# UNIT 1 WATERSHED MANAGEMENT PROGRAMMES

**Structure**



## 1.1 INTRODUCTION

Watershed management implies the rational utilization of land and water resources for optimum production with minimum hazard to natural resources. The concept of watershed management is essentially adoption of soil and water conservation practices in the watershed. The aim of these practices are proper land use, protecting land against all forms of deterioration, building and maintaining soil fertility, conserving water for farm use, proper management of local water for drainage, flood protection and sediment reduction and increasing productivity from all land uses.

India has vast experience of implementing watershed programmes both by the government as well as Non Governmental Organisations (NGOs) sector. Beginning with *ad hoc* soil and water conservation measures over three decades ago, what has evolved is a national level, integrated, inter-sectoral, participatory approach to micro-watershed management. One of the main factors that influenced the change from *ad hoc* soil and water conservation measures to an integrated micro-watershed management approach was the success of local initiatives by NGOs in watershed management. The most significant early initiatives were those in the villages of Sukhomajri (near Chandigarh) and Ralegan Siddhi, District Yavatmal (Maharshtra).

With the help of a case study, this unit discusses the management of watershed programme.

After studying this unit, you should be able to:

- explain the meaning of watershed management;
- explain the importance of community participation in watershed management and its essential components of a sustainable watershed management;
- describe the integrated approach for watershed development; and
- discuss various measures of water harvesting in watershed management.

## 1.2 WATERSHED MANAGEMENT

### 1.2.1 Meaning of Watershed

Watershed is defined as 'a geohydrological unit draining to a common point by a system of drains'. All lands on earth are part of one watershed or other. Watershed is thus the land and water area, which contributes runoff to a common point. In other words, watershed is a topographically delineated area draining into a single channel. Watershed is considered as a biological, physical, economic and social system too. Viewed in another angle watershed is a natural unit of land, which collects water and drains through a common point by a system of drains. Hence it comprise of a Catchment Area (Recharge Zone), a Command Area (Transition Zone) and a Delta Area (Discharge Zone). Therefore, watershed is the area encompassing the catchment, command and delta area of a stream. The top most portion of the watershed is known as the "ridge" and a line joining the ridge portions along the boundary of the watershed is called a "ridgeline". A watershed is thus a logical unit for planning and optimal development of its soil, water and biomass resources.

Watersheds could be classified into a number of groups depending upon the mode of classification. The common modes of categorization are the size, drainage, shape and land use pattern. The categorization could also base on the size of the stream or river, the point of interception of the stream or the river and the drainage density and its distribution. The All India Soil and Land Use Surveys (AIS&LUS) of the Ministry of Agriculture, Government of India, have developed a system for watershed delineation like water resource region, basin, catchment, sub-catchment, and watershed. The usually accepted five levels of watershed delineation based on geographical area of the watershed are the following: -

i. Macro watershed (More than 50,000 ha)

ii. Sub-watershed (10,000 to 50,000 ha)

iii. Milli-watershed (1000 to10000 ha)

iv. Micro watershed (100 to 1000 ha)

v. Mini watershed (1-100 ha)

A watershed could be described as fan shaped (near circular) or fen shaped (elongated). Hydrologically the shape of the watershed is important, because it controls the time taken for the runoff to concentrate at the outlet. Watersheds may also be categorized as hill or flat watersheds, humid or arid watersheds, red soil watershed or black soil watershed based on criteria like soil, slope, climate, etc. Depending on the land use pattern, watershed could again be classified as highland watersheds, tribal settlements and watersheds in areas of settled cultivation.

### 1.2.2 Meaning of Watershed Management

After knowing the meaning of watershed, now it is appropriate to know the meaning of watershed management. In the past, watershed development programmes mainly concentrated on the technical aspects, due to which expected results could not be achieved and the impact could not be sustained.

These programmes failed to achieve their objectives, because the people for whom these programmes were meant were not involved. NGOs recognized the need for community participation, and concentrated their efforts on building community level institutions for implementing the watershed development programmes. It is well recognized now that while government agencies have the technical expertise, the non-government agencies have the skill for facilitating people's participation. In fact the most successful watershed development projects have been those that combined the technical expertise of the line departments of the government with the community organization skill of the NGOs.

