	7.50	9.50	5.50	9.50	6.50	12.00
2	G. Nut	-	-	12.00	11.00	9.50	11.00	11.00	14.00	10.00	13.00
3	Jawar	5.00	8.00	-	-	-	-	-	-	-	-
4	Wheat	11.00	14.00	5.00	10.00	4.50	12.00	6.50	9.50	4.00	12.00
5	Onion	43.00	55.00	30.00	40.00	37.00	48.00	37.00	46.00	35.00	38.00
6	Vegetable	30.00	50.00	-	-	36.00	45.00	-	-	50.00	90.00

(Cond.)

Table 6.2.4.2 : Comparative Analysis of the WDP's - Crop Yield

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	8.00	9.00	2.00	8.00	2.00	7.50	6.00	10.00	4.00	8.00
2	G. Nut	9.00	13.00	-	-	-	-	5.00	11.00	-	-
3	Jawar	-	-	2.00	8.00	-	-	7.00	11.00	12.00	14.00
4	Wheat	6.00	9.00	7.00	12.00	8.00	12.00	4.00	8.00	8.00	11.00
5	Onion	47.00	57.00	40.00	53.00	55.00	65.00	40.00	50.00	65.00	75.00
6	Vegetable	42.00	50.00	-	-	50.00	62.00	35.00	50.00	55.00	62.00

(Cond.)

Table 6.2.4.3 : Comparative Analysis of the WDP's - Crop Yield

Sr.	Particular	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	3.00	8.50	5.00	9.00	4.00	10.00	10.00	12.00	5.00	6.50
2	G. Nut	5.00	11.00	-	-	6.00	10.00	9.00	13.00	10.00	11.50
3	Jawar	-	-	6.00	10.00	-	-	-	-	-	-
4	Wheat	8.00	15.00	10.00	14.00	7.00	10.00	10.00	13.00	5.50	7.50
5	Onion	50.00	110.00	25.00	48.00	40.00	65.00	40.00	52.00	36.00	40.00
6	Vegetable	45.00	80.00	-	-	-	-	50.00	75.00	-	-

Source- field work

Table 6.2.4 Shows Comparative pre-post agriculture productivity (Crop yield) of various crops including vegetables for fifteen WDP's areas. Average productivity of Bajara improved considerably and was recorded as 12:00 qt / ha in Sarole Pathar, Bhojdari, Vankute 9.50 to 10.00 qt/ha. in Mhasvandi, Kauthe Kamleshwar, Sawarchol WDPs respectively. In case of ground nut, the average productivity increased by 10.00 to 13.00 qt/ha in Mhasvandi, Gunjalwadi, Bhojdari, Malegaon Pathar, Kumbharwadi, Darewadi, Savarchol, Vankute and sattyachiwadi. But, in Sarole Pathar the G. Nut crop yield decreased. Average productivity of Jawar in watershed increased from 8.00 to 10.00 qt/ha in Mendhavan, Karule, Kumbharwadi, Shivapur, Kauthe Kamleshwar WDP's respectively. Maximum increase in the productivity of wheat was recorded as 13.00 to 15.00 qt/ha and 10.00 to 12.00 qt/ha in Darewadi, Kauthe Kamleshwar, Mendhavan, Vankute, Bhojdari, Mhasvandi, Sarole Pathar, Karule, Kasare, Shivapur and Sawarchol WDP's respectively. Drastic increase in the production of Onion cash crop yield was recorded as 65.00 to 110.00 qt/ha and 35.00 to 65.00 qt/ha in Darewadi, Shivapur, Sawarchol, Kasare, Karule, Kumbharwadi, Malegaon Pathar, Mhaswandi, Sarole Pathar and Sattyachiwadi WDPs respectively. Average productivity of vegetable crop increased by from 70.00 to 90.00 qt/ha and 30.00 to 50.00 qt/ha in Bhojdari, Shivapur, Kasare, Darewadi, Vankute, Malegaon Pathar, Mhaswandi, Mendhavan and Kumbharwadi WDPs respectively.

It was reported by the farmers that the yield rates of the crops were increased primarily because of increase in moisture in the farm, which happened due to soil and water conservation work carried out in the region. Now a day the farmers are using HYVS of seed crops. For the cultivation of high value crops usage of fertilizers and insecticides was minimum. The increase in production of all crops was also due to irrigation and use of improved varieties.

Fig. 6.2.4.1

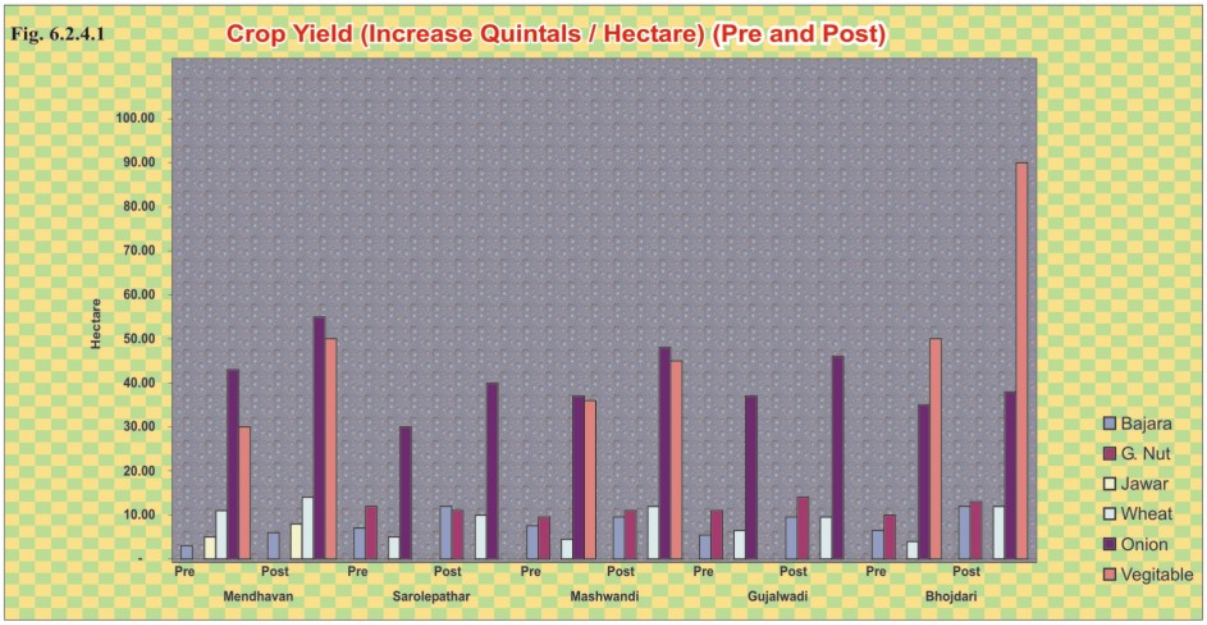


Fig. 6.2.4.2

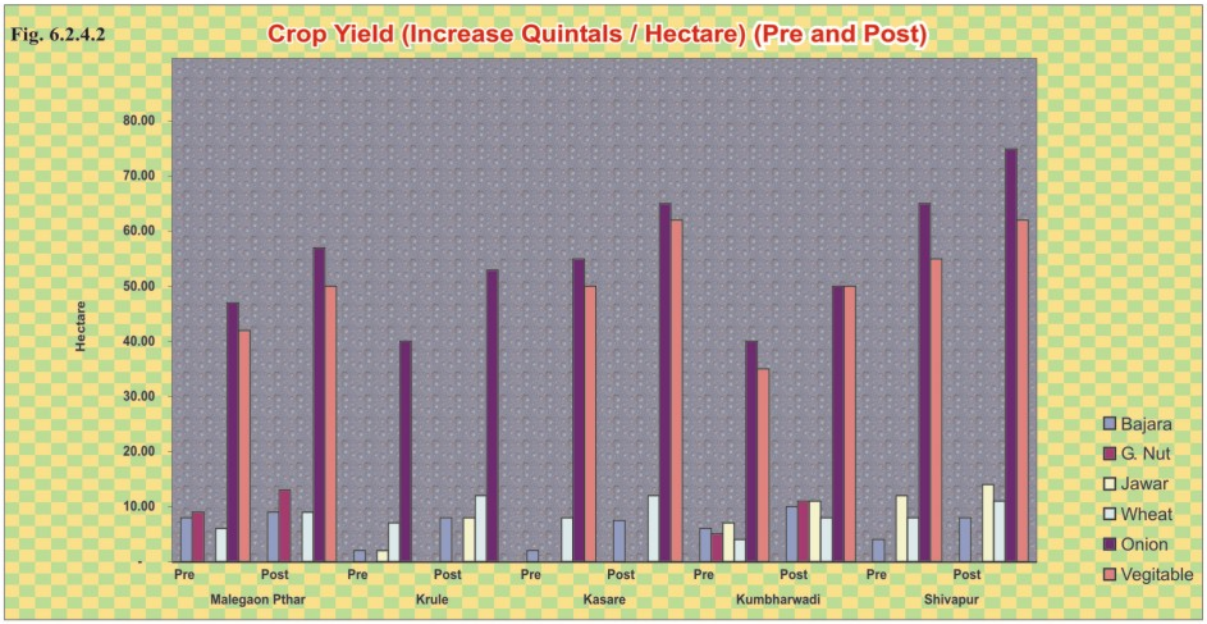
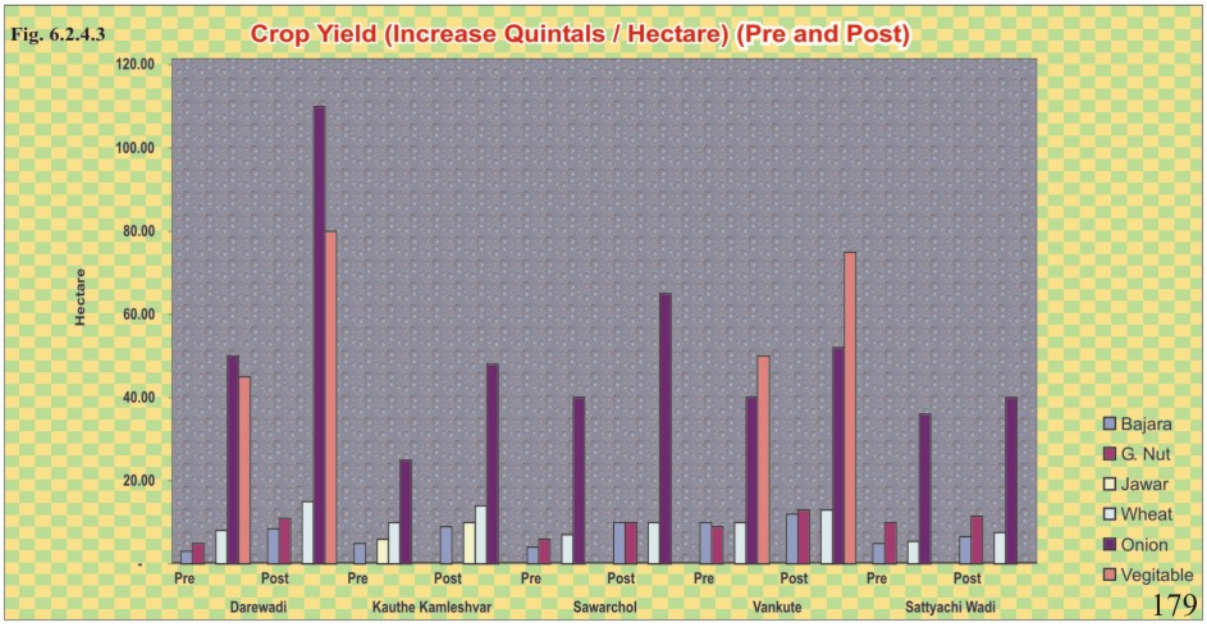


Fig. 6.2.4.3



6.2.5 NET INCOME

Table 6.2.5.1 Comparative Pre-Post Net Income Position of Farmers in WDPS (in Rs.)

Sr.	Crop	Mendhavan		Sarolepathar		Mashwandi		Gunjalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	1,100	4,010	4,000	9,600	4,500	7,125	3,575	8,550	4,025	10,400
2	G. Nut	-	-	15,550	17,200	10,150	14,050	13,600	18,000	11,700	16,100
3	Jawar	2,850	5,450	-	-	-	-	-	-	-	-
4	Wheat	5,350	9,700	1,750	6,900	2,150	9,750	4,225	7,475	1,500	9,550
5	Gram	3,070	8,250	800	3,050	2,770	9,750	3,475	5,875	2,750	10,400
6	Onion	34,900	60,250	25,100	61,000	31,450	53,200	26,200	37,100	28,100	61,500
7	Vegetable	1,100	4,850	14,675	30,150	26,900	40,650	16,000	35,550	18,050	49,600
	Total	48370	92510	61875	127900	77920	134525	67075	112550	66125	157550

Table 6.2.5.2 : Net Income increase / decrease in Income

Sr.	Crop	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	4,300	6,450	400	6,200	250	4,775	2,650	7,050	850	4,900
2	G. Nut	12,400	21,750	-	-	-	-	5,500	16,150	-	-
3	Jawar	-	-	350	5,850	-	-	3,500	7,550	3,500	8,900
4	Wheat	2,850	6,700	3,150	10,200	3,600	9,300	1,750	5,850	3,000	8,600
5	Gram	4,700	9,600	1,200	6,100	3,100	7,950	-	-	-	-
6	Onion	26,100	42,900	20,150	42,050	17,300	36,700	12,550	27,750	14,650	38,650
7	Vegitable	19,250	32,600	-	-	13,000	31,700	14,100	47,450	14,700	28,700
	Total	69600	120000	25250	70400	37250	90425	40050	111800	36700	89750

Table 6.2.5.3 : Net Income increase / decrease in Income

Sr.	Crop	Darewadi		K. Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Bajara	750	7,400	2,000	7,800	760	7,000	8,000	12,000	3,350	5,400
2	G. Nut	5,200	20,200	-	-	8,600	18,800	12,900	25,600	12,100	19,000
3	Jawar	-	-	5,700	9,200	-	-	-	-	-	-
4	Wheat	3,800	12,800	8,800	13,800	3,450	7,800	10,600	16,600	3,825	7,950
5	Gram	3,300	14,400	6,800	10,700	5,550	12,600	10,300	16,400	3,200	7,575
6	Onion	15,500	85,000	3,400	29,100	14,200	33,250	34,300	60,200	19,600	31,800
7	Vegetable	27,050	68,800	1,600	14,300	25,300	53,200	17,000	37,450	15,800	24,900
	Total	55600	208600	28300	84900	57860	132650	93100	168250	57875	96,625

Source – Field work & VWC record

Table 6.2.5 shows net income from fifteen WDPs area and crop wise net income in all the fifteen WDPs under study. The net income obtained from Bajara (Rs. 4010), Jawar (Rs. 5450), Wheat (Rs. 9700), Gram (Rs.8250), Onion (Rs. 60,250), Vegetable (Rs. 4850) respectively in Mandhavan WDP. Similarly a comparison of pre and post watershed income from Karule WDP revealed that crop wise net benefits

Fig. 6.2.5.1

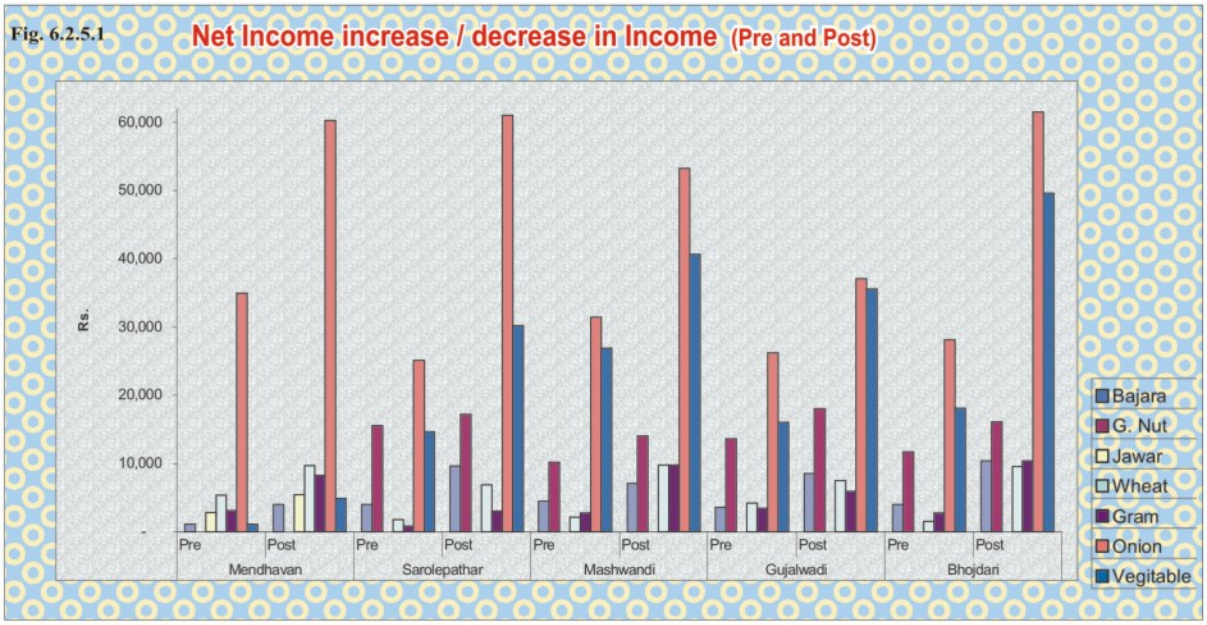


Fig. 6.2.5.2

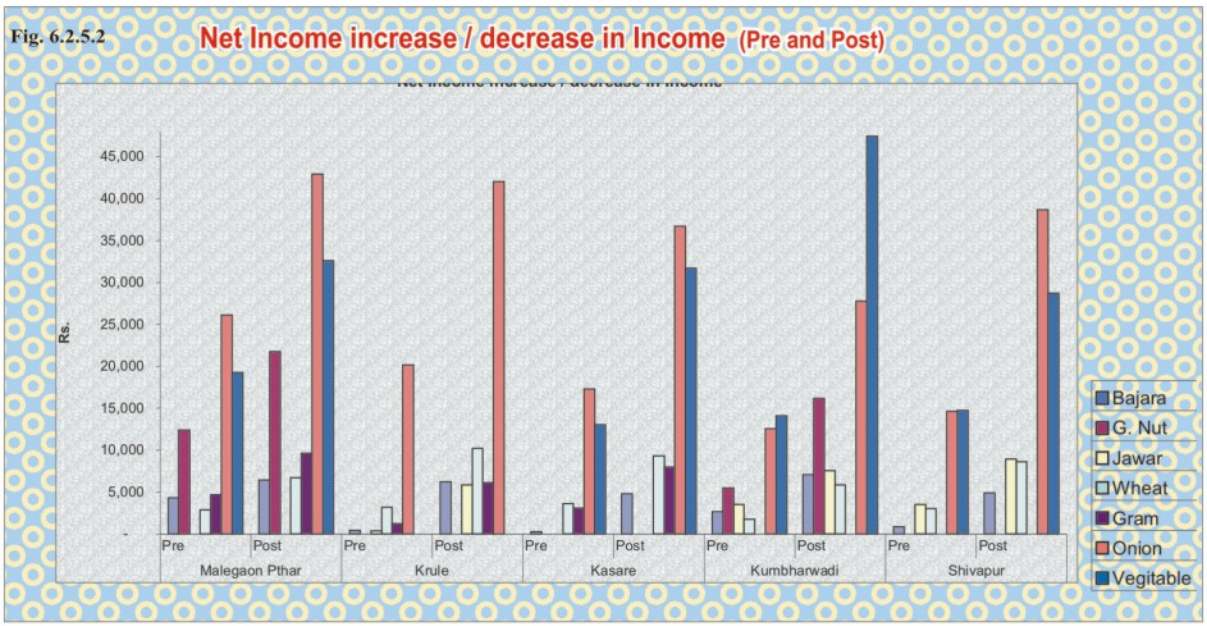
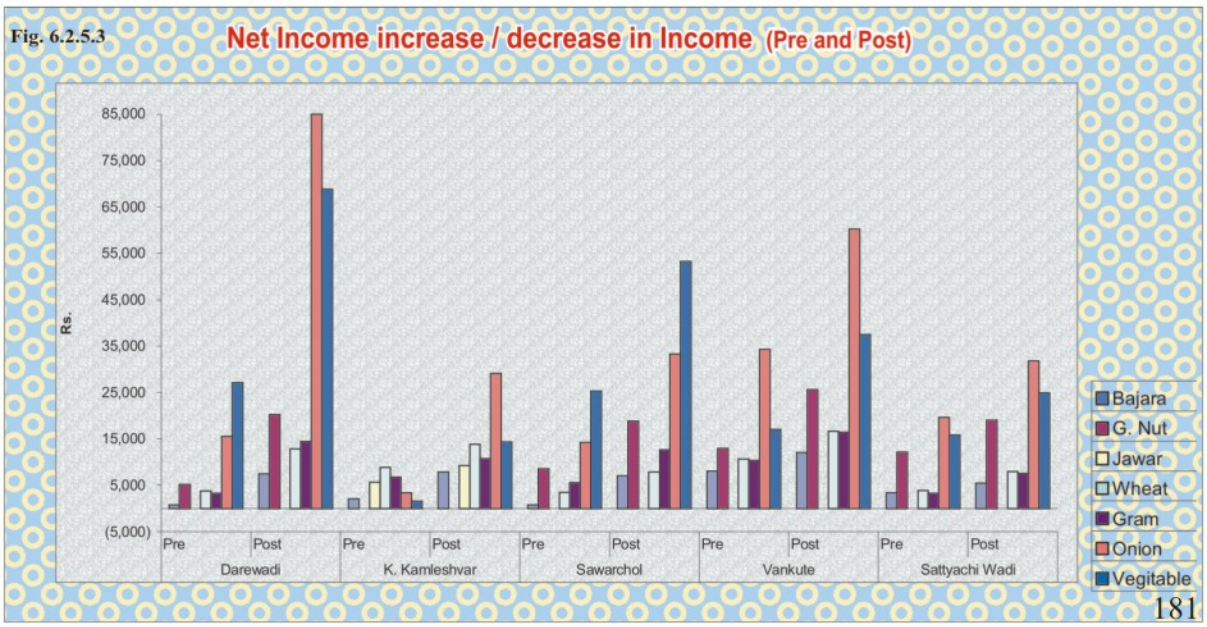


Fig. 6.2.5.3



from Bajara was (Rs. 6200), Jawar (Rs. 5850), Wheat (Rs. 10200), Gram (Rs.6100), Onion (Rs. 42050) respectively.

In post watershed period income from Bajara was (Rs. 7125), G.Nut (Rs. 14050), Wheat (Rs. 9750), Gram (Rs.9750), Onion (Rs. 53200), Vegetable (Rs. 40650) respectively. Mhasvandi in WDP. The net income obtained from Bajara is (Rs.7400), G. Nut (Rs.20,200), Wheat (Rs. 12800), Gram (Rs. 14800), Onion (Rs. 8500), Vegetable (Rs. 68800) respectively in Darewadi WDP there has In both these fifteen WDPs their has been marginal increase in gross area under different cops due to undertaking of different activities. A perusal of Table 6.5 reveals that as compared other WDPs, farmers of Vankute WDPs derived maximum income from Bajara (Rs. 12000), G. Nut (Rs. 25600), Wheat (Rs.16000), Gram (Rs. 16400) whereas maximum income was to the tune of Rs. 85000 (Onion) and Rs. 68800 (Vegetable) as reported by the farmers of Darewadi WDPs. Over all maximum increase in the net income was recorded from the farmers of Darewadi (Rs. 208600), Sarole Pathar (Rs. 127900) Mhasvandi (Rs. 134525), Bhojdari (Rs. 157550), Vankute (Rs.138250), Sawarchol (Rs.132650), Gunjalwadi (Rs.112550), Malegaon Pathar (Rs. 120000), Kumbharwadi (Rs. 118000), Mendhavan (Rs. 95510), Kasare (Rs. 90425), Shivapur (Rs. 89750), Sattyachiwadi (Rs. 96625), K. Kamleshwar (Rs.89900), Kurule (Rs 70400) respectively.

6.2.6 : LIVESTOCK

Table 6.2.6.- Comparative Analysis of the WDP's
Live Stock

Table 6.2.6.1 : Live Stock

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Crossbred Cow	25	210	68	180	8	177	48	208	79	110
2	Indigenous	100	18	376	103	312	49	438	119	302	113
3	Sheep & Gote	2,136	1,338	562	606	271	93	648	317	427	150
4	Milk Production Lit / Day	140.00	1,000.00	407.00	1,200.00	190.00	790.00	305.00	1,275.00	37.00	545.00

(Connd.)

Table 6.2.6.2 : Live Stock

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Crossbred Cow	29	175	14	230	34	203	83	278	31	250
2	Indigenous	326	90	91	42	207	66	185	37	150	50
3	Sheep & Gote	415	128	476	180	1,069	1,548	446	795	284	760
4	Milk Production Lit / Day	110.00	1,315.00	70.00	1,410.00	90.00	875.00	130.00	1,012.00	160.00	630.00

(Connd.)

Table 6.2.6.3 : Live Stock

Sr.	Particular	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Crossbred Cow	14	88	29	258	46	107	97	195	3	22
2	Indigenous	170	65	281	86	184	86	155	93	65	50
3	Sheep & Gote	1,323	810	2,494	952	532	312	532	368	385	842
4	Milk Production Lit / Day	60.00	490.00	548.00	1,475.00	73.00	278.00	300.00	800.00	165.00	842.00

Source – VWC Record & field work.

Table 6.2.6 shows comparative pre-post Live Stock from fifteen WDPs under study. Although there existed sizable stocks of cattle in the project area, they comprised only indigenous low-yield variety of Cows, Sheep & Goats Table 6.2.6 indicates that the crossbred Cows has increases in WDPs. Crossbred Cows increased from 200 to 378, 100 to 200 in Khumbharwadi, Kauthe Kamleshwar, Shivapur, Karule, Gunjalwadi, Mendhavan, Sarole Pathar, Bhojdari, Mhaswandi, Kasare, WDPs respectively. It is observed that the indigenous Cows had decreased from 70 to 120, 20 to 70 in Bhojdari, Gunjalwadi, Sarole Pathar, Malegaon Pathar, K. Kaleshwar, Darewadi, Sattyachiwadi and Medhvan WDPs respectively. It is observed that the number of sheep & Goats, drasticlly decreased 1000 to 1500, 90 to 1000 in Kasare, Medhvan, K. Kamleshwar, Savarchol, Darewadi, Sattyachiwadi, Kumbharwadi, Shivapur, Sarole Pathar, Vankute, Gunjalwadi, Malegaon Pathar WDPs respectively.. It is observed that the Milk production has increased from 1000 to 1500 lit/day, 300 to 1000 lit/day in Kauthe Kamleshwar, Karule, Malegaon Pathar, Sarole Pathar, Gunjalwadi, Mendhavan, Kumbharwadi, Kasare, Sattyachiwadi, Vankute, Mhasvandi, Shivapur, Darewadi & Sawarchol WDPs respectively.

