
UNIT 1 INTRODUCTION TO WATERSHED MANAGEMENT

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1.0 OBJECTIVES

After going through this unit, you should be able to:

- outline the concept of watershed management;
- acquaint yourself with the objectives and principles of watershed management;
- explained the history and evolution of watershed management; and
- enumerate different activities to be undertaken in a watershed project.

1.1 INTRODUCTION

In order to understand the concept of watershed, you may go out when it is raining. You would observe that during rains, water flows here and there and eventually follows a particular path. Finally, it gets collected at a particular point (particularly lowest point in your area) depending on the slope. The area which contributes water and flows to the lowest point resembles the watershed. Have you ever observed the flow of rainwater that falls on the roof of your house? The

rainwater falling on a roof always flows through a particular outlet (spout). Taking spout as a point/outlet, the area of the roof may be termed as a watershed. If you have separate spouts for different roofs in your house, you may have many small watersheds within your house.

The term watershed consists of two words: water and shed. Water occurs in nature mostly in solid, liquid and vapour forms. In watershed, water is considered mainly in liquid form. The word “shed” refers to the roof of a shed which collects rainwater and drains out. Shed thus can be defined as an area well marked by a boundary which receives rainwater and drains out towards a common drainage point or outlet.

In the next unit, role of watershed management, its components, major characteristics and criteria for selection of watershed will be dealt with. Integrated watershed management and the importance of institutional arrangement were also highlighted.

1.2 DEFINITION OF WATERSHED

Watershed is a topographically delineated area drained by a stream system i.e. the total land area above some point on a stream or river that drains down slope to the lowest point. The watershed is a hydrologic unit often used as physical unit, biological unit and a socio-economic political unit for planning and management of natural resources.

Watershed may also be defined as a natural unit of land which collects water and drains through a common point called an outlet by a system of drains. Therefore, watershed is the area encompassing the catchments, command and delta area of a stream. The top most portion of the watershed is known as “ridge” and a line joining the ridge portion along the boundary of the watershed is called as “ridgeline”. A watershed is thus a logical unit for planning optimal development of its soil, water and biomass resources.

1.3 WATERSHED MANAGEMENT

Watershed management is the process of guiding and organizing use of land and other resources in the watershed to provide desired goods and services without adversely affecting soil, water and other natural resources.

Watershed management in the broader sense means maintaining the equilibrium between elements of natural eco-system or vegetation, land or water on the one hand and human activities on the other hand. The watershed management programmes aim at improving soil health, soil tilth and drainage and achieving efficient use of harvested and stored rainwater for supplemental irrigation and consequently enhanced productivity and higher economic returns. From community development point of view, watershed management programmes aim at controlling flooding, water logging and soil erosion in order to increase agricultural productivity and a more dependable, cleaner water supply for domestic and industrial use. These programmes also help in minimizing risk of floods in rural and urban areas down streams, reducing sedimentation and conserving natural resources efficiently and effectively. Watershed management programmes strive to improve the lot of the entire farming communities rather than focusing on individual farmers only.

1.3.1 Need of Watershed Management

Watershed degradation in the third world countries threatens the livelihood of millions of people and seriously affects the development of a healthy agricultural and natural resource base. The existing natural resource base is fast depleting due to excessive use of the soil and vegetation system by growing livestock and human population.

The population growth exerts pressure on forests, community lands and marginal agricultural lands resulting in inappropriate cultivation practices, forest depletion and grazing intensities. They cause serious damage to the environment by excessive sedimentation of river system affecting the stream flow to downstream users.

Watershed management has an important role to play in combating the Malthusian Effect which states that that population tends to increase faster than the means to feed it. Watershed management programmes play an important role in minimizing the Malthusian Effect by ecological and economic rehabilitation of misused watershed slopes, revival of natural streams and augmentation of water resources with active support and participation of people.