With the understanding that community involvement was the prerequisite for the successful implementation of the watershed development programme, came the concept of "Watershed Plus". Watershed development came to be recognised as both a technical as well as a social programme. Watershed plus refers to the social and equity aspects of the community which are outside the technical sphere of watershed development. Watershed plus basically implies that watershed development is an integrated, inter-sectoral programme, and the success of the programme depends upon how "integrated: the approach is in its implementation". In other words, it is called as participatory watershed management.

Participatory Watershed Management (PWM) is geared towards the management of natural resources by farmers and communities; the alleviation of poverty, and the overall development of rural families. Local people, especially the poor and disadvantaged have organized themselves with support from governments and NGOs to actively manage water and forest resources. The implementation of participatory watershed management practices has enabled communities to overcome problems and gain more control over their natural resources and livelihoods.

## 1.3 COMMUNITY PARTICIPATION IN WATERSHED MANAGEMENT

### 1.3.1 Need for Community Participation in Watershed Management

The traditional system of natural resource use in rural communities has significantly evolved over the years. In the past, priority of watershed management was given to the Biophysical frame work of watershed which is often based on top-down approach (Rhoades and Elliot, 2000). However in the traditional system, local people were not often consulted in the design of top-down approach, which resulted in failure of projects in achieving the project goals. Watershed projects are more efficient and effective when users are given a role in managing their own watershed resources (Johnson et. al, 2001). User participation has a lot of implications for watershed management and research. There was hardly any scope for learning in the traditional approach and there would be tendency towards giving priority to the biophysical frame work of watersheds justified a top-down planning approach. Planning in the traditional system was often based on the capacity of land rather than needs and capacities of local people (Rhoades and Elliot, 2000). This produced a mismatch between local population and outside watershed project managers and no flow of

information between land users and other key actors such as researchers, planners and policy markers etc.

A major challenge in the traditional watershed management approach was the assumption of technology transfer instead of development of technology on peoples' land and their surroundings. Another important weakness was regarding the training and research where the major responsibility for training has been given to agricultural research institutions and agricultural universities, which are sound in technical aspect of watershed, but are weak in social science aspects of the institution building as well as forging links with non-farm sector to generate value added products from watersheds (SRISTI, 2005). Another key weakness is ignoring local knowledge on local soil types and conditions for suitability of technology to the specific soil while designing and implementation of the projects. It would be better to adopt on-farm research trails for watershed projects designed and implemented jointly by users, scientists and other stakeholders. Farmer participation in the on-farm research will provide an interactive mode so that both scientists and farmers can decide on the conduct of trials and technology testing and active involvement of stakeholders in the research is important for successful adoption of technology. The top-down approach was not conducive for including the stakeholder's participation in designing the programs that are targeted to their improvement. There was lot of mismatch between the needs of the stakeholders and the activities for implementation of watershed development. Such watershed projects often failed to achieve the intended targets in the absence of peoples' participation. Realizing this, participatory watershed management has emerged as a new paradigm for watershed development in India. This paradigm shift was expected to contribute towards more decentralized governance and increased participatory approaches to natural resource management that will rise to face the new challenges by strengthening the capacity of local people.

### 1.3.2 Meaning of Participatory Watershed Management

Participatory watershed management has emerged as a new paradigm for sustainable rural livelihoods and it occupied the central-stage of rural development in the fragile and semiarid environments of the developing nations. The concept of participatory watershed management emphasizes an inter-disciplinary, inter-sectoral and multi-institutional mechanism (Rhoades and Elliot). Participatory watershed management has been defined as a process "which aims to create a self-supporting system, which is essential for sustainability" (Wani et al, 2005). Participatory watershed management provides opportunities to the stakeholders to jointly negotiate their interests, set priorities, evaluate opportunities, implement and monitor the outcomes. This concept came widely into practice in late 1980s and over the time peoples' institutions, like *zila parishads* (district council), self help groups, and watershed-implementing committees were gradually involved in the project management system. With allocation of more funds for watershed development, several non-governmental organizations came forward to aggressively participate in implementing the watershed programs.