Fig. 6.2.6.1

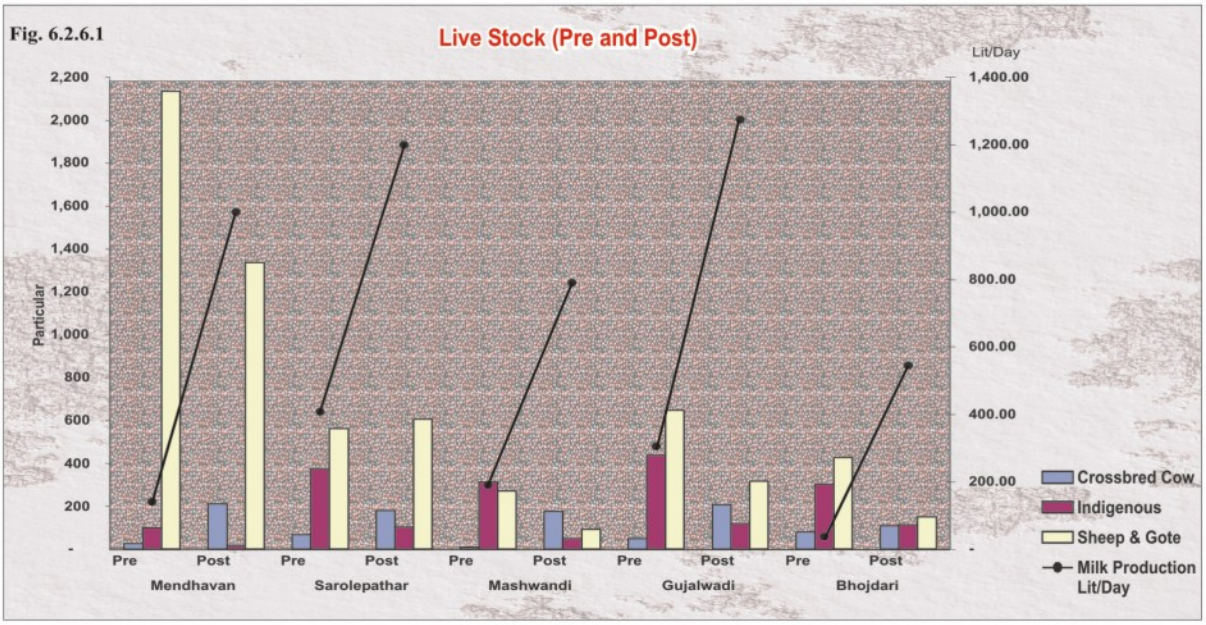


Fig. 6.2.6.2

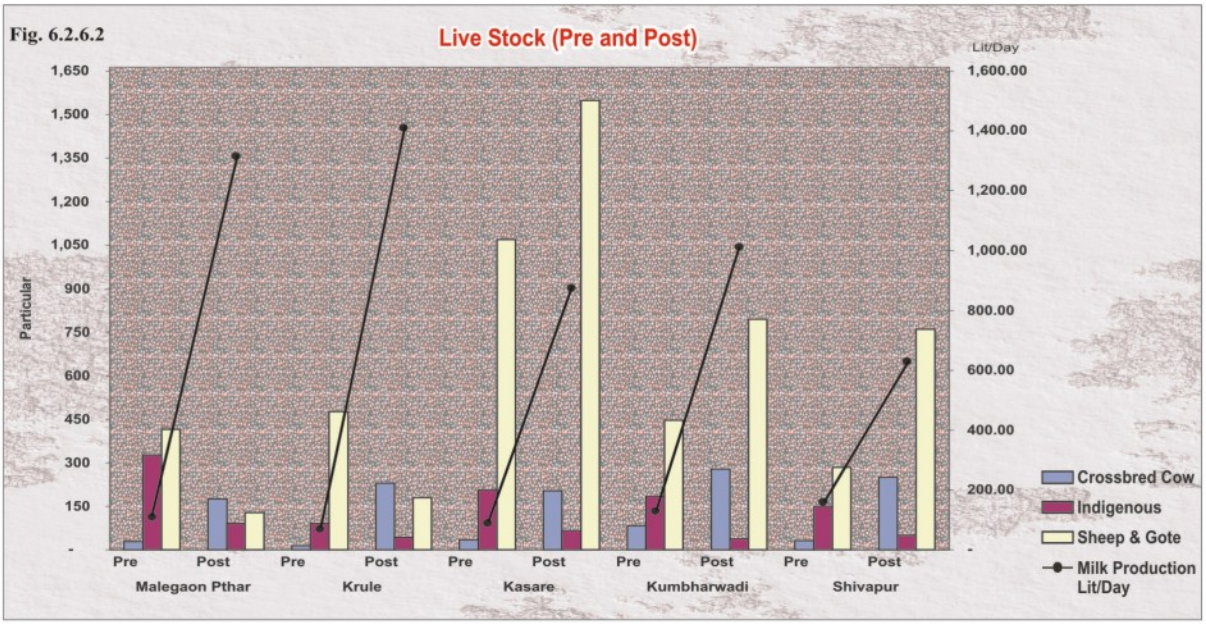
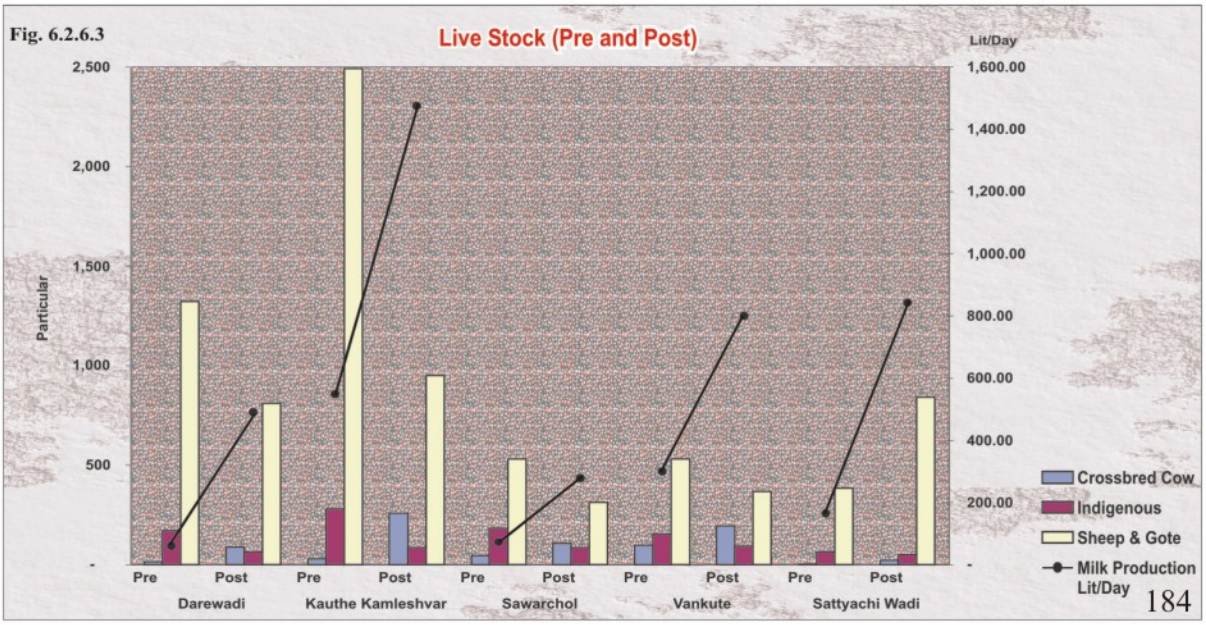


Fig. 6.2.6.3



It is observed that in Mendhvan, Kumbharwadi, Darewadi, Sattyachiwadi, Sawarchol, Karule WDPs villages the main occupation of population from the watershed area was rearing of Sheep before the completion of the WDP. The people used to take the flocks of Sheep for grazing inside the village during the rainy seasons and migrate to the neighboring villages for Sheep rearing in the summer months. But, because of the implementation of the programme there was increase in the availability of Grass fodder from crop cultivation and hence the migration of Sheep was totally stopped.

6.2.7 : NUMBER OF WELLS & WATER TABLE

Table 6.7 - Comparative Analysis of the WDP's
Number of Wells & Water Table

Table 6.2.7.1 : Number of Wells & Water Table

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	No. of Wells	41	91	27	83	46	83	114	165	81	107
2	Avg. depth of water table below G. L. (mtr)	5.40	3.20	5.90	3.90	7.20	6.10	6.80	3.20	5.60	3.50

(Contd.)

Table 6.2.7.2 : Number of Wells & Water Table

Sr.	Particular	Malegaon Pathar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	No. of Wells	19	62	54	179	96	160	78	103	88	130
2	Avg. depth of water table below G. L. (mtr)	5.85	3.00	3.84	3.11	8.56	6.90	6.10	3.00	5.60	3.00

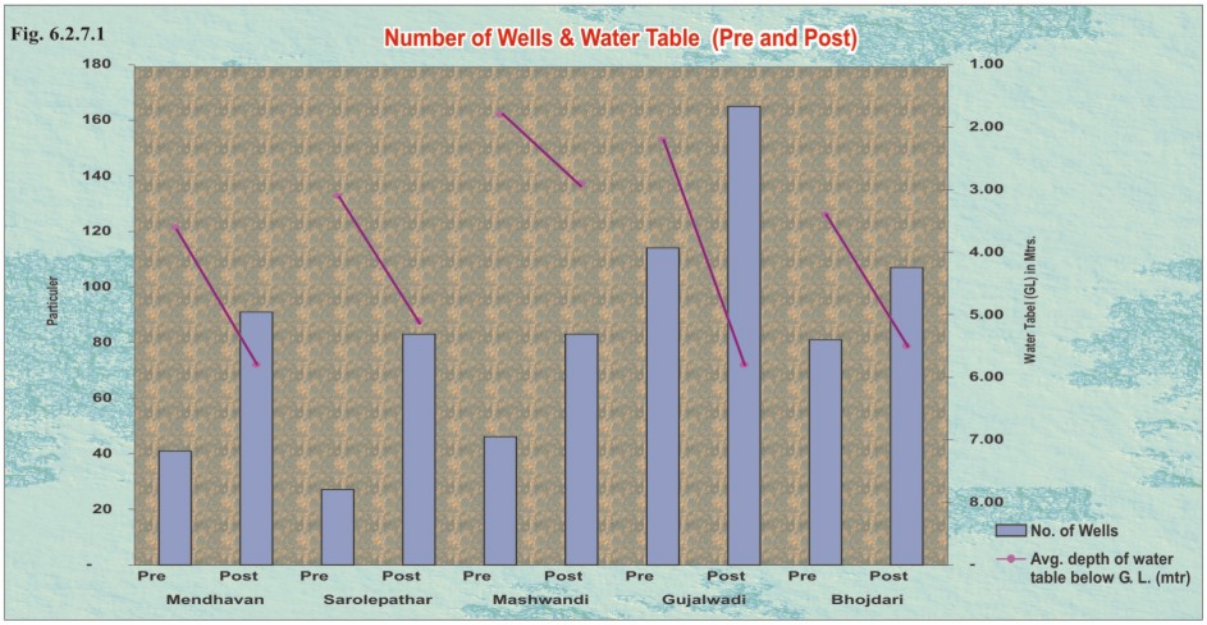
(Contd.)

Table 6.2.7.3 : Number of Wells & Water Table

Sr.	Particular	Darewadi		Kauthe Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	No. of Wells	18	40	236	302	85	118	42	82	19	26
2	Avg. depth of water table below G. L. (mtr)	6.50	3.10	5.80	2.50	3.78	1.07	5.56	3.50	5.90	2.90

Source – Field work.

Fig. 6.2.7.1



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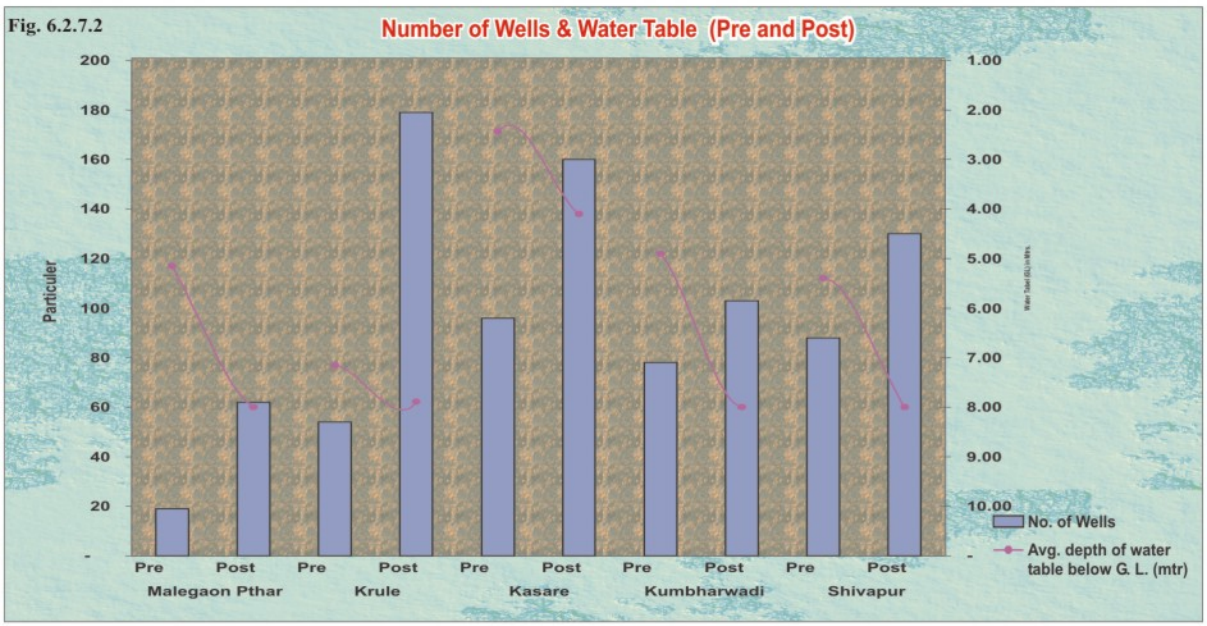


Fig. 6.2.7.3

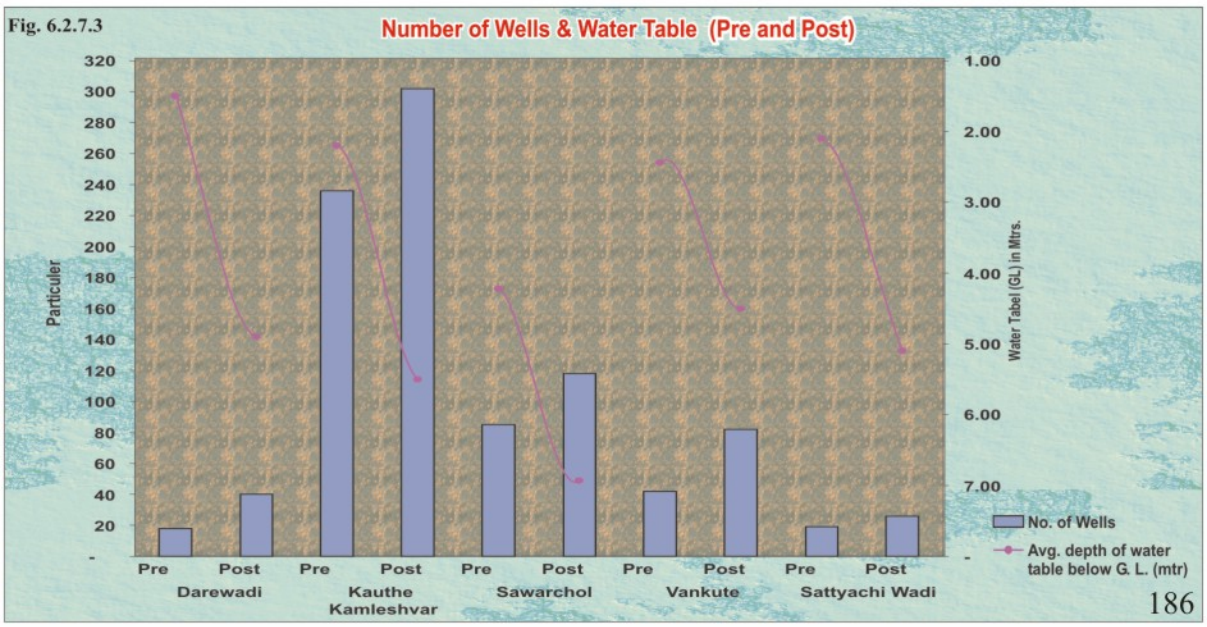


Table 6.2.7 shows number of wells & avg. depth water table below G.L. (Mtr.) for fifteen WDP's. Table 6.7 indicates that there has been increase in number of wells in WS area. After the implementation of the WDP, wells increased from 150 to 302, 26 to 150 in Kauthe Kamleshwar, Sawarchol, Karule, Kasare, Gunjalwadi, Shivapur, Bhojdari, Kumbharwadi, Medhvan, Sarole Pathar, Mhasvandi, Malegaon Pathar, Darewadi & Sattyachiwadi WDP's respectively.

It is observed that the water level of the wells was very low before the implementation of the WDP's. The wells were either full dry or with a water table below Ground Level (G.L) from 3.00 to 8.56m in Kasare, Mhasvandi, Kauthe Kamleshwar, Kumbharwadi, Darewadi, Gunjalwadi, Bhojdari, Sarole Pathar, Sattychiwadi, Vankute, Malegaon Pathar, Shivapur & Karule WDP's respectively. After implementation of WDP's there was increase in number of wells and water table below G. L. from 5.80 to 6.90 m., 1.07 to 3.90m. in Kasare, Mhaswandi, Malegaon Pathar, Sarole Pathar, Bhojdari, Vankute, Karule, Shivapur, Darewadi, Sattychiwad & Savarchol WDP's respectively.

Different Soil and water conservation activities performed under WDP's could help in recharging of the wells in the WDP's area. Construction works like check dam, Nalabunds, percolation tank and C.C.T. work proved helpful for increasing water level in wells. Some thumb rules and witnesses observed increase in water level, in existing wells. Water flow from stream / nallas because free for suspended sediment concentration because of silting in gully plugs, bunds and C.C.T.

6.2.8 : AGRI EMPLOYMENT & AGRI WAGE RATE

Table 6.2.8 - Comparative Analysis of the WDP's

Table 6.2.8.1 : Agri Employment (Monthly / Yearly) & Agri Wage Rate

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Agri Employment (Monthly / Yearly)	3-4 Month	9-10 Month	3-4 Month	9-10 Month	3-4 Mon.	7-8 Mon.	3-4 Mon.	8-9 Month	3-4 Month	9-10 Month
2	Agri Wage Rate (Rs.)	25-30	55-65	20-30	60-70	30-40	60-70	35-40	55-60	30-40	60-70

(Cond.)

Table 6.2.8.2 : Agri Employment (Monthly / Yearly) & Agri Wage Rate

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Agri Employment (Monthly / Yearly)	3-4 Mon.	9-10 Mon.	3-4 Mon.	8-9 Mon.	3-4 Mon.	8-9 Mon.	3-4 Mon.	9-10 Mon.	3-4 Mon.	9-10 Mon.
2	Agri Wage Rate (Rs.)	40-45	60-65	25-30	45-50	30-40	50-55	35-40	60-70	20-25	50-55

(Cond.)

Table 6.2.8.3 : Agri Employment (Monthly / Yearly) & Agri Wage Rate

Sr.	Particular	Darewadi		K. Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Agri Employment (Monthly / Yearly)	3-4 Mon.	9-10 Mon.	3-4 Mon.	9-10 Mon.	3-4 Mon.	8-9 Mon.	3-4 Mon.	9-10 Mon.	3-4 Mon.	7-8 Mon.
2	Agri Wage Rate (Rs.)	20-30	40-50	30-35	55-60	20-25	40-45	35-40	60-70	20-25	40-45

Source - Filed Work.

Table 6.2.8 shows comparative agri employment and agri wage rate increase / decrease in fifteen WDP's . Table 6.8 indicate that during the pre WDP's period agri employment was available for 03 to 04 month in a year in all fifteen WS area. Earlier 60% to 70% of villagers were fully employed on their own farm. At present some families from near by villages have settled in these village and agricultural labours from surrounding area could find jobs. Some villagers migrated to Sangamner, Nashik, Mumbai, Pune Cities and were engaged in unskilled job there. Some people were working under EGS (Employment Guarantee Scheme) in Surrounding area.

During pre watershed period the daily agri wage rates were low i.e. Rs. 20/- for female & 25/- for male in Sattyachiwadi, Sawarchol., Darewadi, Shivapur, Karule, Sarole Pathar, WDP's respectively & Rs. 30/- for female & Rs. 35/- for male in Mendhavan, Mhasvandi, Gunjalwadi, Bhojdari, Kauthe Kamleshwar, Kasare, Kumbharwadi & Malegaon Pathar WDP's respectively.

After the implementation of the WDP's agri employment was available for 09 to 10 month, & 07 to 09 month in Medhvan, Sarole Pathar, Bhojdar, Shivapur, Kumbharwadi ,Malegaon Pathar, Darewadi, Kauth Kamleshwar, Mhasvandi, Gunjalwadi, Kasare, Karule, Savarchol & Sattyachiwadi WDP's respectively.

It is observed that the Agri wage rates increased to Rs. 65/- for Female & Rs. 70/- for Male in Medhvan, Bhojdari, Mhasvandi, Sarole Pathar, Kauthe Kamleshwar, Malegaon Pathar WDP's respectively & Rs. 50/- for Female & Rs. 55/- for Male in Darewadi, Sattychiwadi, Savarchol, Vankute, WDP's respectively. After implementation of WDP's there was increase in Agri employment & Agri wage rates. Villagers altered there land use, started growing new cash crop adopted new package of inputs for cultivation crops which resulted in increased Agriculture production. This implied the use of additional investment, but they successfully arranged it for themselves.

6.2.9 : LAND VALUE (prevailing values per acre)

Table 6.2.9 – Comparative Analysis of the WDP's

Table 6.2.9.1 : Land Value

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Cropped Land(Rs.)	45000	125000	25000	110000	15000	80000	12000	70000	15000	80000
2	Waste Land (Rs.)	7500	30000	10000	45000	5000	45000	9000	40000	6000	35000

Table 6.2.9.2 : Land Value

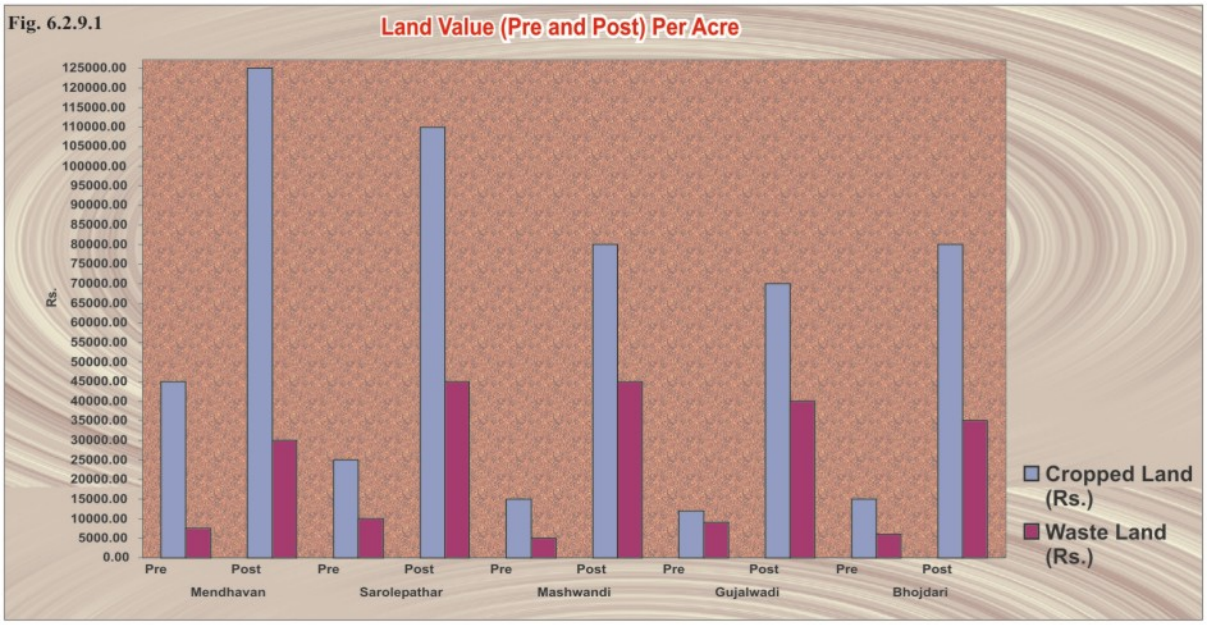
Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Cropped Land (Rs.)	25000	95000	15000	55000	20000	130000	15000	65000	45000	130000
2	Waste Land (Rs.)	40000	38000	8000	30000	10000	60000	4000	18000	8000	30000

Table 6.2.9.3 : Land Value

Sr.	Particular	Darewadi		K. Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Cropped Land (Rs.)	16000	70000	30000	90000	26000	60000	38000	135000	16000	55000
2	Waste Land (Rs.)	3500	17000	7500	40000	6000	19000	8000	35000	6000	18000

Source – Filed work.

Fig. 6.2.9.1



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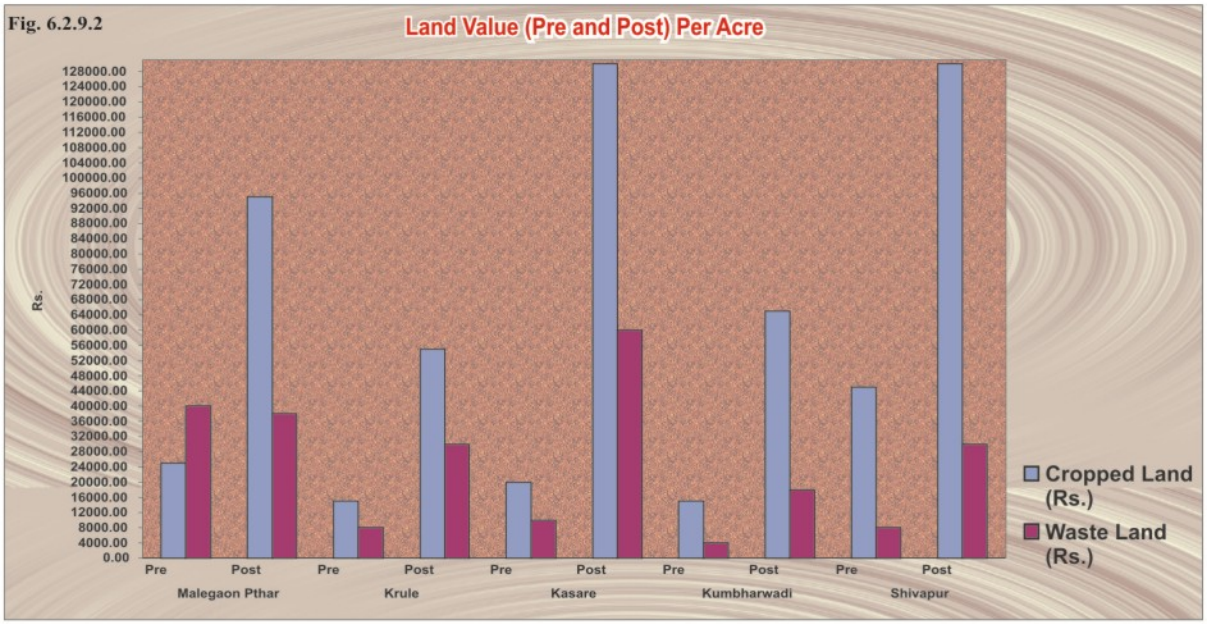


Fig. 6.2.9.3

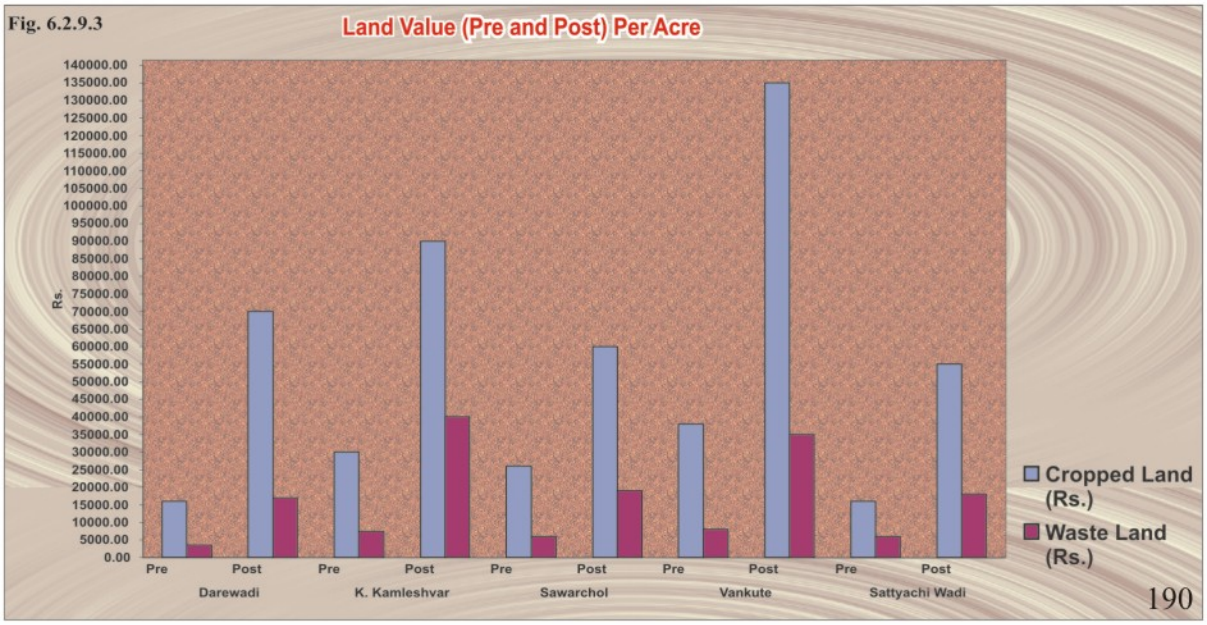


Table 6.2.9 shows comparative land value of cropped land and waste land rate increase / decrease in fifteen WDP's. Table 6.9 indicates that in the pre WDP's period land value per acre of cropped land was Rs. 30,000 to Rs. 45000/- and Rs. 15000/- to Rs. 30000/- in Mandhavan, Sarole Pathar, Mhasvandi, Kauthe Kamleshwar, Vankute WDP's respectively. Land value per acre of waste land was Rs. 8000/- to Rs. 10000/- and Rs. 3500/- to Rs. 7000/- in Savarchol, Kasare, Karule, Gunjalwadi, Darewadi, Sattyachiwadi & Kumbharwadi WDP's respectively.

Earlier Villagers were not fully employed on their own farm, some villagers settled in neighbouring Agricultural villages. Labours from surrounding area could find job. Some villagers migrated in other areas / a city at that time because of traditional cultivation method and traditional cropping patterns production was very low. Well water level was low. Milk production was low in that period cropped land value and wasteland value were low.

After the implementation of WDP's the per acre land value of cropped land continuously increased from Rs. 100000/- to Rs. 130000/- and from Rs. 55000/- to 100000/- in Kasare, Shivapur, Sarole Pathar, Medhavan, Kauthe Kamleshwar, Malegaon Pathar, Bhojdari, Mhaswandi and Sattyachiwad WDP's respectively, per acre land value of wasteland increased from Rs. 50000/- to Rs. 60000/-, Rs. 30000/- to Rs. 50000/- in Kasare, Sarole Pathar, Mhasavandi, Malegaon Pathar, Kauthe Kamleshwar, Gunjalwadi, Bhojdari, Karule, Kumbharwadi & Darewadi WDP's respectively.

After implementation of WDP's there was increase in land value because farmers were required to alter land use, leveling the land, adopt the new cultivation technology, use of HYV seeds, fertilizers. There was the increase in Agri production green fodder, Livestock, Milk production. Water table also increases in WDP's. The standard of living improved. In these villages various facilities like health, Education, Environmental, sanitation increased, Because of all these developments the land value increased in WDP's.

6.2.10 : GROWTH OF SERVICE SECTOR UNIT

Table 6.2.10 - Comparative Analysis of the WDP's

Growth of Service Sector Unit

Table 6.2.10.1 : Growth of Service Sector Unit

Sr.	Particular	Mendhavan		Sarolepathar		Mashwandi		Gujalwadi		Bhojdari	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Tractor	1	14	1	5	1	5	0	1	0	2
2	Transport Vehicles	0	6	0	12	0	2	0	1	0	2
3	Motor Cycle	1	25	1	235	1	21	3	28	4	32
4	Bullock card	36	20	65	52	32	11	23	17	40	12
5	Carpenter Unit	1	1	3	3	1	2	1	2	1	2
6	Tailoring Unit	1	2	1	6	0	2	0	3	0	2
7	Grocery Shop	1	3	3	8	1	2	1	5	1	2
8	Hotel (Tea Stall)	1	3	0	2	0	3	0	8	0	2
9	Flour Mills	1	2	1	4	1	1	0	5	0	1
10	Television	6	7	18	208	1	47	10	65	12	135
11	Threshers	0	3	1	3	0	2	0	1	0	4
12	Indivisal Latrines	1	37	5	70	0	73	2	32	0	12
13	Kitchen Garden	0	35	0	10	0	30	0	7	0	93

(Cond.)

Table 6.2.10.2 : Growth of Service Sector Unit

Sr.	Particular	Malegaon Pthar		Krule		Kasare		Kumbharwadi		Shivapur	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Tractor	0	1	1	5	1	6	0	0	1	6
2	Transport Vehicles	0	1	1	4	1	4	0	1	0	3
3	Motor Cycle	2	28	20	85	20	102	2	13	8	40
4	Bullock card	28	7	25	5	38	25	18	9	48	32
5	Carpenter Unit	1	2	1	2	1	2	1	1	1	0
6	Tailoring Unit	1	4	1	2	1	1	1	1	0	0
7	Grocery Shop	1	1	1	3	1	4	1	2	1	1
8	Hotel (Tea Stall)	0	0	0	3	0	1	0	1	0	0
9	Flour Mills	1	2	1	2	1	1	1	1	0	1
10	Television	0	15	25	200	22	120	3	34	10	122
11	Threshers	0	0	0	2	1	4	0	0	0	3
12	Indivisal Latrines	0	25	12	50	5	25	0	12	13	26
13	Kitchen Garden	2	21	1	4	2	20	2	8	0	8

Cond.)