The watershed management programmes involve the entire community and natural resources particularly land and water resources. Through watershed development programmes, the influence of above factors needs to be observed as given below:

- Socio-economic trend in income generation, employment pattern, household assets, health care education, energy use and impact on women and the landless.
- Perceptions, attitudes and behavior of the people towards project activities and their participation in planning and execution of project and management of resource proposed to be developed under the project together with constraints.
- Productivity/production of crops and forage, changes in cropping pattern and land use adoption or improved cropping practices. Survival and growth of perennial crops on non-arable lands, increase wood and non-wood products and improve livestock milk production.
- Improvement of environment by build up of vegetative cover, reduction of runoff and soil loss, improvement in livestock milk production policy.
- Use of land and water in vegetation, animal and environment.
- Soil erosion, moderation of floods, alleviation of drought, water availability in soil on surface and under ground storage, availability of fuel, fodder and food.
- Development of institutions for planning and implementation.

1.3.2 Focus of Watershed Management

Watershed programmes focus mainly on the following:

- Village common lands as well as private lands;

- Institutionalized community participation;
- Sustainable rural livelihood support system;
- Decentralized planning and decision making;
- Ridge to valley treatment approach;
- **Integrated and holistic development of the watershed unit;**
- Protecting natural resources through stakeholders' participation; and
- Providing best unit for planning a development programme.

1.3.3 Concept of Watershed Management

Watershed management is based on the concept of sustainability and meeting the needs of present population without compromising the interests of future generation. The concept of watershed management is important for the efficient utilization of water and other natural resources. The concept of watershed management may be expressed in symbolic form by "POWER".

- P = Production of food-fodder fuel fruit fibres fish-milk-combine on a sustainable basis.
- = Pollution control.
 - = Prevention of floods.
- O = Over exploitation of resources to be minimized by controlling excessive Biotic interferences like over grazing.
- = Operational practicability of all on-farm operations and follow up programmes including easy access to different locations in watershed.
- W = Water storage at convenient locations for different purposes.
- = Wild animal and indigenous plant life conservation at selected places.
- E = Erosion control
- = Eco-system safety
 - = Economic stability
 - = Employment generation
- R = Rainwater harvesting
- = Recharge of groundwater
 - = Reduction of drought hazard
 - = Reduction of siltation in multi purpose reservoirs
 - = Recreation

POWER is not only important symbolically but watershed programmes bestow real power to the beneficiaries by improving their socio-economic lot.

1.3.4 Benefits of Watershed Management

Watershed management is expected to ensure the following benefits:

- controls floods, erosion and sedimentation;
- enhances productivity per unit area, per unit time and per unit of water;
- increases cropping intensity;
- leads to proper utilization of waste lands through alternate land use systems;
- ensures ecological balance;
- maximizes income through integrated farming system; and
- stabilizes income even under unfavourable weather conditions.

1.3.5 Objectives of Watershed Management

The basic objective of watershed management is to overcome the problems of land and water use based on interdependence of all the resources and therefore must be considered together. The watershed ultimately aims, at improving standard of living of common man in the basin by increasing his earning capacity, by providing facilities such as electricity; water for irrigation and drinking water supply, freedom from fear of floods and droughts etc. Watershed management aims at efficient utilization of the entire resources namely soil, water, crop including plantation, livestock, fishery and human population etc. for sustained prosperity of the watersheds. The overall objectives of watershed development programme are outlined below:

- Recognition of watersheds as a proper unit for utilization and development of all lands. The land should be treated in accordance with its peculiar need and by methods that will control soil erosion, conserve water, encourage wild life, improve farm income and prevent flood damage to agricultural lands.
- Retardation and prevention of floods through small multipurpose reservoirs and other water impounding structures at the streams and in problem areas.
- Provision for an abundant water supply for domestic, industrial and agricultural needs.
- Minimizing organic, inorganic and soil pollution.
- Expansion of recreational facilities i.e. picnic and camping sites with more lakes and streams suitable for boating, fishing or swimming.
- Utilization of natural local resources for improving agriculture and allied occupation or industries (small and cottage industries) to improve socio-economic conditions of the local residents and minimizing risks during aberrant weather conditions.