In India, participatory watershed management has roots in the non-government sector, that go back nearly as far as the government programs. The seeds of the participatory watershed management can be traced to a small village called Ralegan Siddhi in Maharshtra state of India. Anna Hazare, a local leader was responsible for bringing many social changes in the village particularly soil and

water conservation measures besides family planning, a ban on alcohol, protection of non arable lands against open grazing and felling of trees and voluntary labor for community welfare and other measures which helped in restoring natural resources base of the village (Kerr et al, 2002). This ultimately led to people participation in watershed management and the evolution of participatory watershed management looking beyond just the biophysical aspects to also focus on social and institutional aspects following a bottom up approach (Turton et al, 1998).

In this session, you read about the concept of watershed and community participation in watershed management. Now answer the questions given in Check Your Progress 1.

**Check Your Progress 1**

**Note:** a) Write your answer in about 50 words.

b) Check your progress with possible answers given at the end of the unit.

1. What do you mean by watershed?

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2. What do you mean by participatory watershed management?

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## 1.4 A CASE STUDY OF WATERSHED MANAGEMENT - IFFDC

### 1.4.1 Background

Indian Farm Forestry Development Cooperative Limited (IFFDC) – a multi state cooperative organization, promoted by Indian Farmers Fertilizer Cooperative Limited (IFFCO), working in the field of rural livelihood improvement through Natural Resources Management (NRM) has also adopted the integrated participatory approaches, processes, methodologies and technologies in watershed management while implementing its "Western India Rainfed Farming Project" (WIRFP). The Integrated Participatory Approach (IPA) adopted by IFFDC comprised the five "J" viz; *Jal* (water), *Jungal* (forest), *Jameen* (land), *Janwer* (animal) and *Jan* (human being). IFFDC believes that the livelihood of a rural family is mainly depends on these five "J"s. The focus was to enhance the livelihoods of 150,000 poor people in 400 villages of district Pratapgarh (Rajastahn) and district Ratlam (Madhya Pradesh). It worked in 78 core villages and has successfully disseminated its approaches and technologies to another 325 villages. IFFDC used the poverty and gender-focused innovations conforming to the Government of India's policy to eradicate rural poverty. The project supports the Indian Government's objectives of rural poverty reduction,

employment generation and empowering disadvantaged groups, as stated in the Ninth Five Year Plan (1997-2001). It accords with the policy objectives and programmes, including the decentralization to Panchayati Raj Institutions (PRIs); the watershed focus and the agricultural research priorities for increasing the output from rain fed areas.

### 1.4.2 Project Implementation Process

Implementation processes were piloted in the initial 25 core villages, using the Phase-I model, comprising gender-sensitiveness, community-based development through SHGs and a cadre of Jankars. It was extended in January 2002 to an additional 53 core villages in Ratlam district (western MP). The activities and processes of integrated participatory watershed management tested and adopted in the Pratapgarh area were widely adopted and disseminated in the new areas. Village-based programmes were implemented to enhance livelihoods and, progressively, to disseminate successful approaches to other areas. The various project interventions carried out in the project areas are as follows:

i) **Community Mobilization:** Community mobilization is an initial prerequisite for a process-driven development project. However, communities in the project area were reluctant to accept the initial approaches of Project. There were many cases of suspicion and doubts in their minds in the inception phase of the project. Hence, at the very outset, emphasis was placed on gaining the confidence of the villagers. Exposure visits for community members, within and outside the State, were especially effective in gaining the confidence and trust of the communities.