Table 6.2.10.3 : Growth of Service Sector Unit

Sr.	Particular	Darewadi		K. Kamleshvar		Sawarchol		Vankute		Sattyachi Wadi	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	Tractor	0	1	2	17	0	1	0	1	0	0
2	Transport Vehicles	0	2	1	10	0	2	0	6	0	0
3	Motor Cycle	2	126	30	75	6	15	9	30	0	2
4	Bullock card	18	9	80	20	20	7	38	13	2	10
5	Carpenter Unit	1	1	2	3	0	0	1	2	0	0
6	Tailoring Unit	1	1	2	3	0	0	1	2	0	0
7	Grocery Shop	1	1	2	4	1	2	4	4	0	1
8	Hotel (Tea Stall)	0	1	0	2	0	1	0	2	0	0
9	Flour Mills	1	1	1	2	1	2	1	2	0	0
10	Television	3	76	5	30	0	35	20	100	2	20
11	Threshers	0	1	0	5	0	1	0	1	0	0
12	Indivisal Latrines	0	138	0	80	0	32	0	35	0	1
13	Kitchen Garden	0	38	0	10	0	10	0	6	0	2

Source – Field Work.

Table 6.2.10 shows comparative growth services sector unit for fifteen WDPs. Table 6.2.10 indicates that in the Pre WDPs period service sector unit was very low & almost negligible. Bullock card sector unit was large at that period. During the Pre WDP's period Bullock card sector unit was large i.e. from 52 to 80 & 02 to 50 in Sarole Pathar, Bhojdari, Kasare, Medhavan, Mhasavandi, Gunjalwadi, Malegaon Pathar, Shivapur, Kauthe Kamleshwar, Vankute, Savarcol, Kumbharwadi WDPs. After the implementation of the WDPs, growth in the primary sector of economy in these villages led to growth in number of service sector units. Various units, catering to transport of agricultural products facilitating in agricultural operation, and processing of agricultural produce were establish in these villages. Tractors, Thresher, Transport Vehicles, Motor Cycles were purchased by Villagers and were maintained by them for the above purpose. Grocery shop, Hotel, (Tea Stall), Carpenter unit, Tailoring unit, Flour mills were the other units that were maintained at village level for which the villagers earlier had to depend on other villages. Promotion of these units provided additional employment locally.

The assets position had also increased. People spent money on housing, entertainment (Radio & TV), mobility (cycle & motor cycle) etc. Other changes observed in these villages, were in enhancement of educational, health, environmental sanitation, individual latrines, kitchen garden and public hygiene facilities. Better housing and layout for settlement, adequate drinking water, availability of soak pits,

Fig. 6.2.10.1

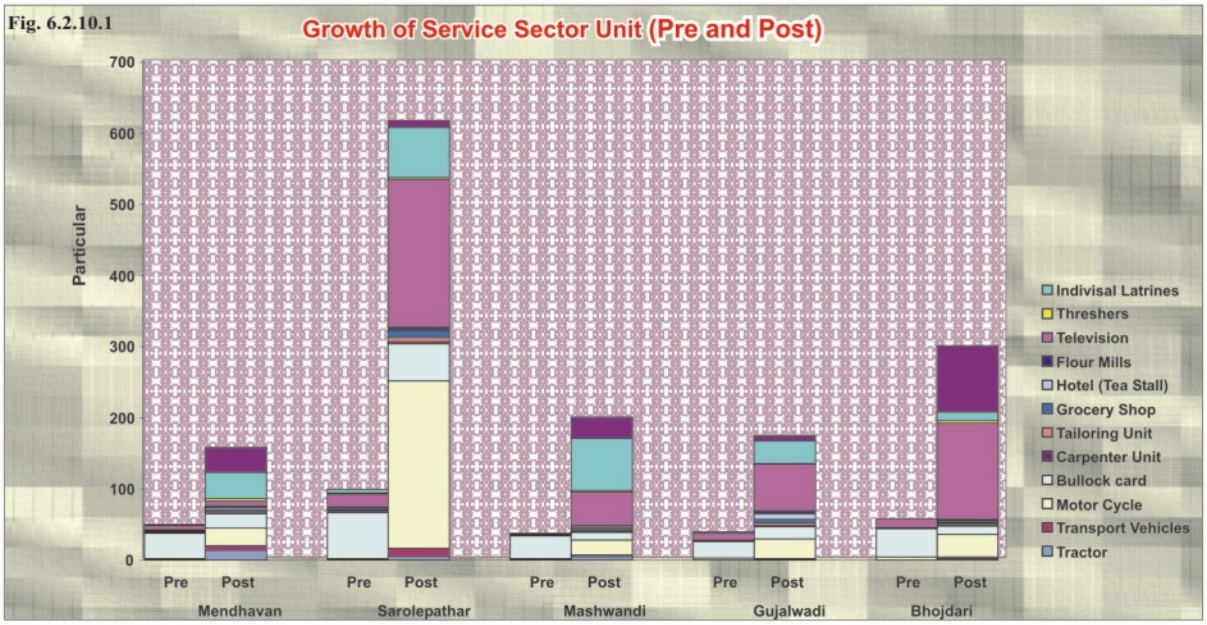


Fig. 6.2.10.2

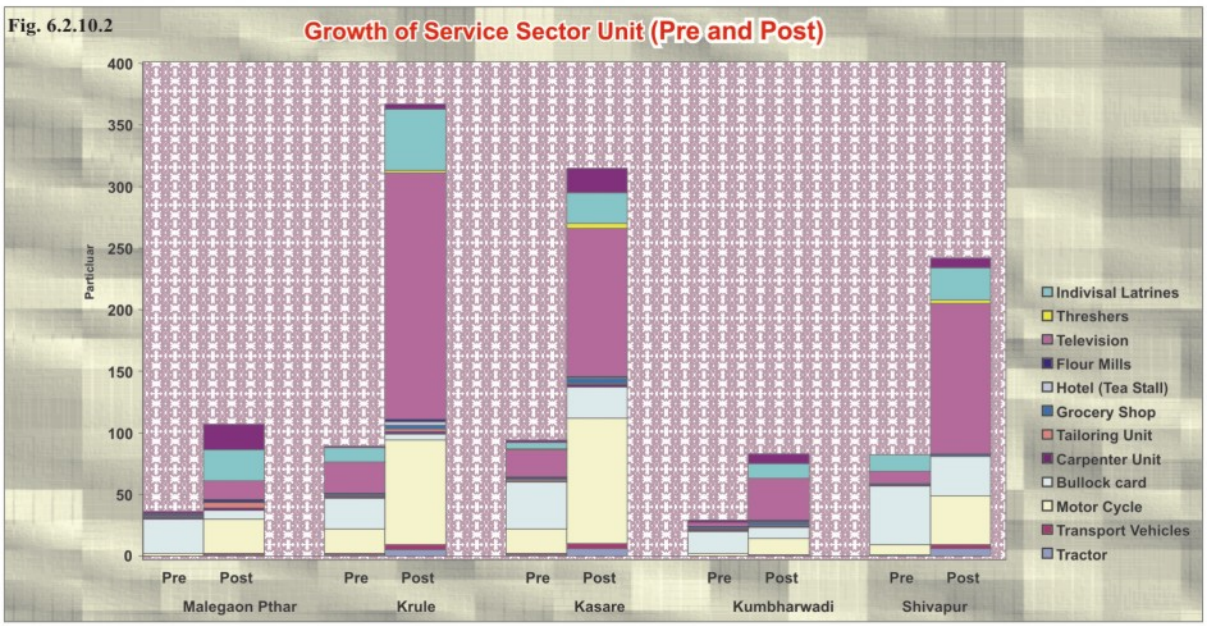
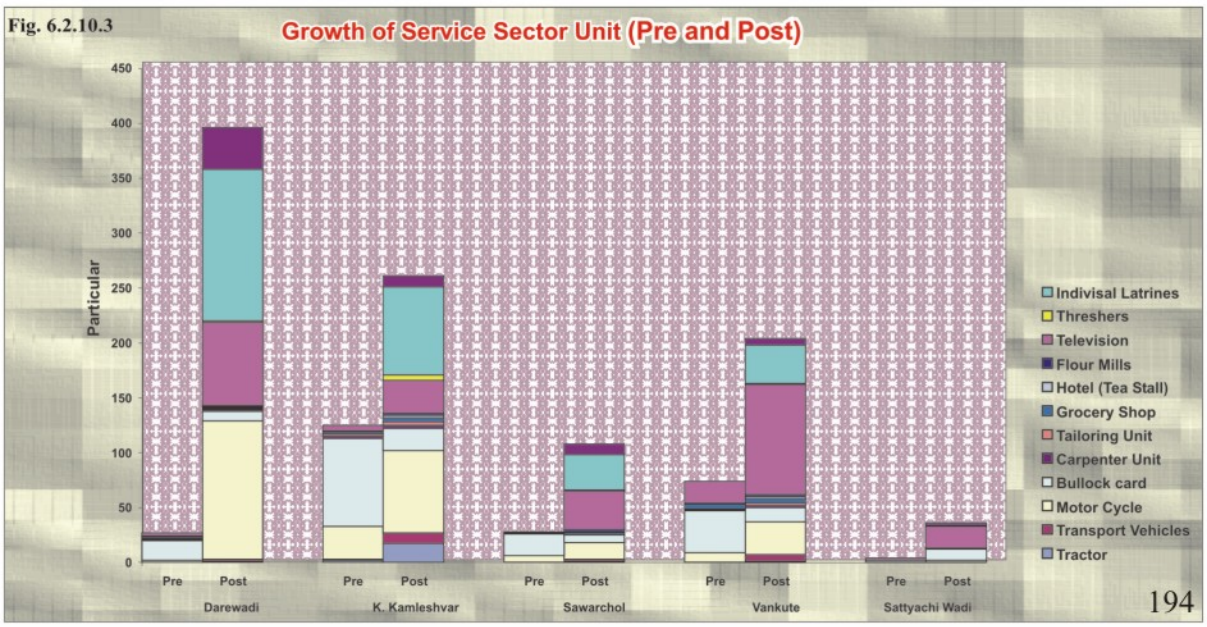


Fig. 6.2.10.3



goober gas plants, growth in agricultural, horticulture social and agro forestry, animal husbandry, dairy farming and service sector unit has led to drastic increase in employment opportunities and income. This has substantially improved the standard of living of the people in Medhvan, Sarole Pathar, Mhasvandi, Gunjalwadi, Bhojdari, Karule, Kasare, Darewadi, Kumbharwadi, Shivapur, Malegaon Pathar, Kauthe Maleshwar, Vankute & Sawarchol WDPs villages.

6.2.11 : SHG STATUS OF WDPS

Table 6.2. 11 Comparative Analysis of WDPs

SHG Status of WDPs

Sr.	Particular	Medha-van	Sarole Pathar	Mahas-wandi	Gunjal-wadi	Bhoj-dari	Malegaon Parthar	Karule	Kasare	K.-wadi	Shivapur	Dare-wadi	K. Kamlesh-was	Sawar-chol	Van-kute	Satty-chiwadi
1	Number of SHG	04	08	06	06	05	04	06	04	04	4	5	4	6	9	5
2	Member of SHG	45	144	160	150	100	92	74	93	117	100	110	118	70	150	74
3	Total Saving	60000	184560	206124	185100	117600	66360	152500	112610	88740	82800	139500	90390	194423	211434	104292
4	Loan	55500	161000	199000	178000	114000	62400	151000	107000	86000	81000	135500	84500	191000	207300	102700

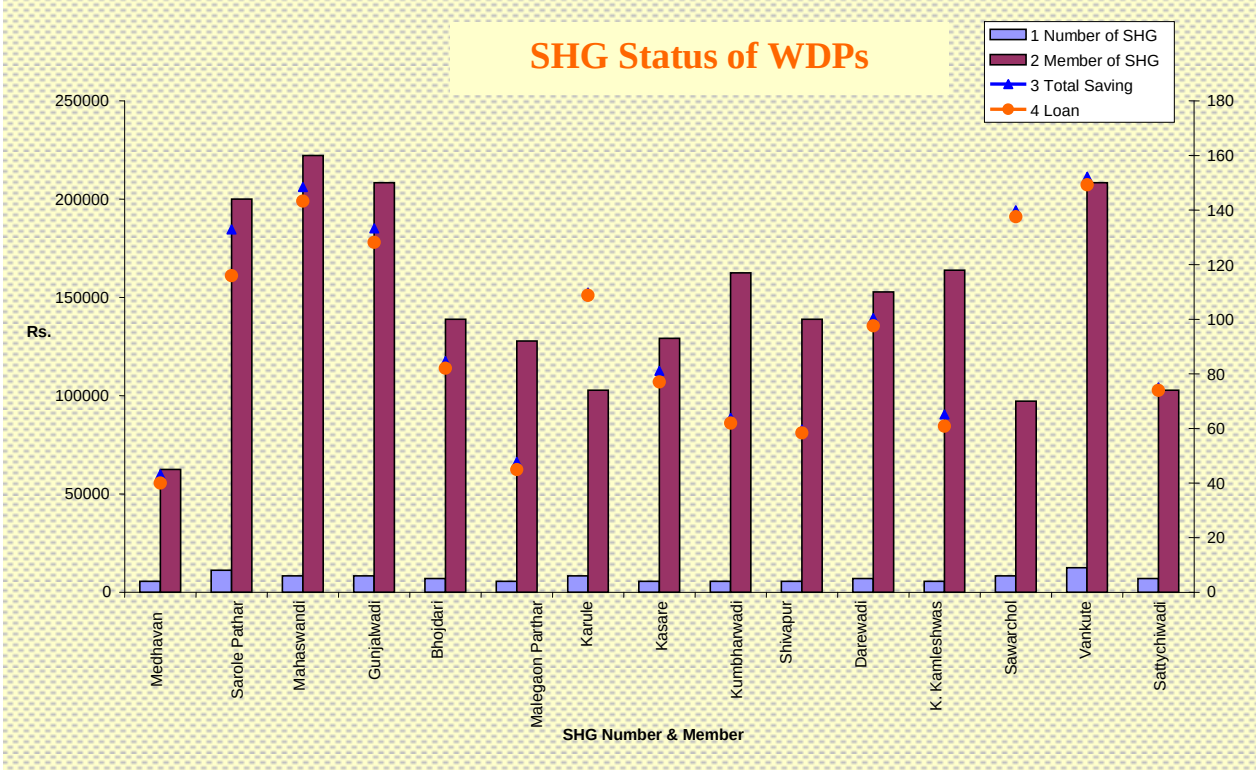


Fig. 6.2.11 : Comparative Analysis of WDPs, SHG Status of WDPs

SHG Status of WDPs Comparative analysis of Self Help Group (SHG) status in fifteen WDPs. Is shown in Table 6.2.11 indicates that during the pre WDPs period SHG was not available. During post watershed period number of SHG came into existence in WDP project areas. i.e. 04 to 06 and 05 to 09 in Kasare, Medhvan, Sarole Pathar, Bhojdari, Karule, Sawarchol, Sattychiwadi & Vankute. Member of SHG are ranging from 45 to 92 and 93 to 150 in Medhvan, Swarchol, Sattychiwadi, Karule, Savarchol, Shivapur, Bhojdari, Sarole Pathar, Kumbarwadi, Kauthe Kamleshwar & Mhasavandi WDPs.

Saving group were organized during the year involving women from fifteen WSD projects. Their saving is from Rs. 60000 to 100000/- and 110000 to 200000/- in Medhavan, Shivapur, Kumbharwadi, Kauthe Kamleshwar, Sattychiwadi, Vankute, Karule, Kasare, Sarole Pathar, Gunjalwadi, Darewadi, Malegaon Pathar and Mhasvandi WDPs.. These group have been linked with banks in order to build the capacity of Self Help Group.

6.2.12 : LOAN UTILIZATION

Table 6.12 Comparative Analysis of WDPs,

L) Loan Utilization

Sr.	Loan Utilization	Medhavan	Sarole Pathar	Mahas-wandi	Gunjal-wadi	Bhojdari	Malegaon Parthar	Karule	Kasare
1	Dairy Farming	10000	38000	19000	30000	25000	18000	25000	22000
2	Land Development	13000	32000	0	35000	10000	0	0	26000
3	Seed, Fertilizer	6000	3000	30000	10000	0	10000	30000	8000
4	Agri Equipment	9000	0	8000	0	19000	0	26000	0
5	Family Function	5000	15000	34000	30000	20000	12000	10000	20000
6	Education	5000	20000	35000	19000	22000	10000	0	10000
7	Business	0	27000	28000	25000	10000	8400	0	15000
8	Health	4000	9000	35000	22000	8000	0	7000	0
9	Hot Water Chula	3500	12000	10000	7000	0	4000	0	6000
10	Drip / Sprinkler	0	0	0	0	0	0	28000	0
11	Solar Lamp	0	5000	0	0	0	0	0	0
12	Grinder Machine	0	0	0	0	0	0	25000	0
13	Salon Parlor	0	0	0	0	0	0	0	0
		55500	161000	199000	178000	114000	62400	151000	107000

Sr.	Loan Utilization	Lumbar-wadi	Shivapur	Darewadi	K.Kamlesh-was	Sawarchol	Vankute	Sattychi-wadi
1	Dairy Farming	21000	20000	25000	18000	38000	13000	16000
2	Land Development	18000	19000	25500	9000	28000	0	28000
3	Seed, Fertilizer	3000	4000	0	9000	11000	22000	10000
4	Agri Equipment	0	0	0	7500	32000	32000	4700
5	Family Function	10000	15000	12000	12000	23000	12000	15000
6	Education	16000	14000	20000	16000	8000	8000	10000
7	Business	0	0	18000	0	10000	0	0
8	Health	13000	6000	18000	8000	7000	10000	15000
9	Hot Water Chula	5000	3000	7000	5000	6000	18000	4000
10	Drip / Sprinkler	0	0	10000	0	0	43000	0
11	Solar Lamp	0	0	0	0	5000	31000	0
12	Grinder Machine	0	0	0	0	23000	13000	0
13	Salon Parlor	0	0	0	0	0	5300	0
		86000	81000	135500	84500	191000	207300	102700

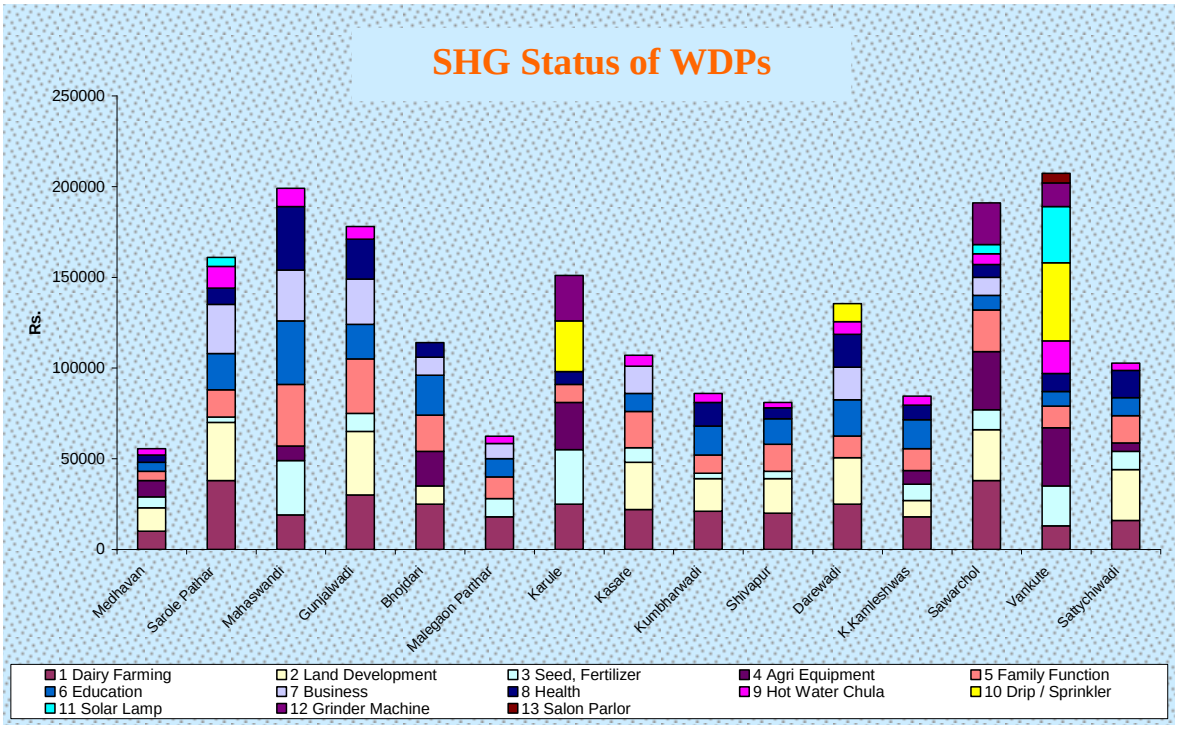


Fig. 6.2.12 : Comparative Analysis of WDPs, Loan Utilization

Table 6.2.12 shows comparative analysis of loan utilization of fifteen WDPs. Their loan utilization is from Rs. 55500/- to Rs. 100000/- and Rs.100000/- to Rs.200000/-. This loan was utilized for Dairy farming, Land development, Seeds, Fertilizer, Agri Equipment, Family function such as marriage, house construction, child education, business, bangle selling shop, tailoring, grocery shop, poultry, health, solar lamp, Hot water Chula, Grinder Machine Drip and Sparkler Irrigation, etc. in Medhavan, Malegaon Pathar, Kasare, Shivapur, Kumbharwadi, Bhojdari, Darewadi,

Karule, Sarole Pathar, Gunjalwadi, Mhaswandi, Savarchol, Sattychiwadi & Vankute WDPs project. The SHG's are found very useful in generating social awareness, responsibilities and well projected social life.

SHG : The women in Watershed area more motivated than Man. The Mahila Mandal formed Women's SHG operating in Fifteen Watershed. Women have a measure role in rural participation in all aspect of the development of the village community. Trainings and various workshop are also organized to develop women's leadership. The Women participate in income generation activities, Social Education, Health Promotion Activities, Kitchen Garden, Nursery, Dairy, Poultry rearing Cows and Goats, Flour mill, Grocry Shop, Stationary Shop. Exposure visits, which have helped them in building up their capacities, skills and knowledge about the watershed work. Quality of life enhancing activities like improved cooking devices, Bio Gas plants, Non-formal education, Latrines, Soak Pits, Health Camps were under taken.

6.2.13 : WATERSHED DEVELOPMENT TECHNOLOGY

Table 6.2.13 - Comparative Analysis of the WDPs

Watershed Development Technology (Work Carried Out)

Sr.	Particular	Mendhavan	Sarolepathar	Mashwandi	Gujalwadi	Bhojdari
1	Watershed Development Technology (Work Carried Out)	- C.C.T. - Gullyplugs - Gabions - Nalabund - Check Dam - Agro Forestry - Drip Irrigation	- C.C.T. - Stone bunding - Farm bunding - Gullyplugs - Gabions - Nalabund - Check Dam - Horticulture - Farm Pond - Afforestation	- C.C.T. - Gullyplugs - Gabions - Nalabund - Check Dam - Agro Forestry - Horticulture	- C.C.T. - Gullyplugs - Gabions - Farm bunding - Stone bunding - Check Dam - Afforestation	- C.C.T. - Stone bunding - Farm bunding - Gabions - Nalabund - Check Dam - Afforestation - Parculation tank

(Cond.)

Sr.		Malegaon Pthar	Krule	Kasare	Kumbharwadi	Shivapur
2	Watershed Development Technology (Work Carried Out)	- C.C.T. - Farm bunding - Stone bunding - Gullyplugs - Gabions - Gabions - Check Dam - Horticulture - Afforestation	- C.C.T. - Farm bunding - Gullyplugs - Gabions - Check Dam - Afforestation	- C.C.T. - Farm bunding - Afforestation - Horticulture - Gullyplugs - Nalabund	- C.C.T. - Farm bunding - Afforestation - Gullyplugs - Gabions - Check Dam	- C.C.T. - Farm bunding - Afforestation - Horticulture - Gullyplugs - Check Dam

(Cond.)

Sr.		Darewadi	K. Kamleshvar	Sawarchol	Vankute	Sattyachi Wadi
3	Watershed Development Technology (Work Carried Out)	- C.C.T. - Farm bunding - Stone bunding - Afforestation - Horticulture - Gullyplugs - Gabions - Check Dam - Drip Irrigation	- C.C.T. - Farm bunding - Afforestation - Gullyplugs - Nalabund	- C.C.T. - Farm bunding - Stone bunding - Afforestation - Gullyplugs - Gabions - Check Dam	- C.C.T. - Farm bunding - Afforestation - Gullyplugs - Gabions	- C.C.T. - Farm bunding - Afforestation - Gullyplugs - Nalabund

Source : NGO & VWC Record

Table 6.2.13 shows comparative use of Watershed Development Technology for fifteen WDPs. There were striking similarities in the package of new Watershed Development Technology adopted at the fifteen projects. Barren hilly land with high slope, covered only bushes were treated with contour bundings and grass, tree plantation. Community pasturelands and other private wasteland, were treated by continuous contour trenches (C.C.T) and covered under tree plantation and grass land development or were utilized for contour cultivation. Relatively more fertile lands located downsides near the main stream were put under diversified crop cultivation and plantation of horticultural.

The major area treatment included trenching, farm bunding, stone bunding and gully plugging. All these work have been satisfactorily carried by the NGOs in the watershed areas. Gully plugs, Nala Bund, Check Dam, C.C.T. work has substantially reduced the run off velocity of water and soil and has increased its percolation for water harvesting, (recharging of ground water) and water conservation measures have resulted in drastic increase in area under irrigation in Medhvan, Sarole Pathar, Darewadi, Bhojdari, Mhasvandi, Kumbharwadi WDPs.

This has improved retention of moisture in the fields and it has led to increase in productivity of crops. However in Sarole Pathar, Mhasvandi, Gunjalwadi, Darewadi, Kumbharwadi, Vankute, Malegaon Pathar though direct measure have not been taken for achieving this objective of equitable distribution of water the ban is imposed on direct lifting of water from water storage structures. There is ban on bore-wells in Sarole Pathar WS area.

Mahatma Phule Krishi Vidyapeeth (MPKV) located in Rahuri is about 70 KM away from Sangamner Takula WDPs area. This university has been established to

provide technical expertise and advice about particularly the dry, rainfed area of Central Mahareashtra. The NGOs has close links with the University and successfully arranges the meetings, Panlot Melawas, Field visits, Study Tours and Training for women. This University provides the demonstrations to the villagers about benefit of watershed through the process of "Seeing is Believing" T & V programme is much helpful to the farmers. Allotment of foundation plots for propogation of new seeds and imparting necessary technical guidance in respect of Agronomical practices may enhance the capability of these farmers for adoption of latest technology in the fields.

6.2.14 : NGO PLANNING & IMPLEMENTATION PROCESS

Table 6.14 - Comparative Analysis of the WDPs

NGO Planning & Implementation Process

Sr.	Particular	Mendhavan	Sarolepathar	Mashwandi	Gujalwadi	Bhojdari
1	Project Implementation Period	1990-91 to 1997-98 (7yrs)	1993-94 to 2000-01 (7Yrs)	1994-95 to 1999-00 (5Yrs)	1995-96 to 2001-02 (5yrs)	1994-95 to 2000-01 (6yrs)
2	Name of the NGO	Social Center	Nisargayan	S.B.S.S.Karkhana	Social Center	S.B.S.S.Karkhana
3	Funding Agencies	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha

(Cond.)

Sr.	Particular	Malegaon Pthar	Krule	Kasare	Kumbharwadi	Shivapur
1	Project Implementation Period	1994-95 to 2000-01 (6yrs)	1994-95 to 2001-02 (6yrs)	1994-95 to 2001-02 (6yrs)	1995-96 to 2001-02 (6yrs)	1995-96 to 2001-02 (6yrs)
2	Name of the NGO	Social Center	Social Center	S.B.S.S.Karkhana	WOTR	Social Center
3	Funding Agencies	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha

(Cond.)

Sr.	Particular	Darewadi	K. Kamleshvar	Sawarchol	Vankute	Sattyachi Wadi
1	Project Implementation Period	1996-97 to 2001-02 (5yrs)	1997-98 to 2004-05 (5 yrs)	2002-03 to 2007-08 (5yrs)	2002-03 to 2007-08 (5yrs)	2003-04 to 2007-08 (4yrs)
2	Name of the NGO	WOTR	Social Center	WOTR	WOTR	WOTR
3	Funding Agencies	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha	-G.T.Z -WOTR -Nabard -Govt. of Maha

Souce : NGO record

Table 6.2.14 shows comparative analysis of NGO, planning & implementation process of fifteen WDPs. The of leaders or non-government organization (NGO) voluntary agencies in these project were able to co-ordinate the efforts of various Government and voluntary agencies for making inputs in a focused manner resulting in watershed development in these village area.

NGO : Social center is the NGO working in Ahmednahar District for 25 years. The NGO has its head office at Ahmednagar and sub office at Sangamner the taluka place. The role of NGO for planning and implementation process was very crucial over the period of 6 to 7 years in the villages i.e. Medhavan (7 to 8Year), Gunjalwadi (5 to 6 years), Malegaon Pathar (6 to 7 year), Karule (6 to 7 years), Shivapur (6 to 7 year) and Kauthe Kamleshwar (5 to 6 years) was ascertained from the villagers.

Watershed organization Trust (WOTR) is leading NGO & has been working in Ahmednagr District for 20 years. The NGO has its Head Office at Ahmednagar and a Sub Office at Sangamner the taluka place. WOTR provides a technical support with 77 NGOs in the field of watershed development and related areas. IGWDP has been spread in all over India Fr. Herman Bacher founder of WOTR strongly felt that this place should be rejuvenated through watershed activities. WOTR treated the following WDPs and the project tretment period for Kumbharwadi was (6 to 7 year), Darewadi (5 to 6 year), Savarchol (5 to 6 year), Vankute (5 to 6 year), Sattaychiwadi (4 to 5 year).

Sangamner Bhag Sahakari Sakhar Karkkhana (S.B.S.S.K.) is the NGO working in Sangamenr Taluka for 30 years. Me. Bhausaheb Thorat was the founder of S B S S K NGO. This NGO treated some WDPs and the project treatment period for Mhaswandi was (5 to 6 year), Bhojdari (5 to 7 year), Kasare (6 to 7 year).

Nisargayan is the NGO working in Sangamner Taluka for 17 years. This NGO has been involved in trekking camps. Geographical Historical photo Exhibition of Sangamner & Akole Taluka, Bal Melawa. Prof. V. M .Shewale is the founder of Nisargayan NGO. Nisargayan NGO Treated Sarole Patharr (6 to 7 year), watershed development project.

