Chapter VII

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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 possibly 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, Bhojdari 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 Gunjalwadi, 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 significantly 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 biseasonal (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, newspapers, 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 from 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 barriers 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.
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 labour 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
5. Graphing, 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 undertaken 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, clarifying 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-hectar 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 awareness 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 organized 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 considered 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 Sahyadri 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.