   The Project developed a successful community mobilisation approach that involved several key steps like: - Village Entry through Entry Point Activities, Rapport Building with the community, Participatory Planning, Community Problem Analysis (CPA) and Participatory Implementation.

ii) **Institution Building:** Appropriate and effective institutional development has always been a prime concern in the development sector. It is the factor that can make substantial impact on the development outcomes. It was supposed during the onset of the project that various Community Based Organisations (CBOs) will play a vital role in the development process of the project. CBOs developments like Self-Help Groups of women and men were taken as the nodal organisations to carry forward poverty alleviation programmes. These SHGs became the entry and exit point organisations for the Project.

iii) **Self Help Groups (SHGs):** The initial process of group formation included mobilization of women and men of a *phala* (hamlet) into self-help groups, who were encouraged to start their regular saving process. The group meetings began on a regular basis and members started to discuss the rationale of their association and the rules and regulations for the smoother group functioning. The members also visited such other groups who had transformed their lives through such collective efforts. Through entry point activities, the planning, implementing and monitoring and institutional mechanisms started to develop within the SHGs. Group vision for the self and collective development became more visible. A total of 929 SHGs are fully functional in the Pratapgarh and Ratlam Project areas, out of which 571 are of women, 338 men and 20 are mixed.

**Box 1: Lessons Learned From SHG Formation**

- Vibrant social mobilization led to energetic & dynamic SHG.
- Door to door contact, focused groups discussion, video show with SHG as main theme, resulted in concept clarity.
- Boosting up the morale of members and transparency in the system.
- A feeling of healthy competition and mutual understanding developed.
- Sense of ownership and responsibility developed.
- Streamlining of the SHGs in terms of rules and regulations has resulted in smooth and sustainable functioning.
- Due to linkages with Government agencies, NGOs, Cooperatives and other institutions, raised awareness about recent development schemes and provided a platform for equal opportunities at all levels.
- A feeling of entrepreneurship generated and people started IGA activities.
- Influence at the policy making levels like Panchayats, PHCs, ICDS, etc.

iv) **Water User's Committees (WUCs)**: There are about 1,951 direct beneficiaries. To ensure sustainability, IFFDC has formed WUCs to manage the water resources in future. The WUC members have been trained on the Operation and Maintenance of structures, Sustainability issues and Monitoring aspects.

v) **Village Forest Management Protection Committees (VFMPCs):** Forest is one of the livelihood sources of the Tribal communities. Due to over-exploitation, the communities face a lot of problems that adversely affect their economic conditions. The project organized VFMPCs under the government Joint Forest Management (JFM) programme, to meet the communities' forest needs. Under JFM, the Forest Department has a combined role for protection of forest/ plantation with community members. The community has rights to a proportion of the forest produce as per State government norms. The Project collaborated with the Forest Department and formed six VFMPCs in villages. Exposure tours and training were organized for members of the VFMPC Executive Committees to strengthen their capacities. The VFMPC prepares an annual work plan and submits this to the Forest Department, as well as to the Project office.

vi) **Evolution of Primary Livelihoods Development Cooperative Societies (PLDCSs):** The project approach focused on formation and empowerment of SHGs and other CBOs to act as the bases for implementing livelihood interventions in the communities. These were later supplemented by committees for managing natural resources (water, forest, etc) and wage labour groups. These community organisations formed the building blocks of the project. However, the communities and IFFDC appreciated that such small organisations would need to collaborate if they were to survive in the post-project period.

Discussions with the communities lead to the concept of 'Primary Livelihood Development Cooperatives'. SHGs from adjacent communities with common

affinities would formally collaborate to establish cooperative societies, so as jointly to enhance their livelihoods. Once registered, the PLDCSs were encouraged to join as members of IFFDC. Functions, rules, membership, share capital and management procedures were developed by IFFDC. A total of 22 PLDCSs have now been formally registered. Activities of PLDCS focused on objectives- "four windows" (Fig. 1.1).