Planning : The NGO created an awareness among the villagers regarding the water storage in Summer season and about migration for employment. The NGO helped the villagers in organizing the VWC, FPC, SHG and motivated it to undertake the activities of resource conservation in the villages. The NGO provided the necessary

technical, financial and organizational support needed for smooth implementation of various activities to the NGO helped the VWC, local Government Department and Agencies in order to secure their collaboration and support for successful and smooth implementation the project activities. The NGO has successfully motivated the villagers for undertaking various resource conservation (Soil and water) activities on their fields as well as organized them for achieving common Goals.

Funding Agencies : Apart from the Government agencies listed above various regional and international voluntary agencies contributed to these projects in terms of technical know-how, finance and even implementation in some cases. Significant international foreign funding agencies particularly those contributing in the initial stages were- Kreditanstalt fuer Wiederaufban (KFW-German Development Bank). Gesellechaff Fuer Technische Zusammenarbeit (GTZ-German Technical Co-Operation), Government of Germany (GOG), Govt. of India (GOI), National Bank for Agricultural and Rural Development (NABARD) and Govt. of Maharashtra (GOM).

The aid from voluntary agencies also helped them to modify the specifications and plug the loopholes for maintaining integration between the inputs, depending upon local conditions or situational changes in the project area.

Villagers receive guidance about modern irrigation system.

Changes in cropping pattern because of WDP

Hon. Hart Kohalar President of Germanay Mrs Eva Kohalar
Hon. Balasaheb Thorat Agri. Minister observing WDP at Darewadi

Exposure Visit Mr vilasrao Salunkhe Guiding the farmers of Villages about saving of water & water use.

Shivar feri one of the activity of WDP

Hon. P.C. Alexauder Chancellor, Govt of MS. And fa. Harman bakhar a visit to mendhven WS

6.2.15 : VILLAGERS OPINION ABOUT THE CHANGES IN TERRAIN FUTURES DUE TO EDP

Table 6.2.15- Comparative Analysis of the WSP
Villagers Opinion about the changes in Terrain Futures Due to EDP

Sr.	Statement	Medhavan (Sample 40)				Sarole P. (Sample 50)				Mhasvandi (Sample 35)				Gunjalwadi (Sample 55)				Bhojdari (Sample 45)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the soil texture is good?	10 (25.00)	30 (75.00)	24 (60.00)	16 (40.00)	14 (28.00)	36 (72.00)	33 (66.00)	17 (34.00)	12 (34.28)	23 (65.71)	29 (85.85)	06 (17.14)	09 (16.36)	46 (83.63)	41 (74.54)	14 (25.45)	16 (35.55)	29 (64.44)	24 (53.33)	21 (46.66)
2	Whether the fields are well drained?	12 (30.00)	28 (70.00)	28 (70.00)	12 (30.00)	29 (58.00)	21 (42.00)	35 (70.00)	15 (30.00)	20 (57.14)	15 (42.85)	27 (77.14)	08 (22.85)	10 (18.18)	45 (81.18)	47 (85.45)	08 (14.54)	40 (88.88)	05 (11.11)	42 (93.33)	03 (66.66)
3	Whether the depth of soil is adequate for crop production?	05 (12.50)	35 (87.50)	34 (85.00)	06 (15.00)	18 (36.00)	32 (64.00)	38 (76.00)	12 (24.00)	10 (28.57)	25 (71.42)	21 (60.00)	14 (40.00)	00.00 (00.00)	55 (100.00)	46 (83.63)	09 (16.36)	18 (40.00)	27 (60.00)	26 (57.77)	19 (42.22)
4	Whether the soil erosion has been checked?	09 (22.50)	31 (77.50)	34 (85.00)	06 (15.00)	06 (12.00)	44 (88.00)	42 (84.00	08 (16.00)	08 (22.85)	27 (77.14)	26 (74.28)	09 (25.71)	05 (09.09)	50 (90.90)	49 (89.09)	06 (10.90)	10 (22.22)	35 (77.77)	43 (95.55)	02 (4.44)
5	Whether the quality of soil has improved?	19 (47.50)	21 (52.50)	28 (70.00)	12 (30.00)	09 (18.00)	41 (82.00)	20 (40.00)	30 (60.00)	07 (20.00)	28 (80.00)	29 (85.85)	06 (17.14)	08 (14.54)	47 (85.45)	51 (92.72)	04 (07.27)	04 (08.88)	41 (91.11)	38 (84.44)	07 (15.55)
6	Whether the soil and water conservation measures have been taken in the field?	02 (05.00)	32 (95.00)	36 (90.00)	04 (10.00)	03 (06.00)	47 (94.00)	45 (90.00)	05 (10.00)	02 (65.71)	33 (94.28)	31 (88.57)	04 (11.42)	18 (32.72)	37 (67.27)	53 (96.36)	02 (03.63)	03 (66.66)	42 (93.33)	44 (97.77)	01 (22.22)

(Cond.)

Sr.	Statement	Karule (Sample 35)				Kasare (Sample 30)				Shivapur (Sample 40)				K. Kamleshwar (Sample 40)				Malegaon Pathar (Sample 35)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the soil texture is good?	10 (28.57)	25 (71.42)	16 (45.71)	19 (54.28)	11 (36.66)	19 (63.33)	21 (70.00)	8 (30.00)	16 (40.00)	24 (60.00)	28 (70.00)	12 (30.00)	12 (30.00)	28 (70.00)	24 (60.00)	16 (40.00)	12 (34.28)	23 (65.71)	29 (85.85)	06 (17.14)
2	Whether the fields are well drained?	06 (17.14)	29 (82.85)	17 (48.57)	18 (51.42)	14 (46.66)	16 (53.33)	25 (83.33)	5 (16.66)	18 (45.00)	22 (55.00)	27 (67.50)	13 (32.00)	09 (22.50)	31 (77.50)	18 (45.00)	22 (55.00)	20 (57.14)	15 (42.85)	27 (77.14)	08 (22.85)
3	Whether the depth of soil is adequate for crop production?	09 (25.71)	26 (74.28)	28 (80.00)	07 (20.00)	4 (13.33)	26 (86.66)	26 (86.66)	4 (13.33)	19 (47.50)	23 (57.50)	29 (72.50)	11 (27.50)	13 (32.50)	27 (67.50)	21 (52.50)	19 (47.50)	10 (28.57)	25 (71.42)	21 (60.00)	14 (40.00)
4	Whether the soil erosion has been checked?	07 (20.00)	28 (80.00)	30 (85.71)	05 (14.28)	9 (30.00)	21 (70.00)	23 (76.66)	07 (23.33)	04 (10.00)	36 (90.00)	21 (52.50)	19 (47.50)	05 (12.50)	35 (87.50)	36 (90.00)	04 (10.00)	08 (22.85)	27 (77.14)	26 (74.28)	09 (25.71)
5	Whether the quality of soil has improved?	09 (22.85)	27 (77.14)	30 (85.71)	05 (14.28)	24 (80.00)	06 (20.00)	28 (93.33)	02 (66.66)	10 (25.00)	30 (75.00)	25 (62.50)	15 (37.50)	10 (25.00)	30 (75.00)	32 (80.00)	08 (20.00)	07 (20.00)	28 (80.00)	29 (85.85)	06 (17.14)
6	Whether the soil and water conservation measures have been taken in the field?	04 (11.42)	31 (88.57)	32 (91.42)	03 (08.57)	03 (10.00)	27 (90.00)	26 (86.66)	04 (13.33)	05 (12.50)	35 (82.50)	33 (82.50)	07 (17.50)	03 (07.50)	37 (92.50)	38 (95.00)	02 (05.00)	02 (65.71)	33 (94.28)	31 (88.57)	04 (11.42)

(Cond.)

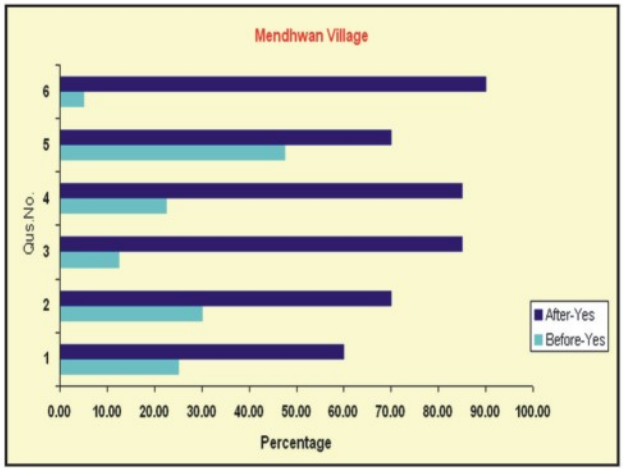
Sr.	Statement	Darewadi (Sample 40)				Kubharwadi (Sample 20)				Wankute (Sample 10)				Savarchol (Sample 20)				Sattyachiwadi (Sample 10)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the soil texture is good?	12 (30.00)	28 (70.00)	24 (60.00)	16 (40.00)	08 (40.00)	12 (60.00)	13 (65.00)	07 (35.00)	03 (30.00)	07 (70.00)	08 (80.00)	02 (20.00)	09 (45.00)	11 (55.00)	14 (70.00)	06 (30.00)	03 (30.00)	07 (70.00)	08 (80.00)	02 (20.00)
2	Whether the fields are well drained?	09 (22.50)	31 (77.50)	18 (45.00)	22 (55.00)	06 (30.00)	14 (70.00)	11 (55.00)	09 (45.00)	04 (40.00)	06 (60.00)	09 (90.00)	01 (10.00)	10 (50.00)	10 (50.00)	13 (85.00)	07 (15.00)	04 (40.00)	06 (60.00)	09 (90.00)	01 (10.00)
3	Whether the depth of soil is adequate for crop production?	13 (32.50)	27 (67.50)	21 (52.50)	19 (47.50)	10 (50.00)	10 (50.00)	17 (65.00)	03 (35.00)	05 (50.00)	05 (50.00)	08 (80.00)	02 (20.00)	12 (60.00)	08 (40.00)	16 (80.00)	04 (20.00)	05 (50.00)	05 (50.00)	08 (80.00)	02 (20.00)
4	Whether the soil erosion has been checked?	05 (12.50)	35 (87.50)	36 (90.00)	04 (10.00)	07 (35.00)	13 (65.00)	15 (75.00)	05 (25.00)	03 (30.00)	07 (70.00)	06 (60.00)	04 (40.00)	06 (30.00)	14 (70.00)	15 (75.00)	05 (25.00)	03 (30.00)	07 (70.00)	06 (60.00)	04 (40.00)
5	Whether the quality of soil has improved?	10 (25.00)	30 (75.00)	32 (80.00)	08 (20.00)	04 (20.00)	16 (80.00)	14 (70.00)	06 (30.00)	01 (10.00)	90 (90.00)	07 (70.00)	03 (30.00)	03 (15.00)	17 (85.00)	11 (55.00)	09 (45.00)	01 (10.00)	90 (90.00)	07 (70.00)	03 (30.00)
6	Whether the soil and water conservation measures have been taken in the field?	03 (07.50)	37 (92.50)	38 (95.00)	02 (05.00)	02 (10.00)	18 (90.00)	19 (95.00)	01 (05.00)	02 (20.00)	08 (80.00)	09 (90.00)	01 (10.00)	02 (10.00)	18 (90.00)	19 (95.00)	01 (05.00)	02 (20.00)	08 (80.00)	09 (90.00)	01 (10.00)

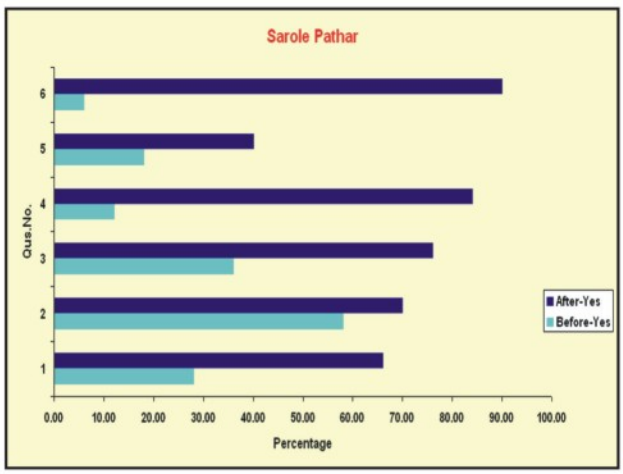
Source Field Work

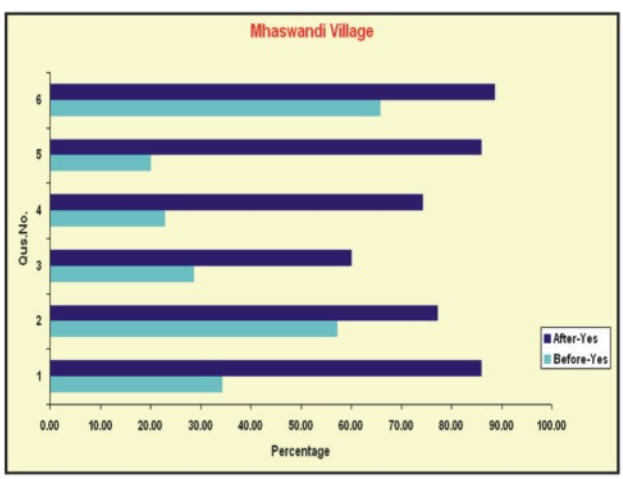
Fig. No. 6.2.15.1

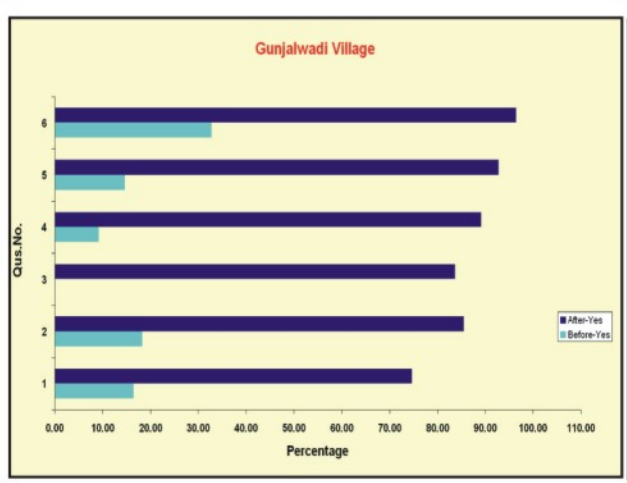
Villagers Opinion about the changes in Terrain Futures

Before & After 'Yes' Opinion

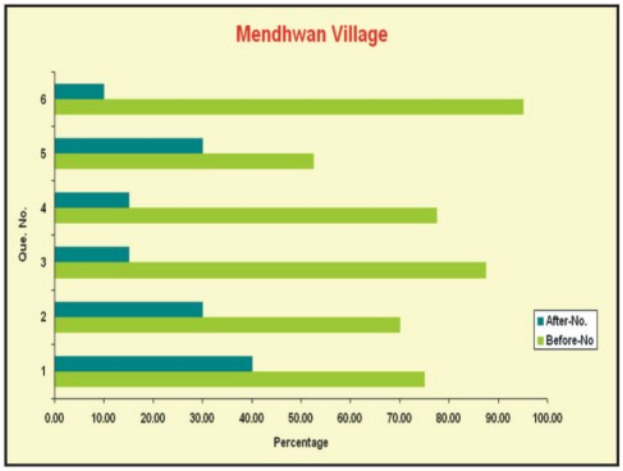


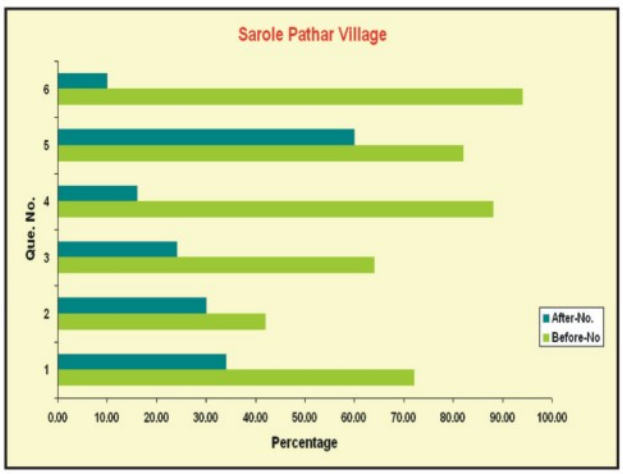


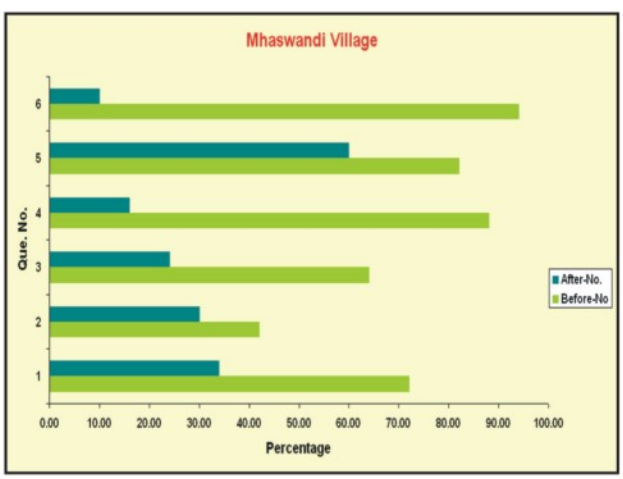




Before & After 'No' Opinion







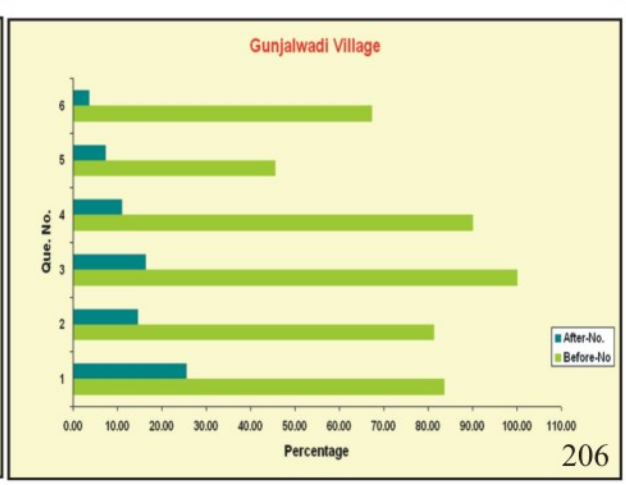
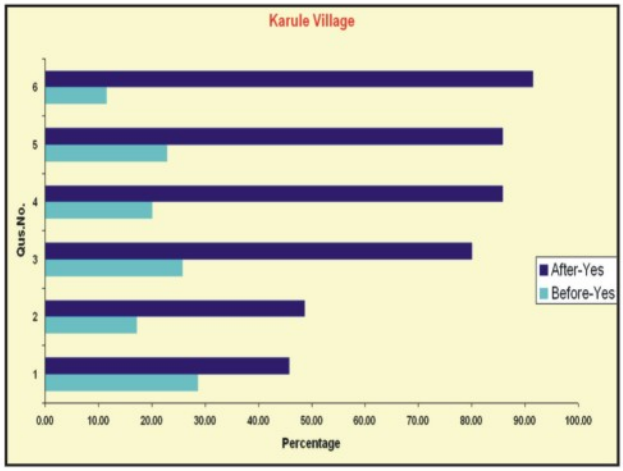
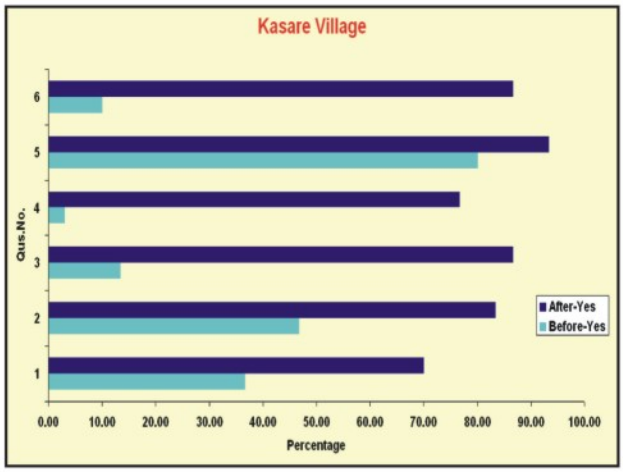


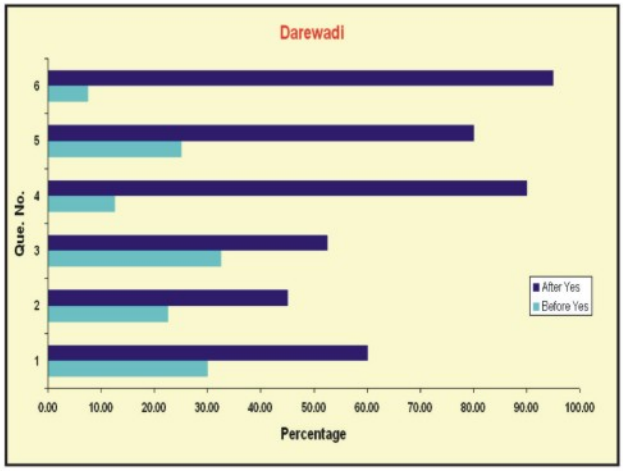
Fig. No. 6.2.15.2

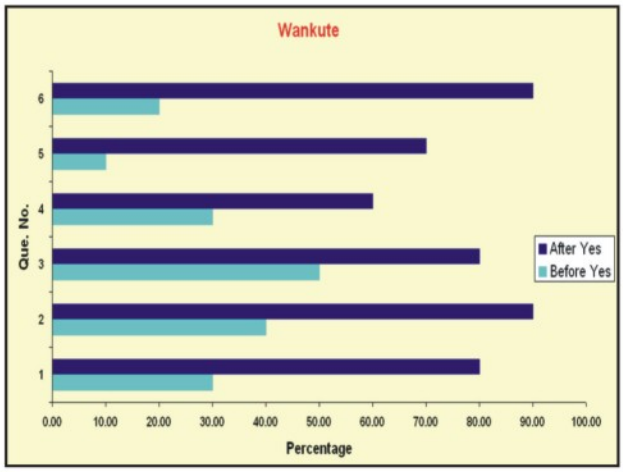
Villagers Opinion about the changes in Terrain Futures

Before & After 'Yes' Opinion

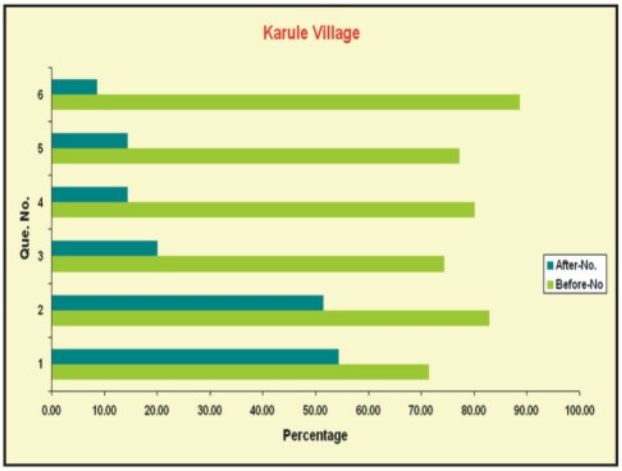


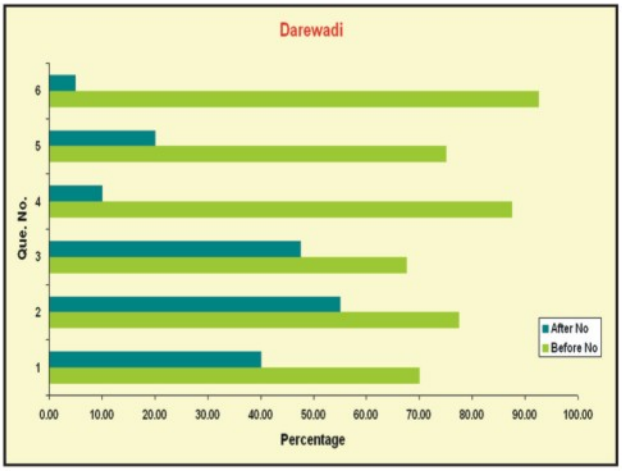


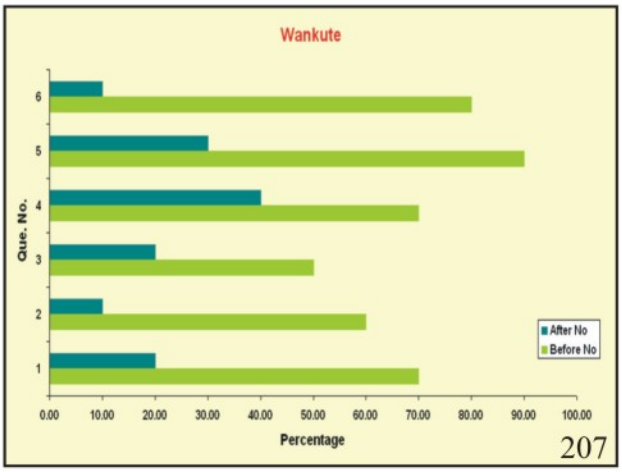




Before & After 'No' Opinion







6.2.15 Villagers Opinion on Changes in Terrain Features Due to WDP

Table 6.2.15 shows comparative opinions of villagers on Changes in Terrain Features Due to WDPs for fifteen WDP areas selected by random sample method the data of villagers opinion about changes in terrain features during pre & post watershed period depicts "Yes" opinion. It was observed that about 12.50 to 93.33% villagers were of the "Yes" opinion about the drainage improvement in the field because of the implementation of the WDP. About 5.00 to 95.00 percent opinion of the villagers confirmed "Yes" that soil and water conservation measure were done in the field. About 25.00 to 85.00 percent villagers opined "Yes" about the good soil texture in Medhavn, Sarole Pathar, Darewadi, Kumbharwadi, Gunjalwadi, Vankute, Karule, Kasare, Malegaon Pathar, Bhaojdari, Mhasavandi, Shivapur & Satychiwadi WDPs.

Villagers "No" opinion about changes in terrain feature before and after WDPs projects. have been depicted in Table 6.2.15 it was it was observed that about 17.00 to 70.00 villagers opined "No". The soil texture is not good in the area in Vankute, Savarchol, Sattychiwadi, Medhvan, Darewadi, Sarole Pathar & Malegaon Pathar WDPs. About 04.44 to 85.71 percent villagers opined "No" that the soil erosion has not been checked in the wastershed area in Karule, Kasare, Medhavan, Sarole Pathar, Mhasvandi, Shivapur, Malegaon Pathar, Darewadi, Kumbharwadi, Vankute, Sattychiwadi WDPs area.

It is also noticed that "Yes" Opinion of villagers about soil texture (16.36 – 30.00 % and 40.00 – 85.85 %), Soil depth (12.50-35.50 % and 60.00 – 86.86 %) and quality of soil (18.00-35.50% and 70.00-85.85%). In "No" Opinion of villagers about soil texture (20.00-30.00 % and 54.28-70.00%), soil depth (15.00-42.22 % and 40.00-78.28%) are shown in Table No. 6.2.15.

6.2.16 : VILLAGERS OPINION ABOUT THE CHANGES IN LAND UTILIZATION IN WS AREA

Table 6.2.16.1 Comparative Analysis of the WSP

Villagers Opinion about the Changes in Land Utilization in WS Area

Sr.	Statement	Medhavan (Sample 40)				Sarole P. (Sample 50)				Mhasvandi (Sample 35)				Gunjalwadi (Sample 55)				Bhojdari (Sample 45)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the available land is useful for seasonal crops ?	39 (97.50)	02 (02.50)	40 (100.00)	00 (00.00)	50 (100.00)	00 (00.00)	50 (100.00)	00 (00.00)	35 (100.00)	00 (00.00)	35 (100.00)	00 (00.00)	55 (100.00)	00 (00.00)	55 (100.00)	00 (00.00)	45 (100.00)	00 (00.00)	45 (100.00)	00 (00.00)
2	Whether the available land is used perennial crops?	02 (05.00)	38 (95.00)	10 (25.00)	30 (75.00)	02 (04.00)	48 (96.00)	08 (16.00)	42 (84.00)	03 (08.57)	32 (91.42)	10 (28.57)	25 (71.42)	00 (00.00)	55 (100.00)	03 (05.45)	52 (94.54)	03 (06.66)	42 (93.33)	09 (20.00)	36 (80.00)
3	Whether the watershed programme is useful?	08 (20.00)	32 (80.00)	34 (85.00)	06 (15.00)	10 (20.00)	40 (80.00)	43 (86.00)	07 (14.00)	12 (34.28)	23 (65.71)	29 (82.85)	06 (17.14)	05 (09.09)	50 (90.90)	49 (89.09)	06 (10.90)	07 (15.55)	38 (84.44)	41 (91.11)	04 (08.88)
4	Whether the inter crops are taken?	36 (90.00)	04 (10.00)	32 (80.00)	08 (20.00)	45 (90.00)	05 (10.00)	40 (80.00	10 (20.00)	33 (94.28)	02 (5.71)	25 (71.42)	10 (28.57)	55 (100.00)	00 (00.00)	51 (92.72)	04 (07.27)	43 (95.55)	02 (04.44)	33 (73.33)	12 (26.66)
5	Whether the land is less productive?	37 (92.50)	03 (07.50)	20 (50.00)	20 (50.00)	38 (76.00)	12 (24.00)	22 (44.00)	28 (56.00)	27 (77.14)	08 (22.85)	31 (88.57)	04 (44.42)	45 (81.81)	10 (18.18)	30 (54.54)	25 (45.45)	42 (93.33)	03 (06.66)	15 (33.33)	30 (66.66)
6	Whether the traditional crops are grown?	36 (90.00)	04 (10.00)	30 (75.00)	10 (25.00)	47 (94.00)	03 (06.00)	37 (74.00)	13 (26.00)	34 (97.14)	01 (02.85)	20 (57.14)	15 (42.85)	47 (85.45)	086 (14.54)	36 (65.45)	19 (34.54)	45 (100.00)	00 (00.00)	08 (17.77)	37 (82.22)
7	Whether the irrigation facility is satisfactory?	05 (12.50)	35 (87.50)	18 (45.00)	22 (55.00)	04 (08.00)	46 (92.00)	16 (32.00)	34 (68.00)	03 (08.57)	32 (91.42)	16 (45.71)	19 (54.28)	02 (03.63)	53 (96.36)	12 (21.81)	43 (78.18)	06 (13.33)	39 (86.66)	16 (35.55)	29 (64.44)
8	Whether two crops are taken every year?	20 (50.00)	20 (50.00)	30 (75.00)	10 (25.00)	25 (50.00)	25 (50.00)	35 (70.00)	15 (30.00)	10 (28.57)	25 (71.42)	17 (48.57)	18 (51.42)	38 (69.09)	17 (30.90)	46 (83.63)	09 (16.36)	24 (53.33)	21 (46.66)	30 (66.66)	15 (33.33)
9	Whether chemical fertilizers are used?	08 (20.00)	32 (80.00)	22 (55.00)	18 (45.00)	09 (18.00)	41 (28.00)	20 (40.00)	30 (60.00)	08 (22.85)	27 (77.14)	14 (40.00)	21 (60.00)	06 (10.90)	49 (89.09)	11 (20.00)	44 (80.00)	10 (22.22)	35 (77.77)	25 (55.55)	20 (44.44)
10	Whether insecticides are used?	03 (07.50)	37 (92.50)	12 (30.00)	28 (70.00)	02 (04.00)	48 (96.00)	10 (20.00)	40 (80.00)	06 (17.14)	29 (82.85)	13 (37.14)	22 (62.85)	03 (05.45)	52 (94.54)	13 (23.63)	42 (76.36)	05 (11.11)	40 (88.88)	17 (37.77)	28 (62.22)
11	Whether land utilization is affected because of factor such as less productive land. Lack of irrigation no markets. Labour problem and fragmentation of land.	33 (82.50)	07 (17.50)	29 (72.50)	11 (27.50)	42 (84.00	08 (16.00)	38 (76.00)	12 (24.00)	29 (82.85)	06 (17.14)	23 (65.71)	12 (34.28)	48 (87.27)	07 (12.72)	40 (72.72)	15 (27.27)	41 (91.11)	04 (8.88)	38 (84.44)	07 (15.55)

Table 6.2.16.2 Comparative Analysis of the WSP

Sr.	Statement	Karule (Sample 35)				Kasare (Sample 30)				Shivapur (Sample 40)				K. Kamleshwar (Sample 40)				Malegaon Pathar (Sample 35)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the available land is useful for seasonal crops ?	35 (100.00)	00 (00.00)	35 (100.00)	00 (00.00)	30 (100.00)	00 (00.00)	30 (100.00)	00 (00.00)	37 (92.50)	03 (07.50)	40 (100.00)	00 (00.00)	40 (100.00)	00 (00.00)	40 (100.00)	00 (00.00)	35 (100.00)	00 (00.00)	35 (100.00)	00 (00.00)
2	Whether the available land is used perennial crops?	03 (08.57)	32 (91.42)	07 (20.00)	28 (80.00)	01 (03.33)	29 (96.66)	04 (13.33)	26 (86.66)	00 (00.00)	40 (100.00)	02 (05.00)	38 (02.50)	04 (10.00)	36 (90.00)	10 (25.00)	30 (75.00)	03 (08.57)	32 (91.42)	10 (28.57)	25 (71.42)
3	Whether the watershed programme is useful?	12 (34.28)	23 (65.71)	32 (91.42)	03 (08.57)	10 (33.33)	20 (66.66)	28 (93.33)	2 (6.66)	05 (12.50)	35 (87.50)	39 (97.50)	01 (02.50)	08 (20.00)	32 (80.00)	35 (87.50)	05 (12.50)	12 (34.28)	23 (65.71)	29 (82.85)	06 (17.14)
4	Whether the inter crops are taken?	33 (94.28)	02 (5.71)	23 (65.71)	12 (34.28)	28 (93.33)	02 (6.66)	22 (73.33)	10 (28.57)	36 (90.00)	04 (10.00)	22 (55.00)	18 (45.00)	37 (92.50)	03 (07.50)	33 (85.50)	07 (17.50)	33 (94.28)	02 (5.71)	25 (71.42)	10 (28.57)
5	Whether the land is less productive?	26 (74.28)	09 (25.71)	11 (31.42)	24 (68.57)	27 (77.14)	08 (22.85)	31 (88.57)	04 (44.42)	37 (92.50)	03 (07.50)	28 (70.00)	12 (30.00)	38 (95.00)	02 (05.00)	28 (70.00)	12 (30.00)	27 (77.14)	08 (22.85)	31 (88.57)	04 (44.42)
6	Whether the traditional crops are grown?	33 (94.28)	02 (05.71)	23 (65.71)	12 (34.28)	34 (97.14)	01 (02.85)	20 (57.14)	15 (42.85)	34 (85.00)	06 (15.00)	30 (75.00)	10 (25.00)	40 (100.00)	00 (00.00)	33 (85.50)	07 (17.50)	34 (97.14)	01 (02.85)	20 (57.14)	15 (42.85)
7	Whether the irrigation facility is satisfactory?	05 (14.28)	30 (85.71)	18 (51.42)	17 (48.57)	03 (08.57)	32 (91.42)	16 (45.71)	19 (54.28)	18 (45.00)	22 (55.00)	32 (80.00)	08 (20.00)	05 (12.50)	35 (87.50)	17 (42.50)	23 (57.50)	03 (08.57)	32 (91.42)	16 (45.71)	19 (54.28)
8	Whether two crops are taken every year?	22 (62.85)	13 (37.14)	28 (80.00)	07 (20.00)	10 (28.57)	25 (71.42)	17 (48.57)	18 (51.42)	20 (50.00)	20 (50.00)	29 (72.50)	11 (27.50)	30 (75.00)	10 (25.00)	35 (87.50)	05 (12.50)	10 (28.57)	25 (71.42)	17 (48.57)	18 (51.42)
9	Whether chemical fertilizers are used?	07 (20.00)	28 (80.00)	20 (57.14)	15 (42.85)	08 (22.85)	27 (77.14)	14 (40.00)	21 (60.00)	10 (25.00)	30 (75.00)	19 (47.50)	21 (52.50)	06 (15.00)	34 (85.00)	20 (50.00)	20 (50.00)	08 (22.85)	27 (77.14)	14 (40.00)	21 (60.00)
10	Whether insecticides are used?	06 (17.14)	29 (82.85)	10 (28.57)	25 (71.42)	06 (17.14)	29 (82.85)	13 (37.14)	22 (62.85)	03 (07.50)	37 (92.50)	09 (22.50)	31 (77.50)	03 (07.50)	37 (92.50)	10 (25.00)	30 (75.00)	06 (17.14)	29 (82.85)	13 (37.14)	22 (62.85)
11	Whether land utilization is affected because of factor such as less productive land. Lack of irrigation no markets. Labour problem and fragmentation of land.	33 (94.28)	02 (5.71)	26 (74.28)	09 (25.71)	29 (82.85)	06 (17.14)	23 (65.71)	12 (34.28)	35 (87.50)	05 (12.50)	30 (75.00)	10 (25.00)	33 (82.50)	07 (17.50)	25 (62.50)	15 (37.50)	29 (82.85)	06 (17.14)	23 (65.71)	12 (34.28)

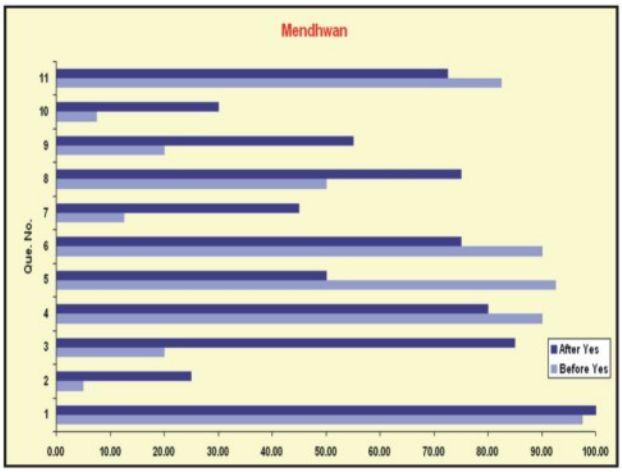
Table 6.2.16.3 Comparative Analysis of the WSP

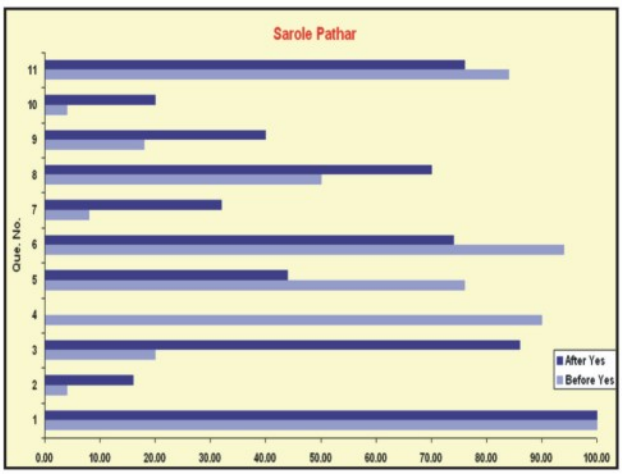
Sr.	Statement	Darewadi (Sample 40)				Kubharwadi (Sample 20)				Wankute (Sample 10)				Savarchol (Sample 20)				Sattyachiwadi (Sample 10)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the available land is useful for seasonal crops ?	40 (100.00)	00 (00.00)	40 (100.00)	00 (00.00)	20 (100.00)	00 (00.00)	50 (100.00)	00 (00.00)	08 (80.00)	02 (20.00)	10 (100.00)	00 (00.00)	20 (100.00)	00 (00.00)	20 (100.00)	00 (00.00)	08 (80.00)	02 (20.00)	10 (100.00)	00 (00.00)
2	Whether the available land is used perennial crops?	04 (10.00)	36 (90.00)	10 (25.00)	30 (75.00)	04 (20.00)	16 (80.00)	08 (40.00)	12 (60.00)	00 (00.00)	10 (100.00)	09 (90.00)	01 (10.00)	00 (00.00)	00 (00.00)	02 (10.00)	18 (90.00)	00 (00.00)	10 (100.00)	09 (90.00)	01 (10.00)
3	Whether the watershed programme is useful?	08 (20.00)	32 (80.00)	35 (87.50)	05 (12.50)	03 (15.00)	17 (85.00)	18 (90.00)	02 (10.00)	01 (10.00)	09 (90.00)	09 (90.00)	01 (10.00)	08 (40.00)	12 (60.00)	16 (80.00)	04 (20.00)	01 (10.00)	09 (90.00)	09 (90.00)	01 (10.00)
4	Whether the inter crops are taken?	37 (92.50)	03 (07.50)	33 (85.50)	07 (17.50)	18 (90.00)	02 (10.00)	14 (70.00)	06 (30.00)	07 (70.00)	03 (30.00)	08 (80.00)	02 (20.00)	18 (90.00)	02 (10.00)	10 (50.00)	10 (50.00)	07 (70.00)	03 (30.00)	08 (80.00)	02 (20.00)
5	Whether the land is less productive?	38 (95.00)	02 (05.00)	28 (70.00)	12 (30.00)	10 (50.00)	10 (50.00)	08 (40.00)	12 (60.00)	06 (60.00)	04 (40.00)	03 (30.00)	07 (70.00)	17 (85.00)	03 (15.00)	11 (55.00)	09 (45.00)	06 (60.00)	04 (40.00)	03 (30.00)	07 (70.00)
6	Whether the traditional crops are grown?	40 (100.00)	00 (00.00)	33 (85.50)	07 (17.50)	20 (100.00)	00 (00.00)	15 (75.00)	05 (25.00)	10 (100.00)	00 (00.00)	09 (90.00)	01 (10.00)	20 (100.00)	00 (00.00)	15 (75.00)	05 (25.00)	10 (100.00)	00 (00.00)	09 (90.00)	01 (10.00)
7	Whether the irrigation facility is satisfactory?	05 (12.50)	35 (87.50)	17 (42.50)	23 (57.50)	03 (15.00)	17 (85.71)	18 (51.42)	17 (48.57)	00 (00.00)	10 (100.00)	05 (50.00)	05 (50.00)	01 (05.00)	19 (95.00)	08 (40.00)	12 (60.00)	00 (00.00)	10 (100.00)	05 (50.00)	05 (50.00)
8	Whether two crops are taken every year?	30 (75.00)	10 (25.00)	35 (87.50)	05 (12.50)	08 (40.00)	12 (60.00)	13 (62.00)	07 (35.00)	01 (10.00)	90 (90.00)	04 (40.00)	06 (60.00)	13 (65.00)	07 (35.00)	16 (80.00)	04 (20.00)	01 (10.00)	90 (90.00)	04 (40.00)	06 (60.00)
9	Whether chemical fertilizers are used?	06 (15.00)	34 (85.00)	20 (50.00)	20 (50.00)	01 (05.00)	19 (95.00)	08 (40.00)	12 (60.00)	00 (00.00)	10 (100.00)	03 (30.00)	07 (70.00)	05 (25.00)	15 (75.00)	11 (55.00)	09 (45.00)	00 (00.00)	10 (100.00)	03 (30.00)	07 (70.00)
10	Whether insecticides are used?	03 (07.50)	37 (92.50)	10 (25.00)	30 (75.00)	00 (00.00)	20 (100.00)	02 (10.00)	18 (90.00)	00 (00.00)	10 (100.00)	01 (10.00)	09 (90.00)	01 (5.00)	19 (95.00)	06 (30.00)	14 (70.00)	00 (00.00)	10 (100.00)	01 (10.00)	09 (90.00)
11	Whether land utilization is affected because of factor such as less productive land. Lack of irrigation no markets. Labour problem and fragmentation of land.	33 (82.50)	07 (17.50)	25 (62.50)	15 (37.50)	18 (90.00)	02 (10.00)	14 (70.00)	06 (30.00)	08 (80.00)	02 (20.00)	06 (60.00)	04 (40.00)	17 (85.00)	03 (15.00)	13 (65.00)	07 (35.00)	08 (80.00)	02 (20.00)	06 (60.00)	04 (40.00)

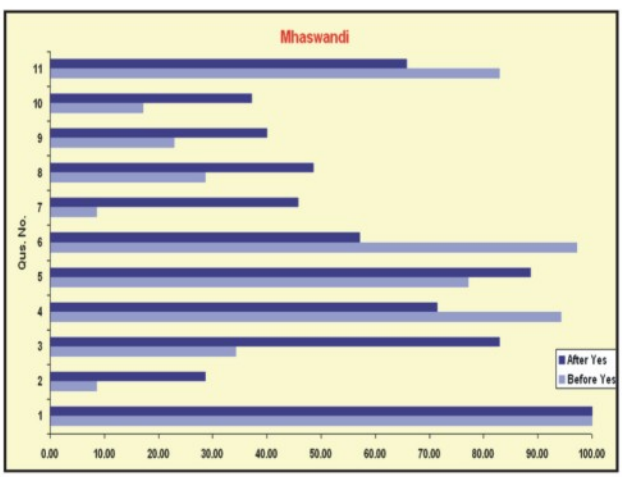
Fig. No. 6.2.16.1

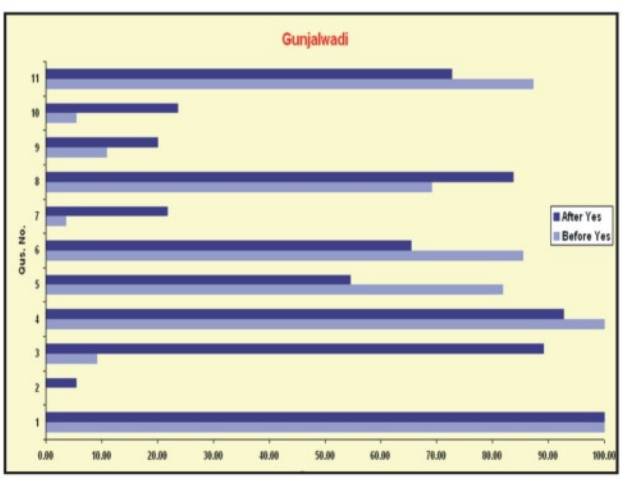
Villagers Opinion about the changes in Land Utilization in WS Area

Before & After 'Yes' Opinion

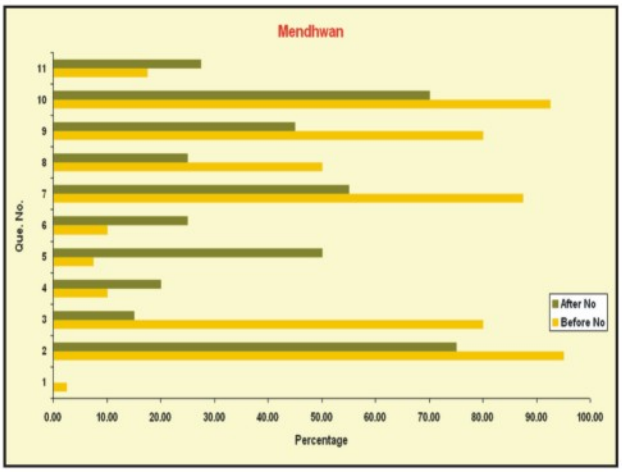


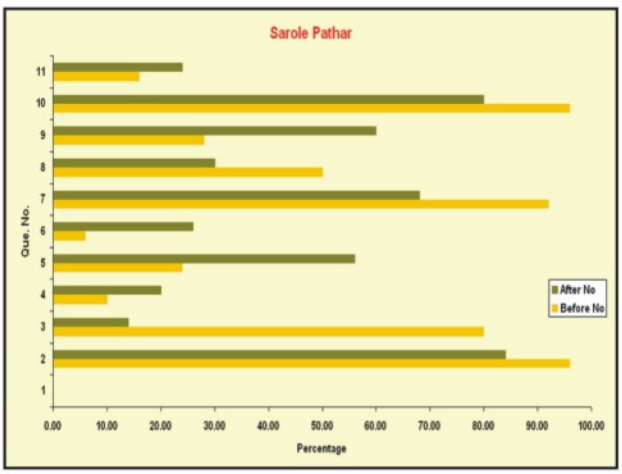


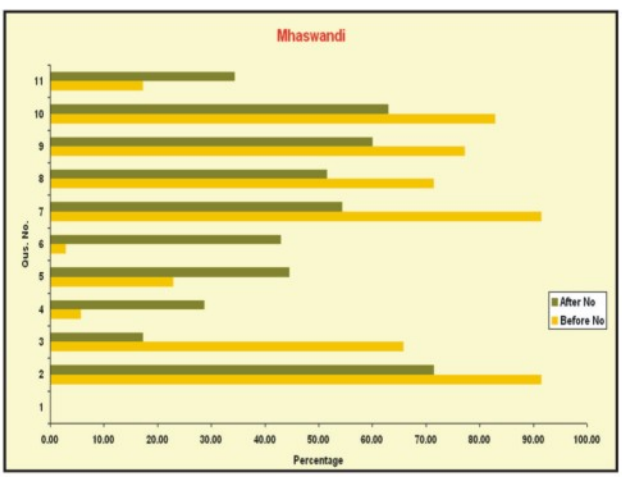




Before & After 'No' Opinion







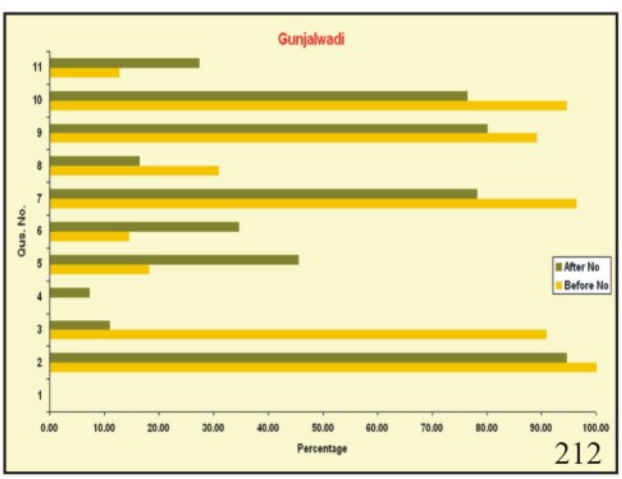
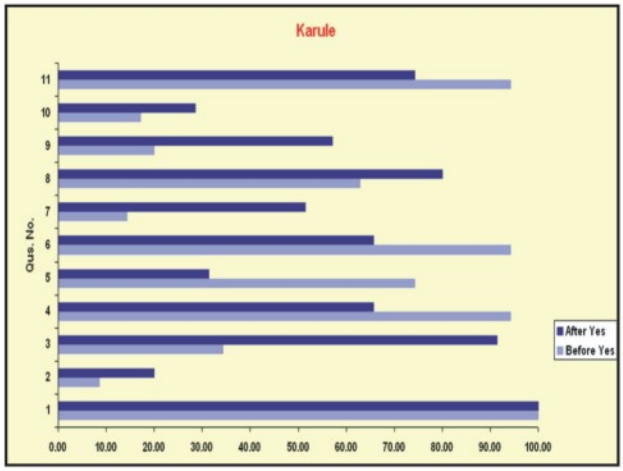
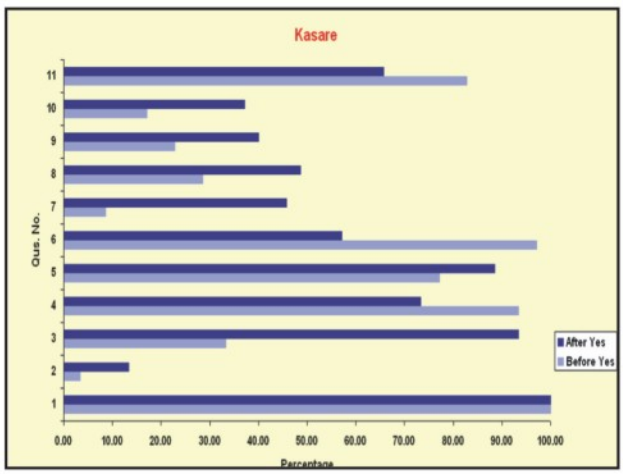


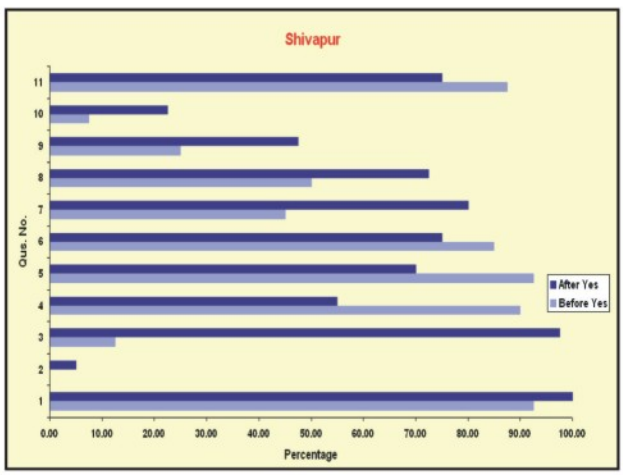
Fig. No. 6.2.16.2

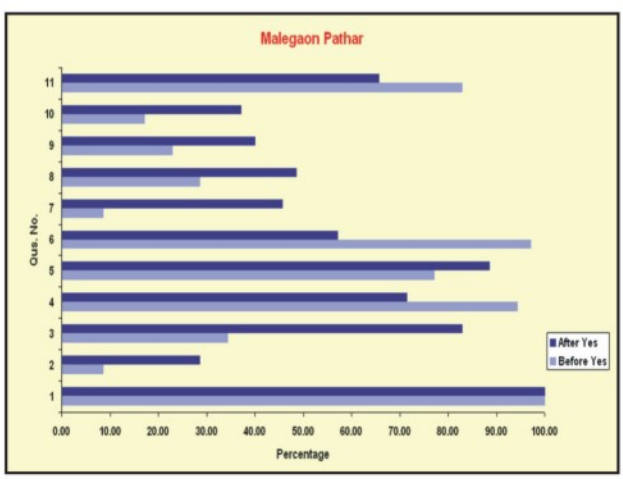
Villagers Opinion about the changes in Land Utilization in WS Area

Before & After 'Yes' Opinion

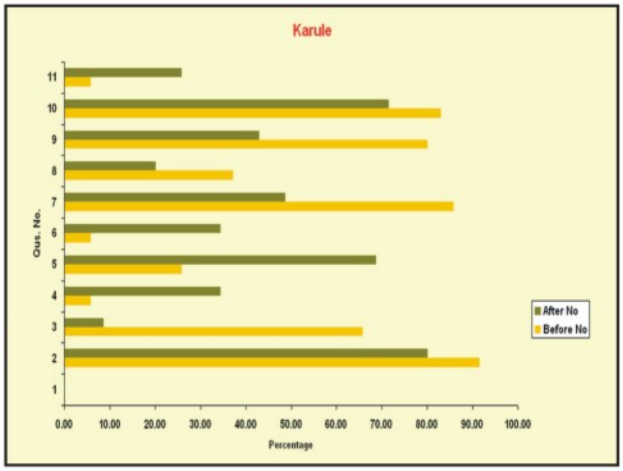


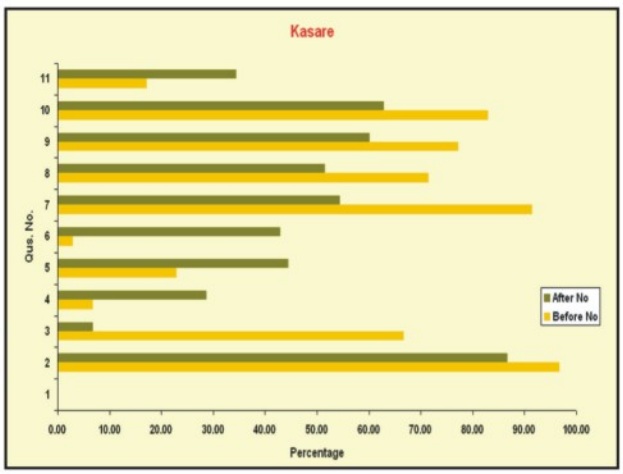


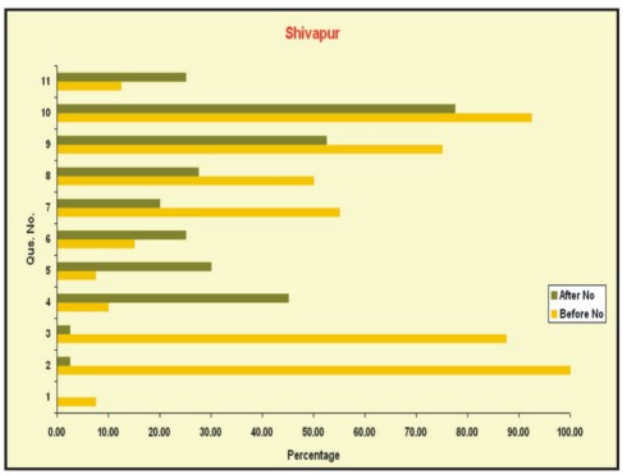




Before & After 'No' Opinion







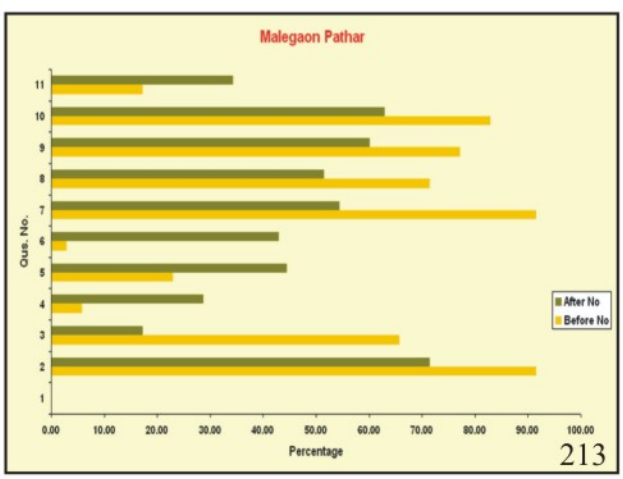
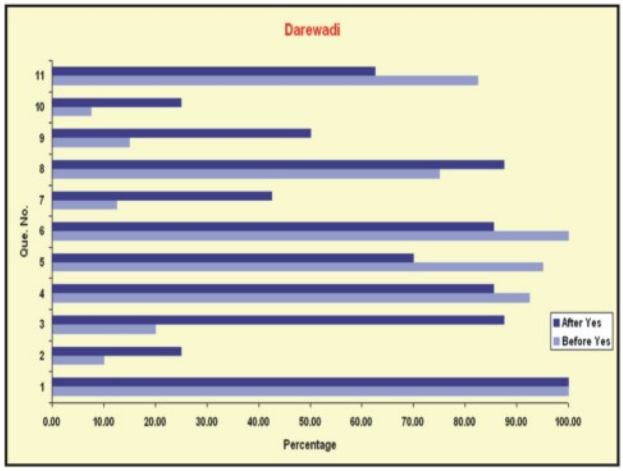
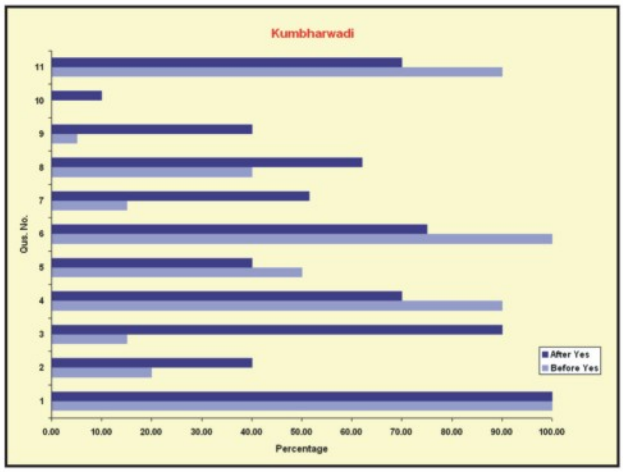


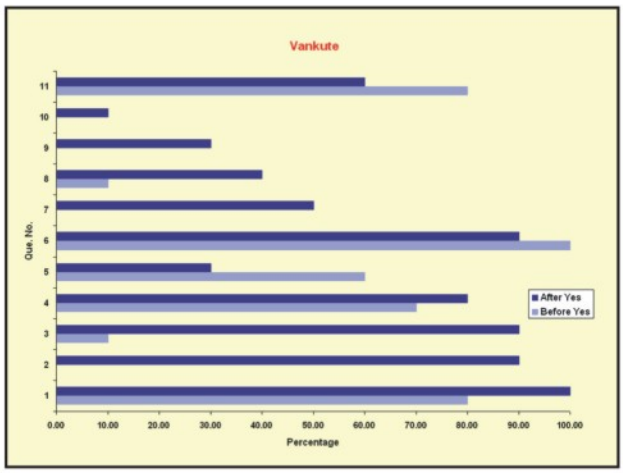
Fig. No. 6.2.16.3

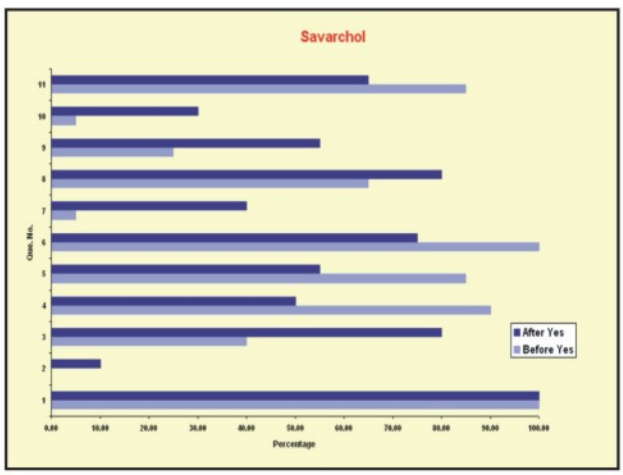
Villagers Opinion about the changes in Land Utilization in WS Area