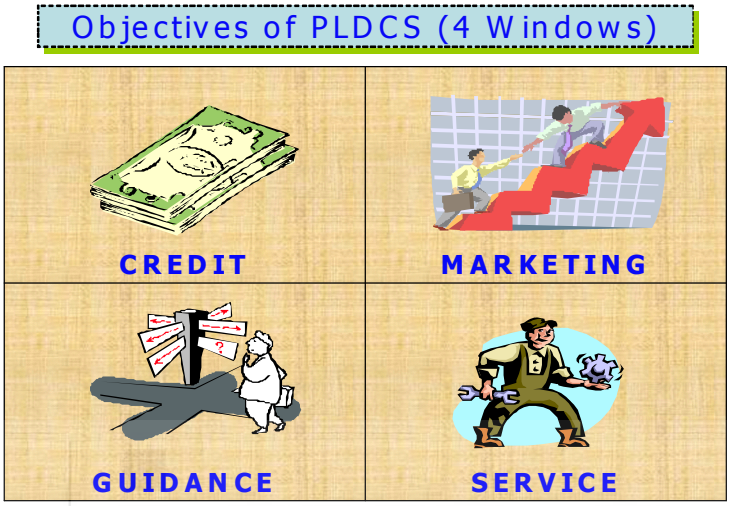


**Fig. 1.1: Objectives of PLDCSs**

The major activities of PLDCS are as following: -

i. **Trading:** Trading in farm input (fertilizers & agro chemicals), farm produce (grain) and NTFP by buying and selling in bulk. The PLDCS can achieve better prices for farmer, charging commission that is deposited in the PLDCS's account. The PLDCSs have developed a good awareness of market conditions. Trading in household requisites, through a shop, is practiced by some cooperatives.

ii. **Local Services:** Provisions of local services such as bicycle and thresher hiring for generating revenue.

iii. **Enterprise Resource Centre:** These have been established by PLDCSs in Pratapgarh, focusing on women's sewing, making of quilted bags and shoes making. PLDCS have engaged trainers who have market knowledge, so that the product should be saleable.

iv. **Natural Resources:** Regeneration of local resources is supported by PDLCSs, such as repairs to hand pumps, de-silting ponds, forest planting and anicut construction.

v. **Accessing Investments:** PLDCSs have a role in seeking outside funding and in conflict resolution (eg: In Moti Kheri, executive committee managed the construction of an anicut under a Government drought relief programme. There had been local conflict over the scheme but when the PLDCS assumed responsibility for negotiation, funds were released. Each member who was employed contributed 5% of earnings to the cooperative).

vi. **Training:** The PLDCS members will have a training role and will act as field-level training resource persons. The experience will enable them to sell their services as trainers to other villages and local agencies.

vii. **Social Services:** The cooperatives have a role in organizing social services (eg: health & veterinary camps) and providing loans at preferential rates and emergency support to the poorest members of their communities.

### 1.4.3 Water Resource Development and Watershed Management

The project aimed to enhance sustainability of the livelihoods of poor tribal farmers through watershed management. Improved management of natural resources is vital if the living conditions of the rural poor are to be enhanced, especially through low cost investments. With an average annual rainfall of 800 mm falling in just three months, *nala* (streams) cease flowing soon after the cessation of the monsoon in early September, large rivers flow for about four weeks longer. By early October only major rivers flow. In this context, improved water supplies for irrigation were essential to achieve the goal of self-sufficiency in food grain production. The Project worked with a range of techniques for developing water resources: impounding surface water, developing ground water resources and conserving soil water. Some of the strategies adopted are discussed below.

i. **Masonry Check Dams/Stop Dam (*Anicut*) / Ground Water Dams:** *Anicut* (local name in Rajasthan) is a weir structure constructed across the natural drain or *nala* for harvesting the water. The harvested water stored behind the structure can be used for supplemental irrigation to crops as well as for drinking water for human and livestock. This also helps in recharging the wells located downstream of the structure. 93 such structures have been constructed in the project villages which irrigate 932 hactare area, 15 old *anicuts* were repaired also. A groundwater dam is a sub-surface barrier across stream which retards the natural groundwater flow of the system and stores water below ground surface to meet the demand during the period of need.

ii. **Wells:** Wells are the main source of irrigation water, used for domestic purpose and drinking water for cattle. As the water table is continuously decreasing for last few decades, deepening is necessary for exploring more water. Due to the existence of hard rock, farmers are unable to dig wells. Blasting is done for deepening the well. To reduce the siltation problem in wells permanent construction of wall is necessary. In hard rock areas, there are many dug wells which have either gone dry or the water levels have declined considerably. These can be used as structures to recharge the groundwater. The reservoir can be diverted into these structures to directly recharge the dried aquifer. The recharge water is guided through a pipe to bottom of well, below the water level to avoid scoring of bottom and entrapment of air-bubbles in the aquifer. In planning, top priority was given to solve the drinking water problem. To address this, need based sites were identified on which 461 wells were constructed/deepened which benefited 5,376 H/Hs.