Before & After 'Yes' Opinion

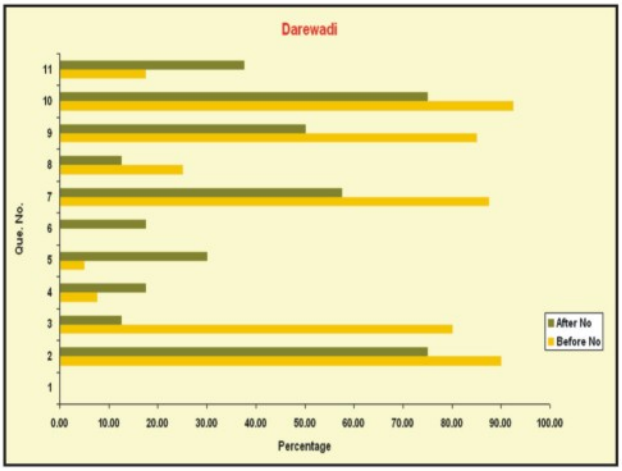


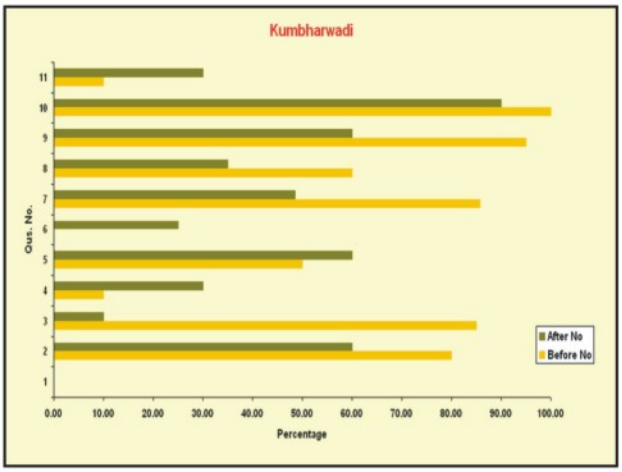


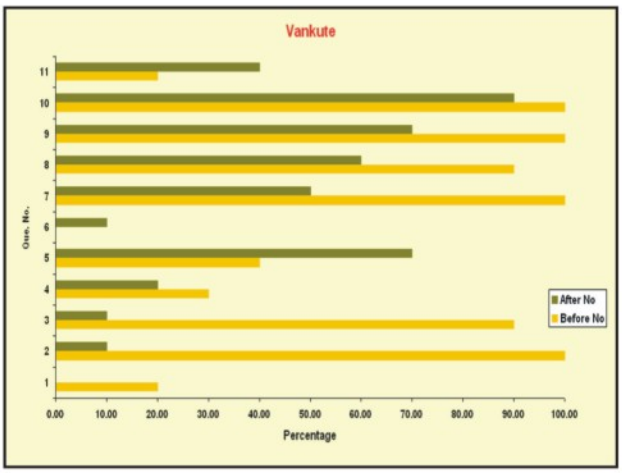


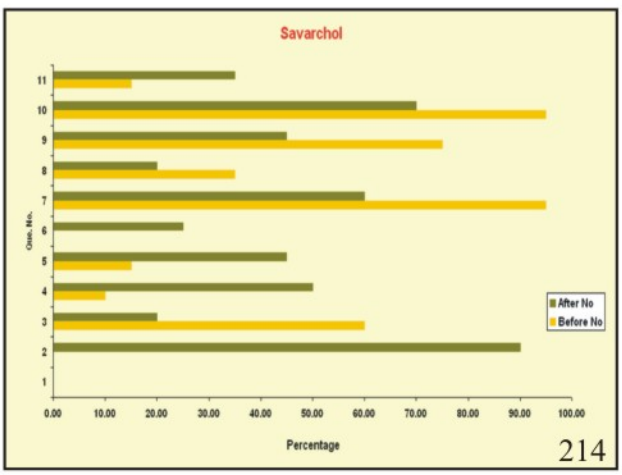


Before & After 'No' Opinion









6.2.16 Villager Opinion on Changes in Land Utilization in WS area.

Tabel 6.2.16.1, 6.2.16.2, 6.2.16.3 shows comparative Villager Opinion on Changes in Land Utilization in WS area. Before & After WS project for fifteen villagers by Random Sample method. The data about the opinion "Yes" before and after implementation of WS project has been comparatively depicted in Table No. 6.2.16. It was observed that there was positive changes in area (50.00 to 70.00 % and 70.00 to 100.00%), improvement in irrigation facility (00.00 to 12.50 % and 15.00 to 51.00%) increase in area under two crops per year (10.00 to 40.00 % and 70.00 to 87.50 %) in Gunjalwadi, Darewadi, Bhojdari, Karule, Sarole Pathar, Medhvan, Mhasvandi, Shivapur, Kumbharwadi, Sawarchol and Sattaychiwadi WDPs.

"No" Opinion of the villagers about changes in land utilization Before and After the WS project has been depicted in Table 6.2.16. It was observed that the decrease of traditional cropping system (2.85 to 17.85% and 20.00 to 25.00%) insecticide are used (62.85 to 77.50% and 80.00 to 100.00%) in Sattyachiwadi, Sawarchol, Kumbharwadi, Karule, Kasare, Vankute, Malegaon Pathar, Sarole Pathar, Shivapur, Medhvan, Mhaswandi, Gunjalwadi, Bhojdari, Darewadi WDP. It was found that there was "No" changes in the opinion of respondents on the issue of land utilization for perennial crops, use of chemical fertilizers and insecticide, Seasonal crop production etc.

6.2.17 : VILLAGERS OPINION ABOUT THE CHANGES IN WATER AVAILABILITY IN WS AREA

Table 6.2.17.1 Comparative Analysis of the WSP

Sr.	Statement	Medhavan (Sample 40)				Sarole P. (Sample 50)				Mhasvandi (Sample 35)				Gunjalwadi (Sample 55)				Bhojdari (Sample 45)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the number of dug wells, tube wells, tanks, farm pot increased?	08 (20.00)	32 (80.00)	26 (65.00)	14 (35.00)	09 (18.00)	41 (82.00)	29 (58.00)	21 (42.00)	09 (25.71)	26 (74.28)	25 (71.42)	10 (28.57)	10 (18.18)	45 (81.81)	49 (89.09)	06 (10.90)	07 (15.55)	38 (84.44)	20 (44.44)	25 (55.55)
2	Whether the water from dugwell, tubewell tank is available throughout the year?	05 (12.50)	35 (87.50)	15 (37.50)	25 (62.50)	05 (10.00)	45 (90.00)	09 (18.00)	41 (82.00)	04 (11.42)	31 (88.57)	11 (31.42)	24 (68.57)	02 (03.63)	53 (96.36)	46 (83.63)	09 (16.36)	08 (17.77)	37 (82.22)	16 (35.55)	29 (64.44)
3	Whether water is required during kharip season also?	38 (95.00)	02 (05.00)	39 (97.50)	01 (02.50)	10 (20.00)	40 (80.00)	15 (30.00)	35 (70.00)	30 (85.71)	05 (14.28)	31 (88.57)	04 (17.14)	52 (94.45)	03 (05.45)	54 (98.18)	01 (01.81)	40 (88.88)	05 (11.11)	43 (95.55)	02 (04.44)
4	Whether the adequate water is available for rabi season because of watershed structure?	07 (17.50)	33 (85.50)	18 (45.00)	22 (55.00)	07 (14.00)	43 (46.00)	22 (44.00	28 (56.00)	-	-	29 (82.85)	06 (17.14)	07 (12.72)	48 (87.27)	16 (29.09)	39 (70.90)	10 (22.22)	35 (77.77)	28 (62.22)	17 (37.77)
5	Whether water is adequately available during summer season because of watershed structure?	02 (05.00)	38 (95.00)	12 (30.00)	28 (70.00)	01 (02.00)	49 (98.00)	08 (16.00)	42 (84.00)	-	-	28 (80.00)	07 (20.00)	02 (03.63)	53 (96.36)	08 (14.54)	47 (85.45)	02 (04.44)	43 (95.00)	09 (20.00)	36 (80.00)
6	Whether water level in dug wells increased due to watershed structure?	--	--	33 (82.50)	07 (17.50)	--	--	42 (84.00)	08 (16.00)	-	-	32 (91.42)	03 (08.57)	-	-	42 (76.36)	13 (23.63)	--	--	40 (88.88)	10 (22.22)
7	Whether the usage of water increased because of watershed structure?	--	--	35 (87.50)	05 (12.50)	--	--	35 (70.00)	15 (30.00)	-	-	30 (85.71)	05 (14.28)	-	-	43 (78.18)	12 (21.63)	--	--	30 (66.66)	15 (33.33)
8	Whether the water available because of watershed structure is used for drinking, agriculture and for cattle?	--	--	40 (100.00)	00 (00.00)	--	--	50 (100.00)	00 (00.00)	-	-	35 (100.00)	00 (00.00)	-	-	50 (90.90)	05 (09.09)	--	--	45 (100.00)	00 (00.00)
9	Whether the devices like pumps, diseal engines are used for water lifting?	30 (75.00)	10 (25.00)	34 (85.00)	06 (15.00)	32 (64.00)	18 (36.00)	44 (88.00)	06 (12.00)	27 (77.14)	08 (22.85)	31 (88.85)	04 (11.42)	40 (72.72)	15 (27.27)	46 (83.63)	09 (16.36)	38 (84.44)	07 (15.55)	42 (93.33)	03 (06.66)
10	Whether the time required for recharging of dug wells is improved? (4 to 5 Hrs.)	09 (22.50)	31 (77.50)	22 (55.00)	18 (45.00)	10 (20.00)	40 (80.00)	24 (48.00)	26 (52.00)	10 (28.57)	25 (71.42)	16 (45.71)	19 (54.28)	10 (18.18)	45 (81.81)	18 (32.72)	37 (67.27)	30 (66.66)	15 (33.33)	40 (88.88)	10 (22.22)
11	Whether the area under irrigation has increased due to watershed work?	08 (20.00)	32 (80.00)	36 (90.00)	04 (10.00)	06 (12.00	44 (88.00)	36 (72.00)	14 (28.00)	04 (11.42)	31 (88.57)	22 (62.85)	13 (37.14)	07 (12.72)	48 (87.27)	43 (78.18)	12 (21.81)	09 (20.00)	36 (80.00)	28 (62.22)	17 (37.77)
12	Whether the ground water is polluted?	08 (20.00)	32 (80.00)	12 (30.00)	28 (70.00)	12 (24.00)	38 (76.00)	50 (100.00)	00 (00.00)	02 (05.71)	33 (98.28)	08 (22.85)	27 (77.14)	03 (5.45)	52 (94.45)	11 (20.00)	44 (80.00)	08 (17.77)	37 (82.22)	19 (42.22)	26 (57.77)
13	Whether the drains are rainfed i.e. seasonal and whether the water is available for longer time because of watershed work?	07 (17.50)	33 (82.50)	30 (75.00)	10 (25.00)	--	--	48 (96.00)	02 (04.00)	-	-	31 (88.85)	04 (11.42)	-	-	47 (85.45)	08 (14.54)	--	--	41 (91.11)	04 (08.88)

Table 6.2.17.2 Comparative Analysis of the WSP

Sr.	Statement	Karule (Sample 35)				Kasare (Sample 30)				Shivapur (Sample 40)				K. Kamleshwar (Sample 40)				Malegaon Pathar (Sample 35)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the number of dug wells, tube wells, tanks, farm pot increased?	08 (22.85)	27 (77.14)	22 (62.85)	13 (137.14)	08 (26.66)	22 (82.50)	18 (45.00)	22 (55.00)	07 (17.50)	33 (82.50)	26 (65.00)	14 (35.00)	07 (17.50)	33 (82.50)	18 (45.00)	22 (55.00)	09 (25.71)	26 (74.28)	25 (71.42)	10 (28.57)
2	Whether the water from dugwell, tubewell tank is available throughout the year?	03 (8.57)	32 (91.42)	12 (34.28)	23 (65.71)	04 (10.00)	36 (90.00)	16 (40.00)	24 (60.00)	04 (10.00)	36 (90.00)	15 (37.50)	25 (62.50)	04 (10.00)	36 (90.00)	16 (40.00)	24 (60.00)	04 (11.42)	31 (88.57)	11 (31.42)	24 (68.57)
3	Whether water is required during kharip season also?	13 (37.14)	22 (62.85)	20 (57.14)	15 (42.85)	20 (50.00)	20 (50.00)	15 (37.50)	25 (62.50)	08 (20.00)	32 (80.00)	14 (65.00)	26 (35.00)	20 (50.00)	20 (50.00)	15 (37.50)	25 (62.50)	30 (85.71)	05 (14.28)	31 (88.57)	04 (17.14)
4	Whether the adequate water is available for rabi season because of watershed structure?	09 (25.71)	26 (74.28)	28 (80.00)	07 (20.00)	06 (15.00)	20 (85.00)	22 (55.00)	18 (45.00)	09 (22.50)	31 (77.50)	18 (45.00)	22 (55.00)	06 (15.00)	20 (85.00)	22 (55.00)	18 (45.00)	-	-	29 (82.85)	06 (17.14)
5	Whether water is adequately available during summer season because of watershed structure?	02 (5.71)	33 (94.28)	07 (20.00)	28 (80.00)	-	-	09 (22.50)	31 (77.50)	-	-	08 (20.00)	32 (80.00)	-	-	09 (22.50)	31 (77.50)	-	-	28 (80.00)	07 (20.00)
6	Whether water level in dug wells increased due to watershed structure?	-	-	31 (88.57)	04 (11.42)	-	-	31 (77.50)	09 (22.50)	-	-	23 (57.50)	17 (42.50)	-	-	31 (77.50)	09 (22.50)	-	-	32 (91.42)	03 (08.57)
7	Whether the usage of water increased because of watershed structure?	-	-	30 (85.71)	05 (14.28)	-	-	30 (75.00)	10 (25.00)	-	-	30 (75.00)	10 (25.00)	-	-	30 (75.00)	10 (25.00)	-	-	30 (85.71)	05 (14.28)
8	Whether the water available because of watershed structure is used for drinking, agriculture and for cattle?	-	-	35 (100.00)	00 (00.00)	-	-	38 (95.00)	2 (5.00)	-	-	40 (100.00)	00 (00.00)	-	-	38 (95.00)	2 (5.00)	-	-	35 (100.00)	00 (00.00)
9	Whether the devices like pumps, diseal engines are used for water lifting?	24 (68.57)	11 (31.42)	29 (82.85)	06 (17.14)	24 (60.00)	16 (40.00)	29 (72.50)	11 (27.50)	12 (30.00)	28 (70.00)	31 (77.50)	09 (22.50)	24 (60.00)	16 (40.00)	29 (72.50)	11 (27.50)	27 (77.14)	08 (22.85)	31 (88.85)	04 (11.42)
10	Whether the time required for recharging of dug wells is improved? (4 to 5 Hrs.)	09 (25.71)	26 (74.28)	25 (71.42)	10 (28.57)	11 (27.50)	29 (72.50)	28 (70.00)	12 (30.00)	07 (17.50)	33 (82.50)	16 (40.00)	24 (60.00)	11 (27.50)	29 (72.50)	28 (70.00)	12 (30.00)	10 (28.57)	25 (71.42)	16 (45.71)	19 (54.28)
11	Whether the area under irrigation has increased due to watershed work?	05 (14.28)	30 (85.71)	22 (62.85)	13 (37.14)	07 (17.50)	33 (82.50)	36 (90.00)	04 (10.00)	06 (15.00)	34 (85.00)	32 (80.00)	08 (20.00)	07 (17.50)	33 (82.50)	36 (90.00)	04 (10.00)	04 (11.42)	31 (88.57)	22 (62.85)	13 (37.14)
12	Whether the ground water is polluted?	04 (11.42)	31 (88.57)	08 (22.85)	27 (77.14)	05 (12.50)	35 (87.50)	12 (30.00)	28 (70.00)	09 (22.50)	31 (77.50)	14 (65.00)	26 (35.00)	05 (12.50)	35 (87.50)	12 (30.00)	28 (70.00)	02 (05.71)	33 (98.28)	08 (22.85)	27 (77.14)
13	Whether the drains are rainfed i.e. seasonal and whether the water is available for longer time because of watershed work?	-	-	33 (94.28)	02 (5.71)	-	-	37 (92.50)	03 (7.50)	-	-	30 (75.00)	10 (25.00)	-	-	37 (92.50)	03 (7.50)	-	-	31 (88.85)	04 (11.42)

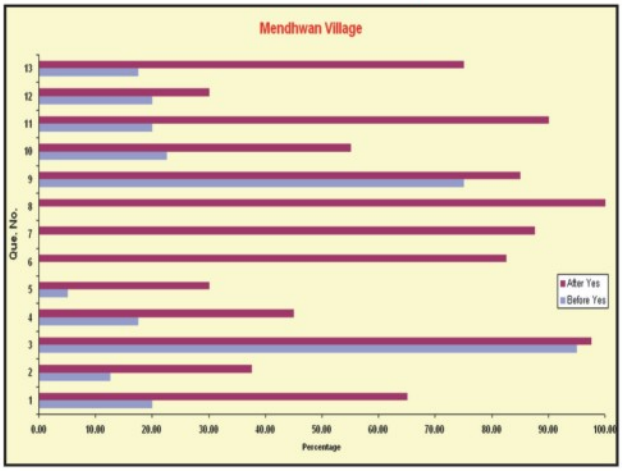
Table 6.2.17.3 Comparative Analysis of the WSP

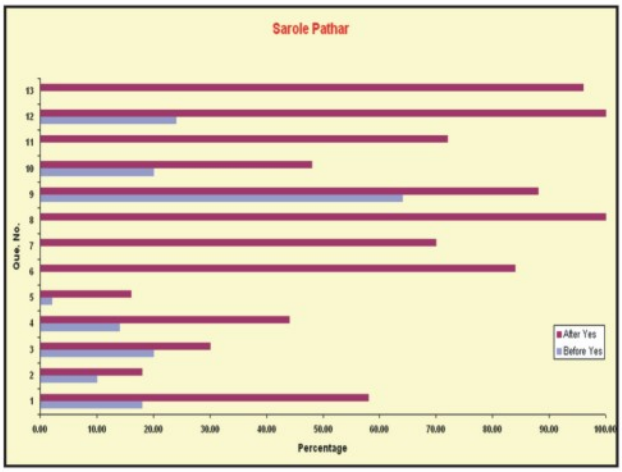
Sr.	Statement	Darewadi (Sample 40)				Kubharwadi (Sample 20)				Wankute (Sample 10)				Savarchol (Sample 20)				Sattyachiwadi (Sample 10)			
		Before		After		Before		After		Before		After		Before		After		Before		After	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1	Whether the number of dug wells, tube wells, tanks, farm pot increased?	07 (17.50)	33 (82.50)	18 (45.00)	22 (55.00)	07 (35.00)	13 (65.00)	14 (60.00)	06 (30.00)	01 (10.00)	09 (90.00)	05 (50.00)	05 (50.00)	06 (30.00)	14 (70.00)	15 (75.00)	05 (25.00)	01 (10.00)	09 (90.00)	05 (50.00)	05 (50.00)
2	Whether the water from dugwell, tubewell tank is available throughout the year?	04 (10.00)	36 (90.00)	16 (40.00)	24 (60.00)	00 (00.00)	20 (100.00)	05 (25.00)	15 (75.00)	00 (00.00)	10 (100.00)	01 (10.00)	09 (90.00)	02 (10.00)	18 (90.00)	07 (35.00)	13 (65.00)	00 (00.00)	10 (100.00)	01 (10.00)	09 (90.00)
3	Whether water is required during kharip season also?	20 (50.00)	20 (50.00)	15 (37.50)	25 (62.50)	10 (50.00)	10 (50.00)	12 (60.00)	08 (40.00)	02 (20.00)	08 (80.00)	04 (40.00)	06 (60.00)	10 (50.00)	10 (50.00)	16 (80.00)	04 (20.00)	02 (20.00)	08 (80.00)	04 (40.00)	06 (60.00)
4	Whether the adequate water is available for rabi season because of watershed structure?	06 (15.00)	20 (85.00)	22 (55.00)	18 (45.00)	06 (30.00)	14 (70.00)	17 (85.00)	03 (15.00)	-	-	04 (40.00)	06 (60.00)	07 (35.00)	13 (65.00)	12 (60.00)	08 (40.00)	-	-	04 (40.00)	06 (60.00)
5	Whether water is adequately available during summer season because of watershed structure?	-	-	09 (22.50)	31 (77.50)	01 (5.00)	19 (95.00)	17 (35.00)	13 (65.00)	-	-	01 (10.00)	09 (90.00)	00 (00.00)	20 (100.00)	01 (05.00)	09 (95.00)	-	-	01 (10.00)	09 (90.00)
6	Whether water level in dug wells increased due to watershed structure?	-	-	31 (77.50)	09 (22.50)	-	-	18 (90.00)	02 (10.00)	-	-	07 (70.00)	03 (30.00)	-	-	14 (70.00)	06 (30.00)	-	-	07 (70.00)	03 (30.00)
7	Whether the usage of water increased because of watershed structure?	-	-	30 (75.00)	10 (25.00)	-	-	15 (75.00)	05 (25.00)	-	-	08 (80.00)	02 (20.00)	-	-	12 (60.00)	08 (40.00)	-	-	08 (80.00)	02 (20.00)
8	Whether the water available because of watershed structure is used for drinking, agriculture and for cattle?	-	-	38 (95.00)	2 (5.00)	-	-	20 (100.00)	00 (00.00)	-	-	10 (100.00)	00 (00.00)	-	-	20 (100.00)	00 (00.00)	-	-	10 (100.00)	00 (00.00)
9	Whether the devices like pumps, diseal engines are used for water lifting?	24 (60.00)	16 (40.00)	29 (72.50)	11 (27.50)	09 (45.00)	11 (55.)	29 (82.85)	06 (17.14)	03 (30.00)	07 (70.00)	06 (60.00)	04 (40.00)	11 (55.00)	09 (45.00)	17 (85.00)	03 (15.00)	03 (30.00)	07 (70.00)	06 (60.00)	04 (40.00)
10	Whether the time required for recharging of dug wells is improved? (4 to 5 Hrs.)	11 (27.50)	29 (72.50)	28 (70.00)	12 (30.00)	09 (25.71)	26 (74.28)	25 (71.42)	10 (28.57)	02 (20.00)	08 (80.00)	07 (70.00)	03 (30.00)	08 (40.00)	12 (60.00)	15 (75.00)	05 (25.00)	02 (20.00)	08 (80.00)	07 (70.00)	03 (30.00)
11	Whether the area under irrigation has increased due to watershed work?	07 (17.50)	33 (82.50)	36 (90.00)	04 (10.00)	05 (14.28)	30 (85.71)	22 (62.85)	13 (37.14)	04 (40.00)	06 (60.00)	08 (80.00)	02 (20.00)	06 (30.00)	14 (70.00)	13 (65.00)	07 (35.00)	04 (40.00)	06 (60.00)	08 (80.00)	02 (20.00)
12	Whether the ground water is polluted?	05 (12.50)	35 (87.50)	12 (30.00)	28 (70.00)	04 (11.42)	31 (88.57)	08 (22.85)	27 (77.14)	03 (30.00)	07 (70.00)	05 (50.00)	05 (50.00)	04 (20.00)	16 (80.00)	10 (50.00)	10 (50.00)	03 (30.00)	07 (70.00)	05 (50.00)	05 (50.00)
13	Whether the drains are rainfed i.e. seasonal and whether the water is available for longer time because of watershed work?	-	-	37 (92.50)	03 (7.50)	-	-	33 (94.28)	02 (5.71)	-	-	08 (80.00)	02 (20.00)	-	-	19 (95.00)	01 (05.00)	-	-	08 (80.00)	02 (20.00)

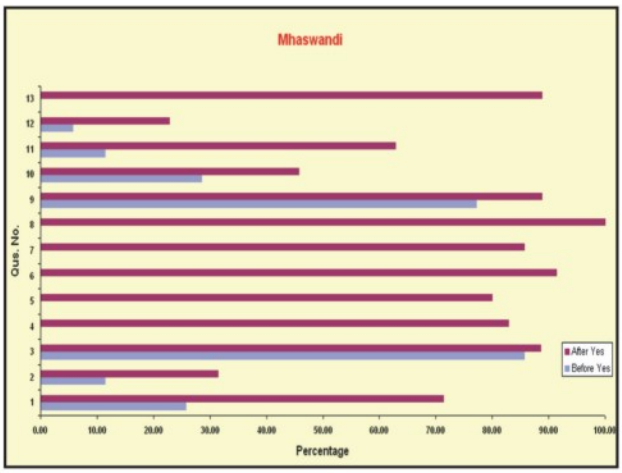
Fig. No. 6.2.17.1

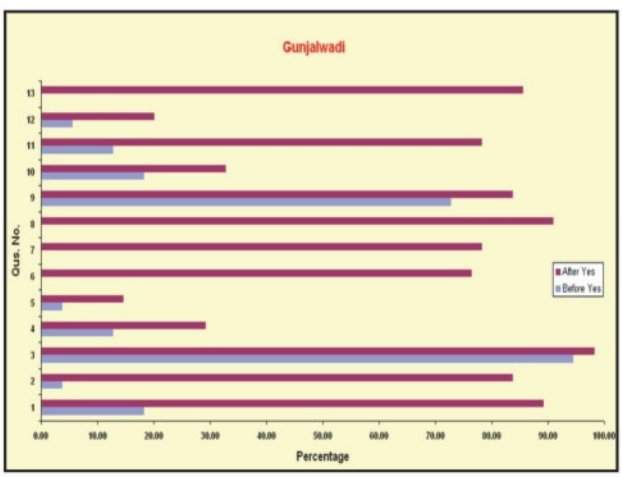
Villagers Opinion about the changes in Water Availability in WS Area

Before & After 'Yes' Opinion

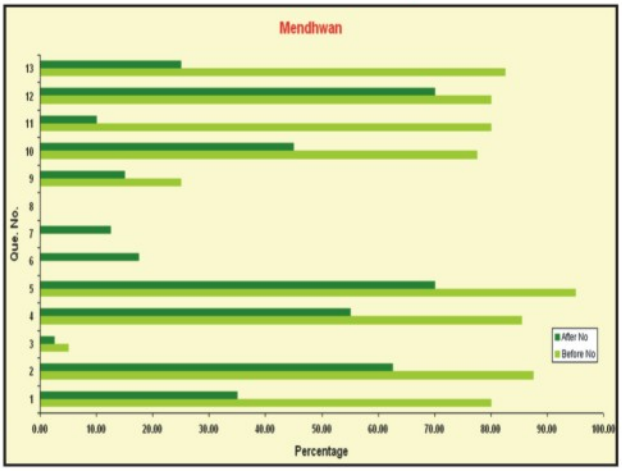


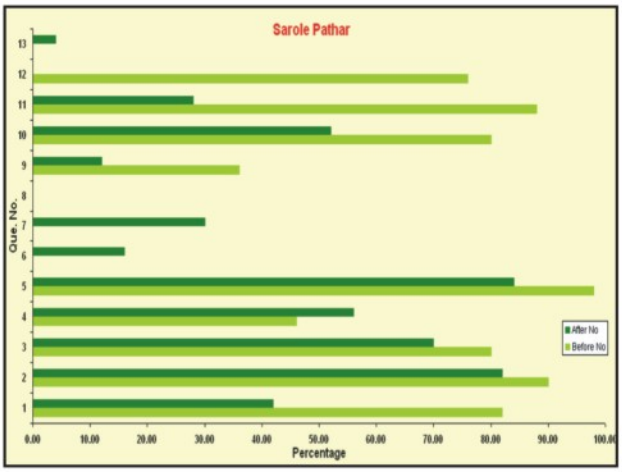


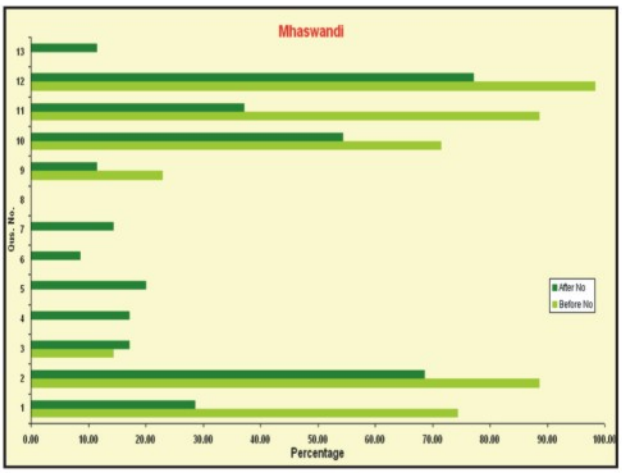




Before & After 'No' Opinion







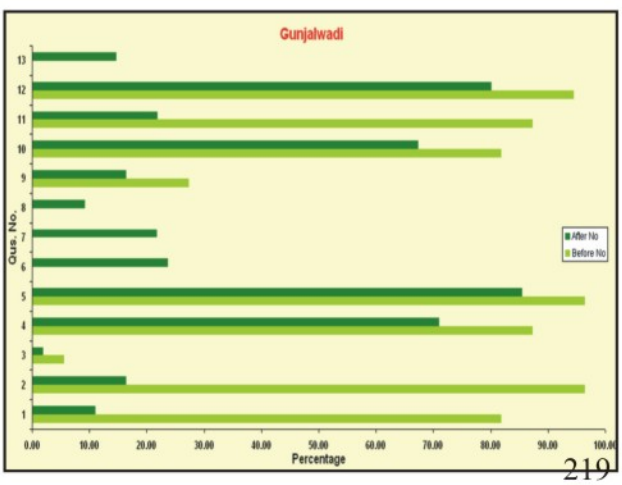
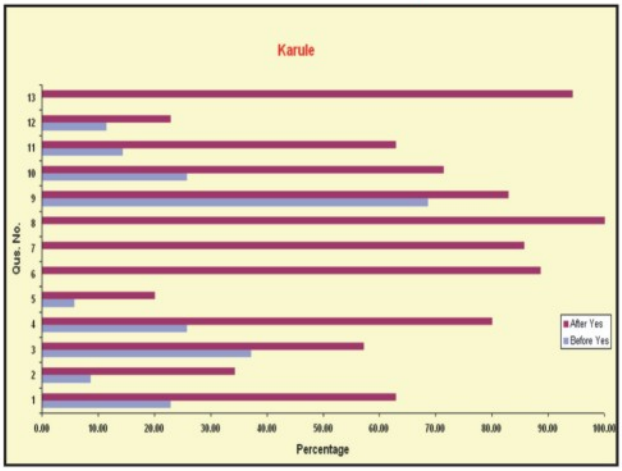


Fig. No. 6.2.17.2

Villagers Opinion about the changes in Water Availability in WS Area

Before & After 'Yes' Opinion



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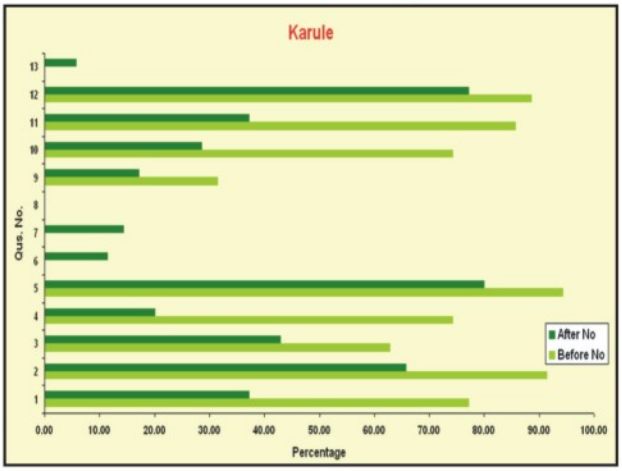
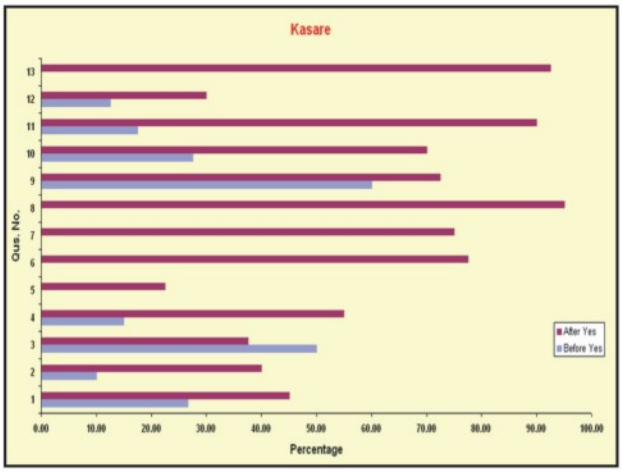
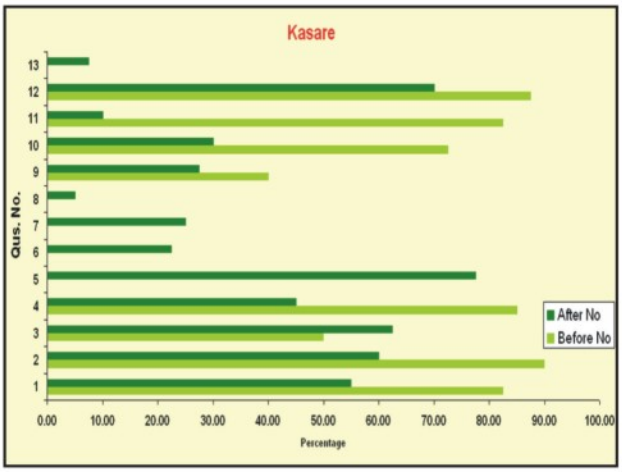
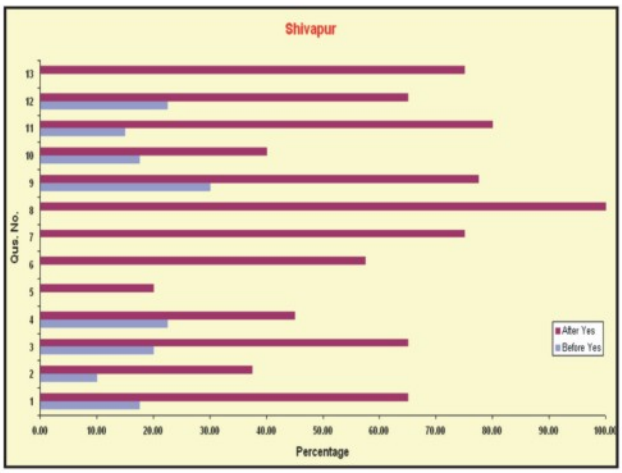
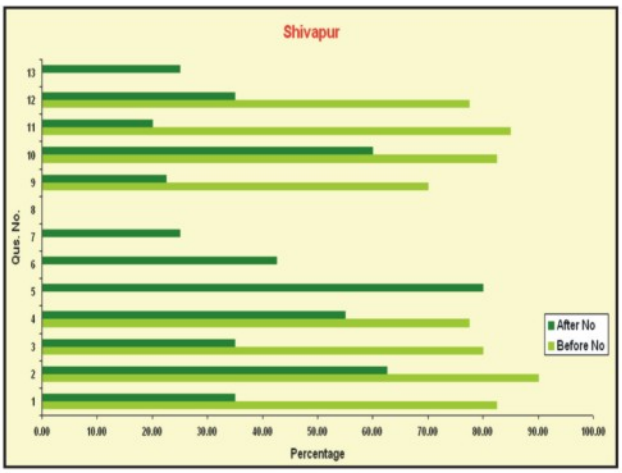
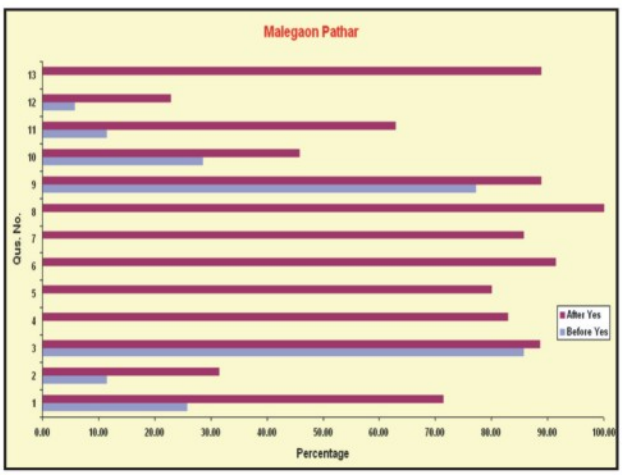












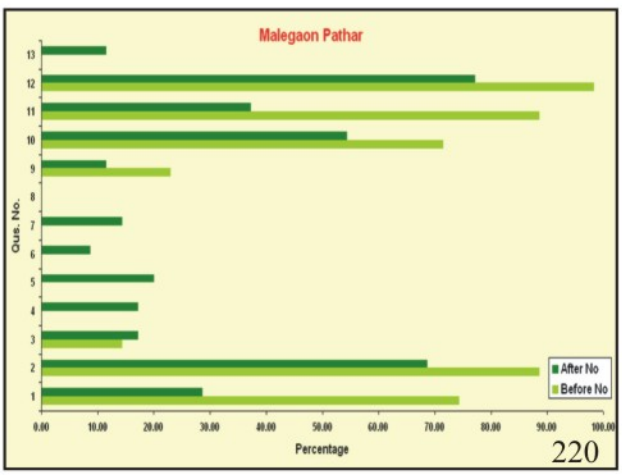
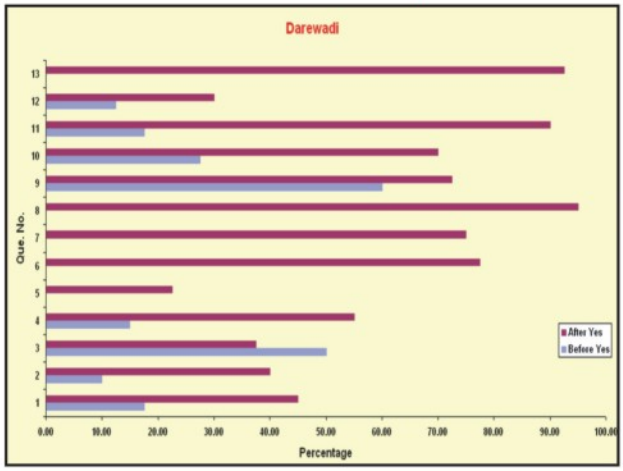


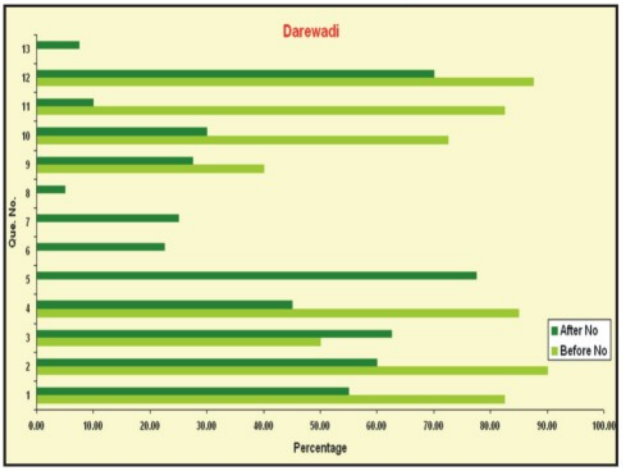
Fig. No. 6.2.17.3

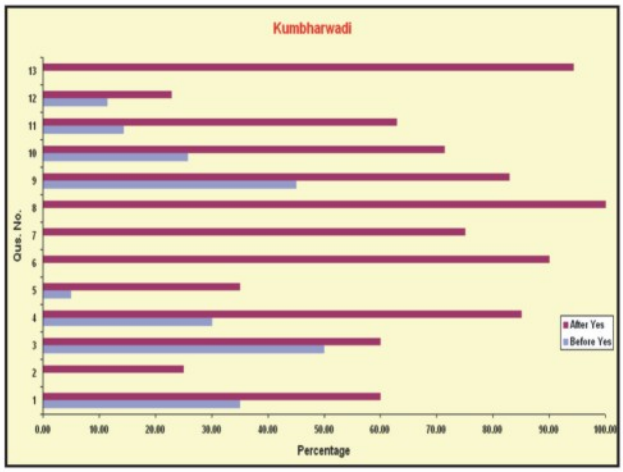
Villagers Opinion about the changes in Water Availability in WS Area

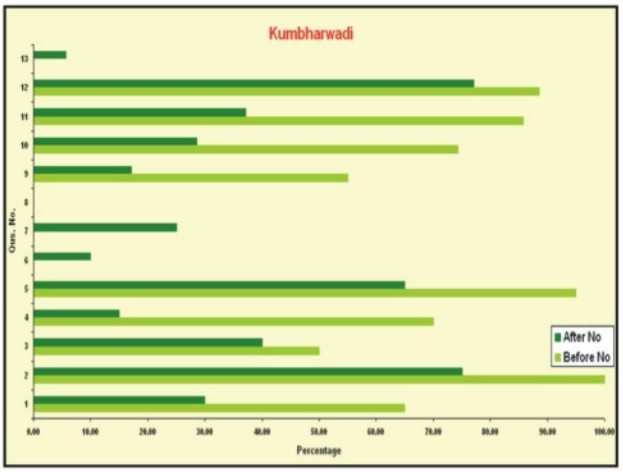
Before & After 'Yes' Opinion

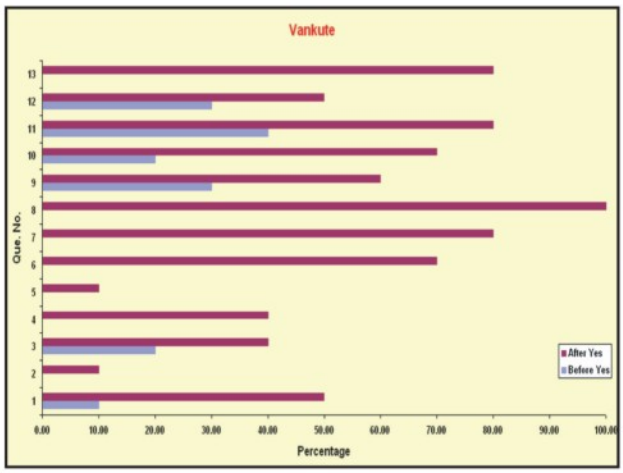


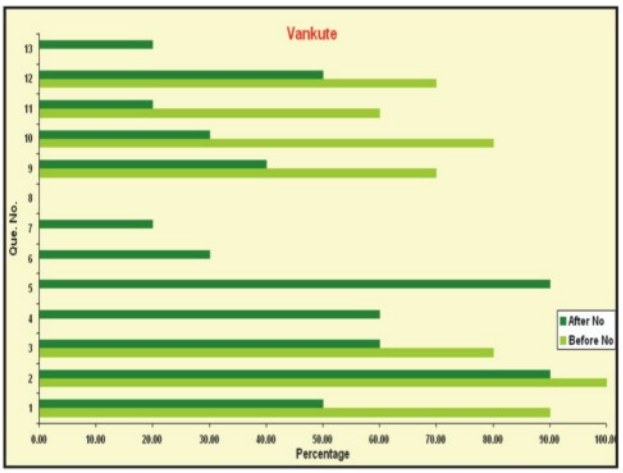
Before & After 'No' Opinion

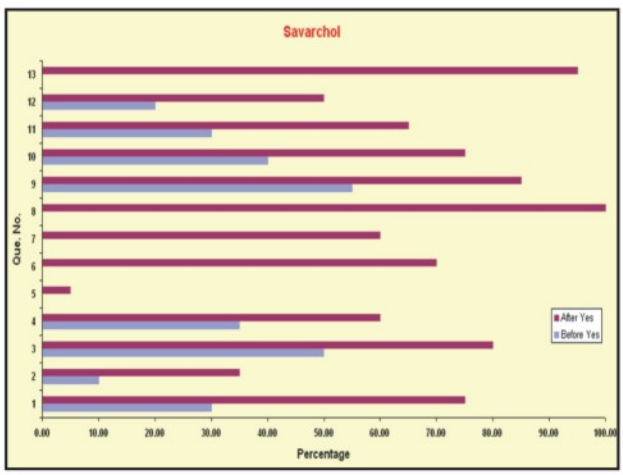


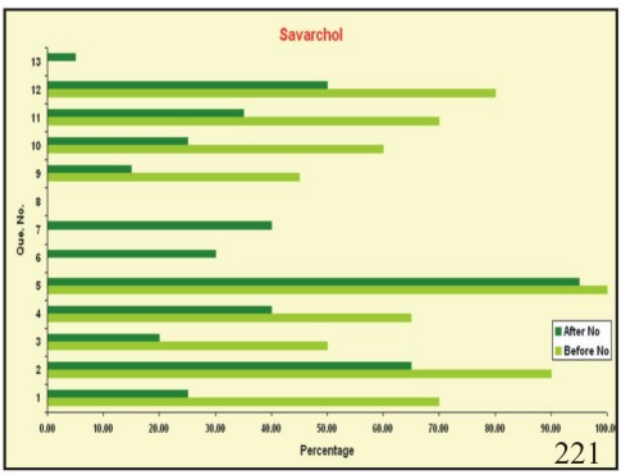












6.2.17 Villagers Opinion on Changes in Water Availability in WS Area.

Table 6.2.17.1, 6.2.17.2, 6.2.17.3 shows comparative Villagers Opinion on Changes in Water Availability in WS Area, before and after WS projects in fifteen villagers by Random Sample. The Data of availability of water before and after WS period was compared with "Yes" opinions and has been shown in Table 6.2.17. It was found that almost all the villagers were of the "Yes" opinion that the water storage structures are useful for drinking water, for cattle, for agriculture and domestic purposes (90.00 to 100.00%). The natural drains are seasonal even though water flow can be seen for longer period due to WS structures (75.00 to 85.00% and 90.00 to 95.00%) in Sarole Pathar, Bhojdari, Karule, Kauthe Kamleshwar, Malegaon Pathar, Darewadi, Kumbharwadi Savarchol, Sattyachiwadi and Mendhavan WDPs.

"No" Opinion of villagers about changes in water availability Before and After WS project has been depicted in Table 6.2.17.1, 6.2.17.2, 6.2.17.3 villagers stated that they are not getting enough water during summer season (65.50 to 77.50 % and 80.00 to 90.00%). Villagers stated that their dug wells are not having adequate water for whole year (60.00 to 82.22 % and 90.00 to 100.00%) in Vankute, Kumbharwadi, Darewadi, Sattyachiwadi, Mhasvandi, Sarole Pathar, Gunjalwadi, Karule, Kasare, Malegaon Pathar & Sawarchol WDPs.

Hence it can be concluded that due to watershed development work their has been considerable improvement in the attitude of people due to soil and water conservation. There is increase in irrigated area, improvement in land utilization, improves livestock, improving economic condition of rural people. Hence, the implementation of watershed development is very essential for the overall development of people.

Chapter VII

Conclusion and recommendations

7.1 Introduction

7.2 Change in land use pattern.

7.3 Change in cropping pattern

7.4 Change in crop productivity

7.5 Change in cost and benefit

7.6 Adaptation level of technology

7.7 Improved live stock production

7.8 Increase in wells and water availabity

7.9 Women empowerment in watershed development project.

7.10 Peoples participation in watershed development project.

7.11 Employment potentials in watershed development project.

7.12 General recommendations.

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7.12.2 Water conservation technologies

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7.12.4 Rain fed farming systems

7.12.5 Effective communication techniques

7.12.6 Wood is the main source of energy

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7.12.8 Funding arrangement :

7.12.9 Human resource development :

7.12.10 Other

CHAPTER VII
CONCLUSION AND RECOMMENDATION

7.1 INTRODUCTION :

The Present study evaluates the WDP implemented under the IGWDP in fifteen villages in Sangamner taluka. The study area falls in sub-tropical climatic zones having an annual rainfall 250 to 350 mm. Erratic rainfall and unequal distribution have remained the characteristic marks of this zones. Because of topographical condition and absence of vegetation cover area is undulating, rugged types, land of this zone have been getting eroded on large scale. Water run-off and soil erosion have led to the wastage of valuable top soil, soil erosion leading to gully formation, low level of crop yield, fuel and fodder production and unchecked grazing rendering the land denuded with poor soil moisture retentively. The income level of masses is abnormally low. The population is dependant on agriculture for livelihood. Earlier the farmers were raising single crop i.e. bajara mostly on rainwater, which is staple food of the people in these villages. After the rainy season some villagers migrated to urban place such as Sangamner, Pune, Nashik, Mumbai, Narayangaon in search of employment. Some people were working under the employment guarantee scheme (EGS) in surrounding areas. The drinking water shortage problem is also experienced for about three to four months during summer months.

The study is based on the case study method of research. Micro level information was collected from the beneficiaries of watershed development area and from the NGO, villages watershed committee (VWC), Mahila Mandal and Self Help Group (SHGs) through personal interview method with the help of specially designed questionnaire based on descriptive, ordinal and open ended questions. The data on various aspects of watershed development programs was collected at two points of time i.e. Before watershed development (Pre) and After watershed development (Post) programme. The fifteen village were covered under IGWDP and at different stage of completion (1991 to 2004) with a view of ascertaining the changes in land use pattern cropping pattern, changes in productivity level, improver live stock production, income, increase in ground water level of well and its suitability for irrigation, increase in area under irrigation, generation of employment, increase in quality & quantity of fodder, fuel and other forest produce.

The land holdings in the sample villages are small and marginal even less than 2.00 ha. The population is dependant on agriculture for the livelihood. The specific problems of the area were diagnosed as low soil moisture retention, poor conservation excessive run-off, severe soil erosion leading to gulley formation, low level of crop yield, fuel & fodder production and unchecked grazing rendering the land denuded with poor soil moisture retentivity. The income level of masses is abnormally low.

7.2 CHANGE IN LAND USE PATTERN

The average holding size of dry land agriculture is comparatively larger than that of the irrigated agriculture land. There is considerable change in land use pattern in the net sown area, gross cropped area, perennial irrigated area, seasonal irrigated area and waste land area in pre WDP to post WDP period for fifteen watershed development project.

Area under perennial irrigation was nil in pre watershed development project which is increased to 18.40 ha, 19ha, 05ha, 04ha, 05ha, 03ha, & 02 ha, after the implementation of the WDP in Darewadi, Gunjalwadi, Malegaon Pathar, Karule, Kasare, Shivapur, Sawarchol, Kumbharwadi & Sattaychiwadi respectively. Seasonally irrigation area has also increased from 54.03 to 443.14 ha. in (Gunjalwadi), 100ha. to 410ha. in (Sarolepathar), 197.23 in to 329ha. in (Darewadi) in pre to post WDP period. Wasteland area has decreased from 231ha. to 90ha. in (Mhaswandi), 238ha to 130ha in (Mendhvan), 117ha to 35ha in (Gunjalwadi) and 123ha to 50ha in (Bhojdari) WS in pre to post WDP period.

Apart from increase in cultivated area and irrigation facilities, use of HYV seeds, fertilizers and pesticides distribution services also contributed largely for achieving agriculture development in the Villages.

Recommendations

1. The alternate land use systems are of great value to achieve sustainable production on marginal land under sub tropical condition. Several forms of Agro-forestry such as agro-horticultural system, agro-silviculture system, and silvo-pastoral system can be practiced as a major alternative land use system for rain fed regions.

2. To take advantage of the large investments in land improvement, agriculture productivity must be increases.
3. Strong support from the department such as Horticulture, Agriculture, Live Stock, Irrigation, forestry and social forestry is needed.

7.3 CHANGE IN CROPPING PATTERN :

With the advent of watershed technologies, there was continuous use of highly improved / hybrid seeds among farmers primarily on economic consideration. Farmers continued with cultivation of local varieties in respect of Bajara, Jawar, Ground nut, Mug, Udid, Chwali, Tur, Onion crops. Number of farmers cultivating local variety of Bajara crop area decreased from 345 to 180ha area in Sarole pathar, 140 to 130ha area in Mashvandi, 290 to 236 ha area in mendhvan, 535 to 440 area in Gunjalwadi, 485 to 350ha area in Bhojdari, 210 to 178ha area in Malegaon Parhar, 520 to 355ha area in Karule, 400 to 364 ha area in Kasare, 273 to 231 ha area in Kumbharwadi, 235 to 160 ha area in Shivapur, 200 to 187 ha area in Savalchol & 700 to 620 ha area in Vankute in post WDP. Improved hybrid variety of Bajara crop has increased from 358 to 430 ha in Darewadi. Area under Ground Nut crop cultivating local variety fell from 245 to 50 ha area decrease in Sarole pathar in post WDP.

Comparative tables revealed that area under improved variety of Onion crop recorded an increase of 510.71% in Sawarchol, 422.22% in Sarole Pathar, 309.09% in Mhaswandi, 266.66% in Darewadi 262.50% in Vankute, 261.29% in Malegaon Pathar, 260.00% in Sattaychiwadi, 229.72% in Bhaojdari, 218.18% in Shivapur, 202.17% in Gunjalwadi, 180.32% in Karule and 168.18% in Kumbharwadi in post WDP.

Percentage increase in area under improved variety of Tomato was reported maximum at Sarole Pathar (375.00), Gunjalwadi (296.87), Bhojdari (272.72), Mhaswandi (271.42), Vankute (212.50), Kumbharwadi (180.18), Savarchol (185.00)

Recommendations :

1) Since improved variety for Onion is recommended for this area farmers should possibily replace it with Tomato and Peas.

2) The yield and area under Bajara is declining so, farmers must be motivated to replace it with Jawar, Onion, Ground Nut, Vegetables, which is the staple food and cash crop of the region.
3) MPKV (Agriculture University) should be associated to undertake plant breeding, keeping of different crops for mixed farming.
4) Farmers must be educated to use improved varieties of Tomato, Pease, Onion, Bajara. If possible the crop should be replaced with Onion as it is more profitable and less water consuming.

7.4 CHANGE IN CROP PRODUCTIVITY :

Agricultural productivity in rain fed area is a function of level of both monetary and non monetary inputs and is generally constrained by several factors such as scare & uncertain water supply, low soil fertility widespread land degradation and soil translocation through erosion consequently application of WDPs technology in the field, crop productivity per hectare in respect of major crops namely Bajara, Jawar, Ground Nut, Wheat, Gram, Tomato & Onion showed improvement in post WDPs compared to pre WDPs phases. Productivity in respect of improved as well as local variety seed continued to remain low as compared to standardized yield due to non-availability of monetary and non- monetary inputs required to achieve higher levels on sustainable basic.

Location of field wise, crop productivity of local variety of paddy was higher in valley region of Sarole Pathar watershed, productivity of local variety Onion increased marginally in post WDP phase compared to pre WDP. Comparatively crop productivity in fifteen watershed increased in post WDP compared to pre WDP. Crop wise maximum increase in Bajara was recorded at 12qt/ha. (Mendhvan, Bhojwdari & Vankute), Ground Nut at 14qt/ha in (Gunjalwadi) and 13 qt/ha at (Bhojdari & Vankute), Wheat at 15 qt/ha (Darewadi), Gram at 9.5 qt/ha at (Bhojdari) and 9.00 qt/ha at (Sawarchol), Onion at 110 qt/ha in (Darewadi), 70 qt/ha at (Shivapur). Tomato at 90 qt/ha (Bhojdari) and 75 qt/ha (Vankute) Vegetable at 80 qt/ha (Darewadi) respectively.

Recommendations :

Selection of proper crop and variety is the first step in any successful crop production. To bring about improvement in productivity per hectare, three things should be available in time i.e. funds, input & technology.

1) For developing better methods of seed selection and distribution technology should be promote. Farmer do not know, which of the traits a bigger size, colour, shine or shape and quality of the grain etc. are important. A study can be undertaken to select seeds according these different parameters.
2) The Dept. of soil conservation (Dept. of agriculture) should make arrangement for timely procurement and distribution of required HYV seeds among farmers.
3) Undertake a breeding and local germplasm development programme to select and spread local high-yielding varieties, which are in tune with specific local agro-climatic conditions.
4) A comparative study on the efficiency of different traditional and modern method seed storing may be made. The results should be disseminated among farmers.
5) Fertilizers, pesticides and plant protection, material implements should be subsidized and made available through single window system.

7.5 CHANGE IN COST AND BENEFIT

Cost and Benefit for WDP was calculate by subtracting average five to ten years cost of cultivation from average five to ten years price of a crop. The area under Bajara decreased and net benefit also increased from Rs.8000/- in pre WDP to Rs.12000/- during post WDP in (Vankute) and Rs. 4000/- in pre WDP to 9600/- during post WDP in (Sarole pathar). Area under Ground Nut increased. Net benefit also increased from Rs. 12900/- in pre WDP to Rs.25600/- during post WDP in (Vanukte) and Rs.5200/- to Rs. Rs.20200/- in (Darewadi). Area under Wheat and Gram increased in villages Vankute, Karule, Bhaojdari and Darewadi resulting corresponding increase in income during post WDP compared to losses reposted in pre WDP. Area under Onion increased and net income increased significantly from Rs.15000/- to Rs.85000/-in (Darewadi), Rs.28100 to Rs.61500/- in (Bhojdari), Rs.25100 to Rs.61000/- in (Sarole pathar). Income from Tomato increased

significantly in Darewadi, Vankute, Savarchol, Mhaswandi and Bhojdari villages in post WDP.

Crop-wise net income in descending order in case of Onion (Rs.85000/-), Vegetable (Rs.68800/-), Tomato (Rs.53200/-), Ground Nut (Rs.25600/-) Wheat (Rs.16600/-), Gram (Rs.16400/-), Bajara (Rs.12000/-) & Jawar (Rs.10450/-). In the cultivation of Bajara, Jawar & Gram the pre watershed losses subside and marginal profits occurred in post watershed development project. Where as maximum income to the tune of Rs.60200/- to Rs. 85000/- (Onion) was reported by farmers of Darewadi, Vankute, Mendhvan and Sarole pathar WDP. Secondly income to the tune of Rs.40000/- to Rs. 69000/- (Vegetable) was reported by farmers of Mhaswandi, Kumbharwadi and Darewadi WDP. and thirdly income to the tune of Rs.30000/- to 54000/- (Tomato) was reported by farmers of Sarole Pathar, Gunjalwadi, Bhojdari, Vankute and Sawarchol WDP.

Recommendations :-

1) The diversification of agriculture in watershed areas is must for increasing the income of the family. Dairy farming, Horticulture (Custard apple, Pomegranate, Mango, Drum Stick, Awala, Tarmind) Poultry, Sericulture and cultivation of medicinal plants, could be the main components of this proposed diversification.
2) Credit plays a vital role in dry land economy especially in rainfed agriculture. To meet the credit needs of farmers, watershed projects need to be linked with credit institutions particularly NABARD, Regional Rural Banks (RRBS), Co-operative Banks, Commercial Banks and Credit Society, etc. That endures free flow of short and medium term loans for dairy farming, poultry and Horticulture cultivation.
3) At the village level through extension activities such as training, workshop seminars and awareness generation camps should be organized for motivating farmers.

7.6 ADAPTATION LEVEL OF TECHNOLOGY :

Adaptation level of technology in terms of agriculture input namely seed, fertilizers pesticides and technology know how for crop production revealed that in

pre WDPs, farmers were using more certified seeds purchased from sale centers. Open market was relied only when seeds is needed quantity or not available in the sale centre. Usage of DAP, Urea, 10:26:26, 18:18:18, 18:46 was recorded to be increase in all fifteen villages under study in post WDP. Similarly number of farmers using chaff cutter and thresher increased during post WDP's. Improved agriculture tools, implements and machinery of new design are of vital importance for increasing farm production reducing the cost from operation and maintenance. The NGOS has close link with MPKV and has successfully arrange the meetings, Panlot Melawas, Field Visit, Study Tours & Training for Women's. This University provided the demonstration to the villagers about adaptation of new technology to process of "Seeing is Believing", "T & V" programme is most helpful to the farmers. Allotments of foundation plots, for propagation of new seeds, technical guidance in respect of agronomical practices may enhance the capability of these farmers for adaptation of latest technology in the field.

Recommendations :

1) Since the area is rainfed, dept. of agriculture should popularize micro irrigation system, drip irrigation and sprinklers system. Farmer should be promoted to dig wells.
2) The design and material used in the pabhar and other harvesting tools possibly be improved to make it more efficient.
3) Demonstration on improved implemented resource management such as use of diesel and electric pumps, thresher, chaff cutter, mechanized plough should be made in the respondent's fields to make them virtually understand the real benefits.
4) Low-cost designed and locally available material brings down the cost of inputs and generates scope for local people to contribute the material required at least in small quantities for some of the public works.
5) Simple engineering designs preferred over complicated huge structures, people can easily grasp design concepts and they can operate and maintain the small and simple structures and equipment. They can even supervise the construction of such structure and the installation of such equipment.
6) Non-engineering measures taken for generation of bio-mass, augmentation of vegetative cover, protection and development of grass cover also reduce soil

erosion and increased availability of fuel, fodder, timber wood for agricultural implements and fruits for own consumption. Social forestry, agro farm, forest, horticulture and grass land pasture development are the important measures.