iii. **Sunken Pond:** Many rivulets (*Nala*) in the project area, damage the fields severely during rainy season. But these can be used for storage of water also by deepening the *nala* at various places. These are also useful in well recharging. These ponds are used many times, as after being used by the farmers; these again get filled with water due to recharging. Small *anicut* (dams) have also been constructed on both sides of sunken ponds to store maximum water and reduce siltation. 230 sunken ponds constructed near the farmer's fields, in project villages are providing irrigation.

iv. **Farm Pond:** 515 farm ponds of various sizes depending upon the catchments have been excavated at lower side of the fields. The soil

obtained by excavation is used for embankment around the pond. At the entrance where run-off enters into the farm pond, a dry stone masonry check dam is constructed. 26 ponds were also deepened which benefited 429 H/Hs. The total irrigated area increased by 415 hectares (257 hectares in Ratlam and 158 hectares in Pratapgarh).

v. **Hand Pump Installation:** Clean drinking water is most urgent need of the rural community. Health and sanitation is a very big problem. 130 hand pumps were installed in areas of severe water scarcity benefiting to 3,089 H/Hs.

vi. **Percolation Tank Earthen Embankment:** Earthen dam is partly excavated and an embankment is constructed to retain the water. It is generally constructed across the stream or *nalla*. The water is stored for longer period to facilitate infiltration and percolation into the sub strata, to raise the ground water level in the zone of influence of pond. These are the most prevalent structures in India as a measure to recharge the groundwater reservoir both in alluvial as well as hard rock formations. The efficacy and feasibility of these structures is more in hard rock formation where the rocks are highly fractured and weathered. 49 earthen dams were constructed benefiting 1951 H/Hs which helped in recharging several wells in the influence zone to serve the drinking and domestic purpose of cattle and human beings.

vii. **Field Bunding:** Major emphasis was given on earthen bunding with masonry outlets up to 3 per cent slope in 455 ha. area on farmers field. Stone Bunding was done in 829 ha. on more sloppy fields (slope 310 per cent), in fields with black soil.

viii. **Loose Stone Check Dams (LSCDs):** These activities were undertaken for drainage line treatment in the project area following top to down approach, with the main objectives, to check the velocity of erosive run-off and ensure the growth of protective vegetation and check channel erosion, 1680 LSCDs were constructed which treated 242 ha. area.

*ix*. ***Nala* Bank Stabilisation:** A series of small bunds or weirs arc made across selected *nala* sections such that the surface water in the stream channel is impeded and water is retained on pervious soil rock surface. *Nala* bunds are constructed across bigger *nalas* of second order streams in areas having gentler slopes. A *nala* bund acts like a mini percolation tank. There is serious problem of erosion of fields adjoining to nala due to erosive velocity of run-off at the time of rainfall, as the run-off diverts the way and damages the farmers' fields. This activity helped converting waste land into arable land by stabilizing 11,483 m *nala* bank.

x. **Gabion Check Dam:** This is a kind of check dam being commonly constructed across small stream to conserve stream flows with practically no submergence beyond stream course. The boulders locally available are stored in a steel wire. This is put up across the stream's mesh to make it as a small dam by anchoring it to the streamside. The height of such structures is around 0.5 m with width of about 10 to 15 m. The excess water overflows this structure storing some water to serve as source of recharge. The silt content of stream water in due course is deposited in the interstices of the boulders to make it more impermeable. Gabion Check Dams are used as semi permanent measures to check the erosive velocity

of runoff. It is very useful structure for drainage line treatment in na1a having high runoff. Local stone of irregular shape was used in 20 Gabion Check Dam constructed in the project area.

xi. **Roof Top Rainwater Harvesting:** The roof top rainwater can be conserved and used for recharge of groundwater. This approach requires connecting the outlet pipe from rooftop to divert the water to either existing wells/tube wells/bore wells or specially designed wells/ponds. The roof of the houses can be utilized for harvesting rooftop rainwater to recharge aquifers such as Bore wells or Dug wells. 8 such structures were constructed in the project area.

xii. **Revival of Lift Irrigation System:** With collaboration of Tribal area development Agency, Udaipur IFFDC revived 4 Lift Irrigation systems in Pratapgarh *panchayat samiti* (Rajasthan). In the villages namely *Motamyanga, Chhotamayanga, Kachotiya and Somawaton Ka Kheda* which are now efficiently working to provide benefits to about 200 farmers for irrigation in 110 ha area.

### 1.4.4 Positive Impact of Watershed Project

A range of positive impacts could be identified which are given below:

**i.** **Increase in Crop Production:** Due to construction of water harvesting structures, the area under *rabi* crops increased from 7 per cent - 27 per cent and presently 1,032 ha of area is being irrigated in *rabi*.

**ii.** **Employment Generation**: During construction of the water resource structures, the project has generated 525,000 person days of employment, of which 60 per cent were contributed by women. The benefits of employment included provision of work close to their homesteads, at a time when there was a shortage of other work, and assured and prompt payment of wages.

**iii.** **Increase in Crop Yield:** In the *kharif*, farmers used to grow maize and cotton (as cash crop) under mixed cropping. Cotton, being a long duration crop, also requires 2-3 irrigations in the *rabi*. According to Focus Group Discussions (FGD) with farmers, prior to the construction of WRD structures, they were not able to provide *rabi* irrigation for cotton (except in some cases having their own source of irrigation). As a result they used to get yield as 2.5 quintals per hectare Following completion of the new structures they obtain 4 quintals per hectare, representing a 60 per cent increase in the yield of cotton over 212 hectare of land.

**iv.** **Community Health & Hygiene:** Previously, villagers required more time to collect water, as sources were distant, especially during summer. The new and repaired hand pumps provided 3,089 households with easier access to safe drinking water. The availability of water within the villages has ensured regular bathing, and facilitated washing clothes. These facts have positive impacts on the health of the communities.

**v.** **Water for Livestock:** Initially livestock had to travel 4-8 km, now they are being provided water locally. Villages consider that the health of the animals has improved. Due to availability of water within villages, the community members have started growing 105 hectare of fodder crops. There is now sufficient fodder within the village, even during drought periods.

vi. **SWC measures:** Integrated approach for drainage line treatment has resulted in reduction of soil erosion, increased infiltration & moisture retention. The research shows that if 30 mts long area is treated under soil water conservation measures, it reduces soil loss by 8.5 tones per hectare annually. Hence, due to earthen & stone bunds the project has saved 67586.7 ton per ha of soil loss annually.

vii. **Wage labouring/ migration reduced:** Livelihood is mainly dependent on agriculture. A lack of water forced them to unskilled wage labouring or migration to nearby cities where they were exploited. After construction of WRD structures, wage labouring/ migration by 328 households have been reduced significantly.

viii. **Increased Value of land:** Introduction of irrigation facilities has increased land values considerably. Initially, the farmers sold their land at Rs. 10,000-15,000 per hectare but now they are able to take two crops per year and the value has risen to Rs. 35,000-50,000 per hectare.

ix. **Improved Social Assets & Better Prospects of Social Exchange:** Inhabitants of villages in hilly areas where water harvestings have been built are getting marriage proposals from villagers situated in valley, due to the availability of water. Moreover, from the local market they are more easily getting farm inputs on credit. Government officials also visit the villages to look at water harvesting structures in such remote areas.

x. **Community Based Institutions to Manage WRD Structures:** The 38 WUCs are functioning effectively for operationalisation and maintenance of the structures, Distribution of water equitably & efficiently among themselves and Resource mobilization.

### 1.4.5 Training and Capacity Building

In order to find success in the Project implementation and sustain the development processes, community members were taken into confidence by way of interaction, training, exposure tours and outside visits. It was necessary to make them aware of the fruitful technologies which could enhance their livelihoods options. Regular training programmes were conducted, especially on the issues of social mobilization, institutional development, farming system development and water resource development. They were exposed through trainings to many topics, such as group functioning, Institutional development, crops, livestock, health and hygiene, income generation activities. The capacity of all levels of staff was strengthened through a wide range of formal and informal training and exposure visits within India. Select staff gained skills from short courses overseas (Thailand, Kenya, Malaysia, UK, Philippines), arranged through DFID funding. Additionally, the Consultant team imparted in-service training to staff and some provided specific training to SHGs.