7.7 IMPROVED LIVE STOCK PRODUCTION :

Man & Animal are complementary to each other. To keep themselves alive, mankind has to depend on animals to meet its various requirements like milk & milk products, meat, eggs, wool etc. The animals have also been used for ploughing fields, drawing water from wells, transportation. Animal dung is used for cooking foods etc. After completion of watershed, local Cows decreased from 438 in pre WDP to 119 during post WDP in Gunjlawadi, in Sarole pathar, Local Cows decreased from 376 in pre WDP to 103 during post WDP. Cross-bred Cows increased significantly form 83 to 278 in Kumbharwadi 31 to 250 in Shivapur 25 to 210 in Mendhvan. Sheep and Goat increased from 1069 to 1548 in Kasare 446 to 795 in Kumbharwadi, but in some watershed projected village sheep and Goat decreased from 2136 to 1338 in Mendhvan 1323 to 810 in Darewadi, Average dairy milk collection increased significatly from 70 lit. to 1410 lit. in Kasare, 110 Lit. to 1315 Lit in Malegaon Pathar & 305 lit. to 1275 lit. in Gunjalwadi.

Recommendations :

1) Live stock production in number and quality would be sufficiently high if the existing rangelands are well managed on scientific basis. Live stock production is optimum from July to December because good nutritive value during that period.
2) For solving the problems of feed and nutrition deficiency there should be feed availability during lean period.
3) The animal in order to produce must have access to enough feed and water throughout the year. Thus water and fodder must be preserved for live stock and human consumption.
4) In the arid regions, mineral deficiency in live stock are very common and these should be controlled by providing mineral mixtures and urea molasses mineral mixture bricks.

5) Dept. of Animal husbandry through proper extension strategies like video films & demonstrations should popularize. Standard procedures for the optimum use of farm animals should be adapted.
6) The veterinary authorities should organize periodic free camps in the villages as the respondents have strong faith in the traditional economy.
7) The shifts from draught animals to tractors has reduced the need to provide grazing land for these stocks. But the farmers do keep other live stock like buffalo, Goat & Sheep for milk, meat and cash income.
8) Improvement of native breeds can be done in two ways firstly by selecting breeding, in which the best bulls of the same breed are used for improving the native breed. Secondly by cross breeding with exotic breeds. In the former method the improvement is low and takes very long period whereas in the later method the improvement is very quick and is reflected in the next generation.
9) Though, the respondents have maintained one or more animals, the milk production capacity is very low. It is suggested to educate them in the use of concentrated feed like oil cakes, sugras, pend and cotton seeds.

7.8 INCREASE IN WELLS AND WATER AVAILABILITY :

All water conservation technology under watershed should aim at minimizing loss of water through runoff, evaporation and percolation. Different soil and water conservation activities performed under watershed development programme could help in recharging of the wells. Five to ten years after completion of watershed number of wells increased from 54 to 179 during post WDP in Karule, 114 to 165 in Gunjalwadi, and 84 to 122 in Darewadi. In addition these wells were bisealsonal (8 months) in pre WDP. After completion of WDP water level of these wells had increase for ten to eleven months. Number of tube wells increased from 18 to 22, 22 to 30, 04 to 10 in Gunjalwadi, Kasare, Kumbharwadi in pre to post WDP. After completion of WDP, there is a ban on digging of tube wells in Sarole Pathar, Medhavan Darewadi, Mhaswandi, Sawarchol and Sattaychiwadi. Water Conservation activity included various structures such as Check Dams, Nala Dams, Percolation Tanks, farm ponds, CCT, and Vanrai Bandhara etc. After completion of WDP the measurement and observation of wells revealed increase in the Ground water level

from 01 to 1.7 m in Sarole Pathar 1.5 to 02 m in Mhaswandi, 2.5 to 3.7 m in Mendhvan, 0.78 to 1.5 in Gunjalwadi, 2.1m in Bhojdari and 01 to 1.5 m in Vankute.

All project focuses on rainwater harvesting. The area irrigated by wells dropped substantially. The water storage structures are for drinking water, for live stock, for agriculture and domestic purposes. Ground water is free from pollution.

Recommendations :

1) The traditional water sources should be rejuvenated by creating awareness among the people. The old baudies, wells and historical tanks, percolation tanks, Nalabunds should be repaired and properly maintained. Women and children should be organized and taught how to conserve water even "drop by drop"
2) In the rural areas particularly in the dry land area incentives should be provided to the people to enable them to construct farm ponds so that rain water can be collected and accumulated to better use of rabbi season crops.
3) The "farm ponds and well" culture should be revived in dry land area. The central and state Government should extend financial and technical help liberally to the people for construction and preservation of farm ponds and wells. The rain water recharging is stored in the farm ponds and peculation in recharging wells.
4) Philanthropists should be encouraged to construct large size village, peculation tanks, tanks, Nalabund, K T wair or farm Ponds in rural areas in order to provide irrigation and drinking water for cattle, while the state Govt. should grant exemption from income tax on amount spent on construction and upkeep of village water storage.
5) Upper regions of watershed must be covered with permanent vegetation and grass cultivation to check soil erosion . Maximum water harvesting structures should be constructed in ridge and middle regions to increase the area under irrigation. In lower regions maximum cultivation could be carried as the water is readily available for irrigation.
6) Constructions of percolation Tanks, Nalaband and bore well etc in the watershed will certainly improve recharging water condition of ground water.

7) Sustained efforts have to be made by the Govt. and various organizations through training motivation camps, posters, wall paintings, hoardings, news papers, radio and television etc to make consumers aware of -
    - No Water.... No Life
    - Water is life
    - Over watering reduces productivity
    - Beware ! save the future generation form water scarcity
    - "Water in the village should remain in the village, water in the fields should remain in the fields"

7.9 WOMEN EMPOWERMENT IN WATERSHED :

Women constitute an integral segment of stakeholders in any natural resources, conservation, management and development project. Experience shows that lack of access to technical education & training, shortage of land & money, poor organization, restricted access to political power & limited ability to influence decision-makers etc are the bariares for their affective participation in watershed development projects.

After five to ten years of completion of watershed the Mahila Mendal and Women's SHGs started operating in the watershed. Each of watersheds established the SHG. In Vankute WS 09 SHGs having a membership of about 150 and per month contribution was Rs. 20 to 100 each with total saving of Rs. 211439/- out of this amount Rs.207300/- loan was utilised for agri development (60.78%) Vermi compost (60.78%) sprinklers (97.77%) Solar lamp (78.14%) Grinder Machine (22.57%) Hot water Chulla (34.73%).

The money circulated in the SHGs was used for creation of assets and productive purpose. Initially the women used the amount for day-to-day needs but slowly shifted to capital expenditure, such as house, land & animal. The SHG member availed the loan facility for agri development and equipment, dairy farming, seeds and fertilizers, education, health and family function. Majority of women used the loan for dairy farming 121.39% in Kumbharwai, 119.99% in Bhojdari, 115.55% in Shivapur, land development 119.18% in Sattaychiweadi, 112.05% in Karule 110.27% in Mendhvan. For seed and fertilizer 80.76% in Malegaon Pathar, 72.30% in Mashvandi. Education 81.40% in Mashvandi, 83.72% in Kumbharwadi, For Health 63.31% in

Mashvandi, 58.45% in Darewadi, for business links (flour mill, grocery shop, stationery shop, bangle selling shop, tailoring shoe mending etc.) 62.59% in Kumbharwadi, 60.37% in Sarole Pathari, 62.43% in Darewadi purchasing agri equipment 90.47% in Sawarchol, 61.98% in Karule WDP.

Women of Sarole pathar, Mhaswandi, Malegaon Pathar, Darewadi and Gunjalwadi possessed moderate level of awareness regarding various watershed technologies. Women have been involved as active members of VWC, FPC, SHG committee member in decision making and execution of work. The emphasis was given by the NGO for development of women by way of introducing various activities such as Aganwadi, Catering training, and employment generating activities i.e. nursery, tailoring etc. The respondents of all the fifteen WDPs emphasized on their empowerment.

Recommendations :

1) There should be development of group dynamics, building leadership quality to realize their potentiality and self belief.
2) The SHG member should be assisted to complete the formalities and documentation required to obtain credit from a bank.
3) SHG groups should be help banks in recovery of credit by motivating members for prompting repayment of loans.
4) There should be establishment of eco-clubs comprising of 20-30 members in each group for imparting environmental education and mobilizing participation of people in various environmental conservation activities which indirectly would benefit the women.
5) Apart from finance, health and education there are the areas which need in the process of empowering rural women such as gender equality and balance representation of all caste groups. The health & family welfare committees formulated at the village level would benefit the rural women.
6) There should be equal wages to Man & Women for equal work.
7) The participation of women resource in decision making should be facilitated.
8) Watershed projects should be implemented in two stages, during the first stage the project implementation agency should understand the community, conduct a livelihood resource survey, and build women's organization. The budget

provided for entry point activities could be used for this in addition to an extra budget could be provided for capacity building for the agency staff.

9) Livelihood options should be provided for women through appropriate income generating activities.
10) Technical training should be made available to women.
11) 50 percent representation of women in the Gram Sabha should be made compulsory.
12) It should be insured that the time and venue of meeting is convenient for all members of the community.

7.10 PEOPLE PARTICIPATION IN WATERSHED

Participation in watershed management is recognized as a preferred tool to address the issues associated with balancing environmental concerns and consumptive use of water. It consists in fulfillment of ingredients of equity empowerment, decision-making and active participation of the ignored sections of society and stake holders in the major social institutions and development programmes.

In Sangamner Taluka Associations (TA) Village Watershed Committee (VWC), Forest Protection Committee (FPC), Mahila Mandal (MM), User Group (UG), Farmer Help Group (FHG), Self Help Group (SHG), Youth Club (UC), Gram Panchayat Member, Co--Operative Society Member, Dairy Member & Bhajni Mandal ensures peoples participation for watershed development projects.

Data from Mendhvan WDP indicated that the participation of VWC (16%), Mahila Madal (19%), FPC (14%), Gram Panchayar Member (6%), Co-operative Society Member (4%), Dairy Member (6%) Youth Club (4%), Bhajni Mandal (11%) & No participated (6%). In Sarole Pathar WS 85% participate & 15% did not participate. In Darewadi WS 96% participated & 4% did not participate. The response rate is high because of generation of awareness & motivation among respondents. The main response for VWC team occupied forest rank, NGO, Informal group, Leaders, SHG, FHG & other activity like exposure visit.

Data from Kauthe Kamleshwar WDP indicated that 60% participated & 40% did not participate. Shivapur WDP indicated that 76% participate & 24 did not participate. The non response rate though high was attributed to the various reasons and the basic cause was found to be participation need was not necessary. The other

reasons were Unawareness about the watershed development programmer, The project was not as per the local needs, no contribution of shramdan, Local politics & insufficient awareness generation by NGO.

Recommendations :

1) A participatory micro plan at grass-root level must be prepared for the overall development of cluster villages covering all socio-economic and natural resources management dimension. The participation of women and weaker sections of society must be ensured in planning, implementation and evaluation of watershed project. People potentially affected by the project need to be more actively involved at designe stage of the project.
2) The interests of small and marginal farmers, landless labours, women and other workers, sections of the society which were earlier neglected must be included in designing diversified income generation activities and special training programmes must be planned for rural youth and women.
3) The tribal / rural communities living inside the reserved forest must be given some legal position and stake in the forest management. Van Panchayats and joint forest committee (JFC) should be formed and few position must be reserved for women members. Social rules for harvesting of forest products must be formed.
4) Indigenous knowledge and local material should be better utilized in the design and implementation of the project activities, particularly in case of vegetative barriers and forestry models, which emphasized fodder and fuel productions.
5) Evolved catalysts and leadership in the effective functioning and sustainable management of VWC (Village Watershed Committee), FPC (Forest Protection Committee) WUS (Water Users Society), NGO (Non-Government Organization) and other social institutions should be strengthened. Since VWC is an integral part of the village protection force, it must be given the status of sub-committee.
6) Appropriate education films and field trips organized can be used to teach farmers about various methods of rainwater conservation and afforestation. Regular visits of field functionaries in watershed area should be organized and

instituting awards and prize should be give for the sincere involvement of farmers in practicing rain water harvesting techniques.

7) Steps should be taken to popularize the self help group concept among formers so that they get loans subsidized from the banks and Government with marginal interest rates.
8) Extension activities should be organized under watershed development project such as rehabilitation of degraded terrain, demonstration of conservation and income generation works, field. observation, extension meetings etc. The role of women in sharing ideas and experiences in these diverse activities on conservation can not be undermined. In this connection, efforts should to made to develop leadership among women and encourage them to form groups.
9) To ensure assimilation of improved indigenous soil and water technologies in the initial years, focus should be placed on building group at village level through exposure visits to farmers, sharing workshops and training of village leaders and front line staff.
10) A scientific study may be carried out on the use of different storage technologies Nala Bund, Farm Pond, different type of seeds and the results should be disseminated among the farmers.
11) To provide shelter for livestock a combination of modern and traditional low cost technologies must be evolved.
12) People friendly use of common land should be promoted as grazing is now a low priority need in view of the declined usage of bullocks and maintenance of large herd of cows.
13) Festivals, religious place and other social institutions may be suitably utilized for continuing the cause of watershed development, successful implementation of soil conservation work in the initial stages generates an influx of visitors like farmers from surrounding areas, journalists, social scientists and Govt. officials to the project area. This formula may be productively utilized for impressing the villagers to further participate in the watershed development process.

7.11 EMPLOYMENT POTENTIALS IN WATERSHED

Agriculture in watershed area is dominated by unorganized sector activities offering almost (Zero) negative rate of growth and elasticity of employment. Further subsistence farming of low value crops on marginal lands, has resulted in the problem of under employment, low wages & poverty.

During the pre WDPs period agri employment was available for 03 to 04 months in a year in all fifteen WS area. Earlier 60% to 70% of villagers were fully employed on there own farms. In pre WDPs period some families from near by village have settled in these village and agricultural labours from surrounding area could find jobs. Some villagers migrated to Sangamner, Nashik, Mumbai, Pune, Narayangaon cities and were engaged in unskilled job there. Some people were working under EGS (Employment Guarantee Scheme) in surrounding areas. After the implementation of the WDPs agri employment was available for 09 to 10 months and 07 to 09 months in Mendhavan, Sarole Pathar, Bhojdari, Shivapur, Kumbharwadi, Malegaon Pathar, Darewadi, Mhaswandi, Gunjalwadi & Sattyachiwadi WDPs respectively. During pre watershed period the daily agri wage rates were low i.e. Rs. 20/- for Female & 25/- for Male in Sattyachiwadi, Savarchol, Darewadi, Shivapur & Sarole Pathar WDPs and Rs. 30/- for Female & 35/- for Male in Malegaon Pathar, Mendhvan, Mhaswandi, Gunjalwadi, Bhojdari, Kasare, WDPS respectively.

After post WDP's it was observed that the Agri wage rate increased to Rs. 65/- for Female & 70/- for Male in Mendhvan, Bhaojdari, Mhaswandi, Sarole Pathar, Malegaon Pathar WDP & Rs. 50/- for Female & 55/- for Male in Darewadi, Sattyachiwadi & Shivapur WDPs.

After implementation of WDPs there was increase in Agri employment & Agri allied activities like- Dairy farming recorded marginal income increase and increased in mandays, Poultry, dry land, Horticulture, nursery, Tailoring, Flour mills, Grocery shop, Stationary shop, Bangle Selling, Shoe Mending and Agri wage rate. Villagers altered there land, started growing new cash crop, adopted new package of inputs for cultivation crop which resulted in increased agriculture production and availed micro finance loan from SHG.

Recommendations :

1) Farmers must be trained for generating additional income opportunities by adopting Dairy farming, vermicompost and cultivation of medicinal plant.
2) Credit at normal rate of interest should be provided by banks, co-operative banks, credit society and financial institutions to the SHG's, UGS, FHGs and individuals who will create additional employment opportunities in the watershed area.
3) Most of male family members were engaged as casual laborers during lean agriculture period. so they may be trained properly in the execution of effective management and supervision jobs.
4) Manufactures of water bag, Cap, Onion bag, Rope, Tailoring, Spices, Awala Candy, Tea, Papad, Solar candles and Embroidery, basket making should be encouraged by SHGs and rural co-operative groups.

7.12 GENERAL RECOMMENDATION :

7.12.1 Soil Conservation Measures Improvement

1. Barren grazing land should be given to landless people for grazing and horticulture with nominal lease amount.
2. After the completion of soil conservation works, the sustainability must be maintained though the fund organized by villagers and govt. agencies.

7.12.2 Water Conservation Technologies

3. Use of watershed approach in the catchment area by afforestation and contour bunding from the ridge to valley inflow and reduce silt load eviction of encroachment from the run-off water catchments area watershed area and afforestation in the upper area should be popularized.
4. Training must be given to the farmers for the construction of farm pond is in middle and lower resign of watershed area.

7.12.3 Afforestation activities :-

5. Several species like custard apple, Awala, Pomogranate, Turmeric, Mango, Drumstick, etc. are suited for the area. Propagation for seed and seedlings

graphting, layering, manuring should be demonstrated by the dept of Horticulture to motivate the farmers.

6. Majority of farmers are poor so fruit tree should be given in subsidized rate to develop interest among farmers.
7. Horticulture nursery must be maintained in the watershed area so that farmers can easily purchase the plants.

7.12.4 Rain fed farming systems :-

8. One third of Maharashtra is covered by dry land so agricultural productivity depends on rains in such circumstances the development of watershed attains great important. Water in the ponds should remain in the ponds; water in the fields should remain in the fields. water in the villages should remain in the village. These should not remain merely a slogans but it should be implemented for the development of watersheds.
9. Integrated programmers for the development of watershed should be worked out and implemented, and they should include agriculture extension, cultivation of pulses and oilseeds, Wasteland should be developed with plantation of medicinal plants and pastures should be developed with good quality grass. Development of dairy and poultry farms and sheep breeding should be explored and be entrusted more and more to voluntary organization (NGO)
10. People should be taught the advantages of sprinklers and drip irrigation and should be encouraged to adopt these methods by providing them with incentives grants and liberal loans from banks.

7.12.5 Effective communication techniques :-

11. Farmers have to be made aware that conservation works should be undertaken over a wider area.
12. Selected fields may be marked for seed plot production instead of grains. A social system may be created for enabling exchange of seeds of the best fields between different villages and farmers.
13. Dept. of Agriculture must make available reliable local seed in packages.

7.12.6 Wood is the Main Source of Energy :

14. Barren area should be under taken for planting a fuel wood plantation.
15. Intensity bund plantation on the boundaries of agriculture fields should be adapted.
16. Improve shelter belt plantation (road side, farm boundaries) should be implemented.
17. Development of fuel farm with stranded selected species suitable for waste land area should be promoted.
18. Use of solar cookers and solar PV pumps for drip irrigation in water scarcity areas should be popularized.

7.12.7 Implementation Arrangement :-

19. Clear criteria should be developed and implemented for the selection of both government and non government organization to become project implementing agencies.
20. Procedure should be introduced to ensure the project implementing agency staff is full time.
21. All watershed development teams should contain one Mahila Samaj Sevika (MSS) Member.
22. Institutionalized mechanisms are needed for strengthening partnership between government, private sector, non- governmental agencies, research institutions and clearly defining their roles and responsibilities to achieve convergence and efficiency.
23. Renewed efforts are needed at central and state government levels to reach agreement with the ministry of Environment and department of forestry to implement joint forest management (JFM) in watershed project area.
24. The project duration should be increased from three to four years to allow for a longer capacity-building phase and provision for handing over phase. No additional expenditure on works is envisaged overhead costs of project implementing agencies and watershed development teams will need to be increased accordingly.
25. During the second half of the project the NGO and VWC should produce an action plan detailing how investment will be maintained. This should include details of procedures and responsibilities for managing the maintenance funds

after the project ends. This must include measures to ensure transparency and clear accountability.

26. A small number of NGO's should be selected and assigned responsibility to provide support to them. Each NGO would be responsible for a specific area. Their responsibilities may include provision of technical and institutional support as needed and providing continuous training of WSD. Provisions for meeting the cost of these "Support teams" will need to be made.
27. State directives should be issued by the IGWDP and the department of forestry, clearifying the position with regard to the development of forest land in watershed. This should direct whenever forest land forms part of micro-watershed. It should be given appropriate treatment.
28. In every watershed a notice or black board detailing financial outlays and progress report of physical works should be displayed in a permanent place.

7.12.8 Funding arrangement :

29. The fund provided under the Guidelines for the works component should remain unchanged.
30. The fund provided for administrative over heads should be calculated separately and be linked from the rate-per-hector formula. It should be calculated above all to ensure that project implementing agencies can operate effectively.
31. Extra funds required for making last minute modification in the design of works / inputs necessitated due to changing situation in the project area. This is always essential, as the cost estimates done by government agencies are based upon uniform design of the works.
32. Extension services and training, special kind of extension services and training is requited to be provided to the community for this purpose. for example, some extra funds have to be required for organizing educational tour for the people from project area to various demonstration sites.
33. Promotion of other facilities like environmental, sanitation, health, hygiene and non-conventional energy sources. Once the villagers become aware of watershed development, they demand these additional inputs.

7.12.9 Human resource development :

34. Training at all levels should contain components on gender awarness and on the role of social scientists.
35. Training in awareness and attitude change should be provided for collectors to intensify them to the benefits and needs of participatory approaches.
36. Workshop for regional and state level functionaries should be organize on watershed development at regular time to exchange ideas and discuss future strategies.
37. Watershed development should be introduced into the university curriculum for engineering and non-agriculture universities.

7.12.10 Other

38. The review recommended that stronger links to be established between the central government, state government, district and taluka levels, for the better strategic planning and management.
    a) Strategic linkage of watershed development with wider rural development initiatives.
    b) There should be permanent staff for training and such training center should be located at district level.
    c) There should be provision for Monitoring and evaluation of WDP.
    d) Strategic selection of watershed development sites should be consider agro-ecological and socio-economic characteristics of the villages.
39. Looking to the fact that one third of the area of Ahmednagar District is a dryland and dependence of most of agriculture on vagaries of rain and the declining level of ground water so the conservation of land and water in the area becomes very important.
40. The implementation should include provisions to ban new tube wells in the "Dark Zones" (watershed area).
41. The Sahydadri Range, which is called lifeline of Ahmednagar District (Maharashtra), should be included in the Mountainous. Region Development Programme and should be protected against cutting of forest and cattle grazing, so that its forest wealth can be conserved

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२४. विठ्ठल म.शेवाळे- संघर्ष (कॉ.दत्ता देशमुख गौरव ग्रंथ)
२५. कदम जनार्दन आणि एस्.बी.वराडे, जलसंधारण विकास, राजहंस प्रकाशन, पुणे.
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COMPARATIVE STUDY IN WATERSHED DEVELOPMENT PROGRAMME IN SANGAM,NER TALUKA.

ANNEXURE - I

QUESTIONNAIRE - I

A) INFORMATION OF WATERSHED DEVELOPMENT PROGRAMME.

- WDP Name : Taluka Sangamner.
- WDP No. :
- WDP Start Year :
- WDP Close year :

B) GEOGRAPHICAL INFORMATION -

Total Geographical are ha.

A] LAND USE PATTERN.

Sr. No.	Particular	Before WS (ha.)	Percentage	After WS (ha.)	Percentage
1.	Government forest				
2.	Gaothan				
3.	Gairan				
4.	Seasonal irrigation				
5.	Perennially irrigation				
6.	Rain fed				
7.	Uncultivable land				

C] CROPPING PATTERN AREA KHARIP SEASON (IN HA)

Sr. No.	Crop	Before WDP			After WDP			After 10 years of WS completion		
		Unirri	Irri	Total	Unirri	Irri	Total	Unirri	Irri	Total
1	Bajara									
2	Jawar									
3	Ground Nut									
4	Paddy									
5	Mix Crop									
6	Other									

D) CROPPING PATTER AREA RABI SEASON (HA.)

Sr. No.	Crop	Before WDP			After WDP			After 10 years of WS completion		
		Unirri	Irri	Total	Unirri	Irri	Total	Unirri	Irri	Total
1	Wheat									
2	Gram									
3	Jawar									
4	Other									

E) CROPPING PATTERN AREA VEGETABLE CROP.

Sr. No.	Crop	Before WDP			After WDP			After 10 years of WS completion		
		Unirri	Irri	Total	Unirri	Irri	Total	Unirri	Irri	Total
1	Onion									
2	Tomato									
3	Potato									
4	Pease									
5	Chilles									
6	Other									

F) CROP PRODUCTION AND INCOME (BEFORE WATERSHED DEVELOPMENT PERIOD)

Sr. No.	Crops	Season	Yield (Auints) per ha	Price quint	Gross value of production	Cost of cultivation	Net income
1	Bajara						
2	G. Nut						
3	Wheat						
4	Gram						
5	Onion						
6	Tomato						
7	Vegetable						

G) CROP PRODUCTION AND INCOME (FIVE YEARS AFTER COMPLETION OF WATERSHED) [RS. PER HA.]

Sr. No.	Crops	Season	Yield (Auints) per ha	Price quint	Gross value of production	Cost of cultivation	Net income
1	Bajara						
2	G. Nut						
3	Wheat						
4	Gram						
5	Onion						
6	Tomato						
7	Other						

H) CROP PRODUCTION AND INCOME (TEN YEARS AFTER COMPLETION OF WATERSHED) [RS. PER HA.]

Sr. No.	Crops	Season	Yield (Auints) per ha	Price quint	Gross value of production	Cost of cultivation	Net income
1	Bajara						
2	G. Nut						
3	Wheat						
4	Gram						
5	Onion						
6	Tomato						
7	Vegetable						

I) POPULATION OF LIVE STOCKS (GROWTH IN DAIRY FARM)

Sr. No.	Particular	Before WS	After five years completion of WS	After Ten years completion of WS.
1	Local Cows			
2	Cross-bred-cows			
3	Sheep & Goat			
4	Average dairy milk collection [in liters]			
5	Selling price for milk [in Rs/lit.]			

J) NUMBER DEPTH OF WELL AND OTHER IRRIGATION RESOURCES.

Sr. No.	Particular	Before WS	After five years completion of WS	After Ten years completion of WS.
1	Total numbers of wells			
2	Average depth of wells			
3	Wells with parapet wall			
4	Total number of tube well			
5	Average depth of tube well			
6	Total number of checks dams			
7	Total number of percolation dam			

K) WATER TABLES STATUS (RAIN FALL WATER TABLE RELATIONSHIP)

Sr. No.	Gat No. / yers	Before WS	After five years completion of WS	After Ten years completion of WS.
1	Rain fall			
2	Gat No. depth of well			
3	Avg. depth of water table below G.L. (cm)			

L) SOIL AND WATER CONSERVATION MEASURES ADOPTED WATERSHED TREATMENTS

Sr. No.	Particular / works	Achieve-ment Qty.	Sr. No.	Particular / works	Achieve-ment Qty.
a)	Soil conservation		d)	Water conservation	
1	Total area treated (h)		1	Gully plugs (no)	
2	C.C.T. (m)		2	Gabions (no)	
3	Farm bunding (h)		3	Nalla bunds	
4	Stone bunding (h)		4	Farm pond (no)	
5	Land leveling (h)		5	Check dam (no)	
b)	Plantation		6	Percolation tank (no)	
1	Aforestation (h)		7	Vanrai Badhara (no)	
2	Grass land with grass and CCT		8	Under ground bunds (no)	
c)	Horticulture		9	Others (no)	
1	Dry land Horticulture plantation (h)				
	Total cost of soil conservation (rs/h)			Total cost of soil conservation (rs/h)	

SOCIO- ECONOMIC ASPECT IN WATERSHED DEVELOPMENT PROGRAMME IN SANGAMNER TALUKA

ANNEXURE - II

QUESTIONNAIRE - II

A) INFORMATION OF WATERSHED DEVELOPMENT PROGRAMME

- WDP Name — Taluka : Sangamner
- WDP No. — Dist. A. Nagar

B) DEMOGRAPHIC DETAILS

Sr. No.	Details of the population	Per WS population	Post WS population
1	Total population		
2	No of family		
3	Male		
4	Female		

C) EDUCATIONAL STATUS

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	Primary		
2	Secondary		
3	Graduates		
4	Post. Graduates		

D) PER AND POST WATERS LED COMPARISON OF

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	Transport vehicles		
2	Tractors		
3	Motor Cycles		
4	Bullock cart		
5	Testers		
6	Kadaba cutter		
7	Spray pump		
8	Telephone		
9	Television		
10	Kichan Graden		
11	Individual Latrines		
12	Soak pits		

E) PRE AND POST WS COMPARISON OF SOCIAL SERVICES SECTOR UNIT

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	Medical Store		
2	Libary		
3	Tample		
4	Mosque		
5	Youth Club		
6	Mahila Mandal		
7	Bhajni Mandal		
8	Gyam		
9	Hotel (Tea stall)		
10	Carpentery unit		
11	Tailoring unit		
12	Barber unit		
13	Grocery unit		
14	Flour mill		

F) PRE AND POST WS COMPARISON VILLAGE LEVEL INSTITUTIONS

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	National Banks		
2	ADCC Bank		
3	Credit Co-operative		
4	Gram Panchayat		
5	Co-Operative Society		
6	Dairy		
7	SHG's		
8	FHG		

G) AGRI EMPLOYMENT (MONTHLY) & DAILY WAGES FOR MAN & WOMEN

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	Agri employment		
2	Agri wages rate – Men		
	Agri wages rate – Women		

H) PRE AND POST WS COMPARISON OF THE LAND VALUE.

Sr.No.	Educational Status	Per WS Educational Status	Post WS Educational Status
1	Cropped land value (rs.)		
2	Waste land value (rs.)		

I) SHGS STATUS OF WDPS

Sr. No.	Name of the SHGs	Number of SHG	Saving	Total Saving	Loan	Loan Utilization

J) STATUS OF LOAN UTILIZATION

Sr. No.	Loan Utilization	Medhawan	Sarole Pathar	Mhaswandi	Bhojdari	Gunjalwadi	Malegaon Pathar	Karule	Kasare	Kubharwadi	Shivapur	Darewadi	K.Kamleshwar	Savar chol	Vankute	Sattaychiwadi
1	Land development															
2	Dairy Development															
3	Seed Fertilizer															
4	Agri Equipment															
5	Family Function															
6	Education															
7	Business															
8	Health															
9	Hot Water Chula															
10	Drip / Sprinkler															
11	Solar Lamp															
12	Grinder Machine															
13	Saloon Parlor															

K) VILLAGERS OPINION ABOUT THE CHANGES IN TERRAIN FUTURES DUE TO WDP

Sr. No.	Statement	Before WS		After WS	
		Yes	No	Yes	No
1					
2					
3					
4					
5					
6					

L) VILLAGERS OPINION ABOUT THE CHANGES IN LAND UTILIZATION IN WS AREA.

Sr. No.	Statement	Before WS		After WS	
		Yes	No	Yes	No
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					

M) VILLAGERS OPINION ABOUT THE CHANGES IN WATER AVAILABILITY IN WS AREA.

Sr. No.	Statement	Before WS		After WS	
		Yes	No	Yes	No
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					