## 1.5 OVERALL IMPACTS

The impacts of the Integrated Watershed Development programme were immediate. Invariably in all project villages, farmers worked untidily primarily for harvesting maximum rain water and secondly to initiate various economic development and social welfare activities. Significant impacts have been summarized and discussed in Table-1.1

**Table 1.1: Impacts of Watershed Development**

| Area of Impact | Qualitative Impact |
|---|---|
| Irrigated Area | Increased between 7% to 27 % for different crops |
| Average Crop Yield | Increased between 40- 60 % for different crops |
| Community Health & Hygiene | Safe drinking water for 3,089 H/Hs made available |
| Water for Livestock | Availability of water and increase in fodder area by 105 ha. |
| SWC measures | Saved 67,586.7 tons of soil loss per ha. annually |
| Wage labouring/ migration | Wage labouring/ migration of 328 households reduced significantly |
| Value of land | Increased from Rs. 10,000-15,000 per ha. to Rs. 35,000-50,000 per hectare |
| Social Assets & Prospects | ● Getting farm inputs on credit.<br>● Better marriage proposals<br>● Regular visits of Government Officials |

**Check Your Progress 2**

**Note:** a) Write your answer in about 50 words.

b) Check your progress with possible answers given at the end of the unit.

1. Describe the integrated approach of participatory watershed management for rural livelihood improvement.

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2. Discuss the various water harvesting measures can be adopted in watershed development project?

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## 1.6 LET US SUM UP

The project has developed replicable approaches and tested models for enhancement of rural livelihoods through integrated participatory watershed management. It has tried to empower the communities, especially women and the marginalized Tribal poor, for their better access to natural resources and government services. At the initial stage, the Project confronted suspicion and

doubts among communities but took a participatory approach to gain their confidence. The beginning was tough and slow but the entry point activities and participatory methodologies have broadened the way for more and continuous developmental efforts.

The Project provided opportunity to strengthen the CBOs and empower local institutions (PLDCSs, SHGs, WUCs & VFPMCs). These primary stakeholders are sustaining their energy and enthusiasm even after the end of the project, with the support of the IFFDC. The seven years of working with the project was a period of lesson learning for all stakeholders. From being reluctant onlookers in the initial stages, the communities have become eager and enthusiastic participants in the project processes.

## 1.7 KEYWORDS

**Community:** All adults living and making their livelihood from within the watershed area are referred to as community.

**Community Participation:** Involvement of the community actively in planning, implementation, monitoring and evaluation and sharing responsibilities of the watershed management is called community participation.

**Cultivars:** Varieties of crops are known as cultivars.

## 1.8 REFERENCES AND SELECTED READINGS

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## 1.9 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

**Check Your Progress 1**

1. Watershed is defined as 'a geohydrological unit draining to a common point by a system of drains'.

2. Participatory watershed management aims to create a self-supporting system, which is essential for sustainability. Participatory watershed management provides opportunities to the stakeholders to jointly negotiate their interests, set priorities, evaluate opportunities, implement and monitor the outcomes

**Check Your Progress 2**

1. Integrated Approach of Watershed Management focused on to enhance rural livelihood through development of Five "J" viz; Jal (water), Jungle (forest), Jameen (land), Janwar (animal) and Jan (human being) on sustainable basis on the foundation of a sound soil and water conservation effort. This approach includes various elements like, natural resources, technical skills, community organization and mobilization for integrated local development.

2. Various harvesting measures vary from one region to other depending their water sources and utilization. Broadly, following measures are in practice masonry check dams/stop dam (*anicut*) / ground water dams, wells, sunken pond, farm pond, hand pump installation, percolation tank i earthen embankment, field bunding, loose stone check dams (LSCDS), nala bank stabilization, gabion check dam, roof top rainwater harvesting, revival of lift irrigation system.