- Improving infrastructural facilities with regard to storage, transportation and marketing of the agricultural produce.
- Setting up small scale agro industries.
- Improving the socio-economic status of the farmers.
- Employment generation.
- Encouraging people participation.

The above objectives can be achieved by planning and implementing the programme in a systematic way with active participation of farmers including constitution of cooperative watershed management societies. The following guidelines may be followed to achieve the objectives of watershed management.

- The implementation programme should start from the ridge line of the watershed to the valley and not on piecemeal basis in isolated patches.
- Development of both arable and non-arable lands should be done together.
- Forest, pasture, cultivable land and waste lands should be treated as interlinked units of hydrological entity. The condition of all lands use has to be improved to meet the demands of increasing human and animal population.
- Essentially, all developmental activities are to be carried out on watershed basis-whole watershed area needs to be covered in planned phases. However, treatment of some lands lying outside the watershed, but geographically contiguous can also be taken up based on socio-economic considerations.

1.3.6 Principles of Watershed Management

The main principles of watershed management based on resource conservation, resource generation and resource utilization are:

- Utilising the land according to its capability;
- Protecting productive top soil;
- Reducing siltation hazards in storage tanks, reservoirs and lower fertile lands;
- Maintaining adequate vegetation cover on soil surface throughout the year;
- *In situ* rainwater conservation;
- Safe diversion of excess water to storage points through vegetative waterways;
- Stabilization of gullies by providing checks at specified intervals and thereby increasing groundwater recharge;
- Increasing crop intensity and land equivalent ratio through intercropping and sequence cropping;

- Safe utilization of marginal lands through alternate land use systems with agriculture-horticulture-forestry-pasture systems with varied options and combinations;
- Water harvesting for supplemental and off-season irrigation;
- Maximizing agricultural productivity per unit area per unit time and per unit of water;
- Ensuring sustainability of the eco-system befitting the man-animal-plant-water system;
- Maximizing the combined income from the interrelated and dynamic crop live stock-tree-labour system over years; and
- Stabilizing total income.

Check Your Progress 1

Note: a) Check your answers with those given at the end of the unit.
b) Use the space given below for your answers.

1) Define watershed.

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2) On what important aspects, does the watershed focus?

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3) What is Malthusian Effect? How does watershed management help in minimizing it?

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4) List two principles of watershed management programme?

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5) List any two objectives of watershed management.?

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Now, that you have worked out the CYPs 2, let us go over to the next section and discuss the history of watershed management and its evolution.

1.4 HISTORY AND EVOLUTION OF WATERSHED MANAGEMENT

Since the advent of civilization, water has always been the most important natural resource. Due to limited availability of fresh water, its proper management has always been of considerable importance. It has now assumed considerable significance due to phenomenal rise in its demand due to ever growing population. Earliest water related activities mainly aimed at controlling torrents in steep unstable mountainous areas with particular emphasis to minimize losses due to floods. The damage and destruction due to uncontrolled water flows were considered more important than the water shortages. In order to control water flow, water storage structures were evolved leading to the development of irrigation systems. The water storage structures faced siltation problems thereby seriously reducing their capacity. In order to overcome this problem, the soil conservation measures were employed to control soil erosion in the watershed.

Full exploitation of the potential of watershed technology began in the beginning of modern era. Since Second World War, watershed management has become a subject of great international interest. Initially, the watershed management concept was introduced in a top-down approach with major emphasis to implement the soil and water conservation measures. In the absence of direct and immediate benefits of soil and water conservation measures, the participation of the watershed community could not be ensured which is so essential for the success of watershed projects. This led to a paradigm shift to the concept of watershed management. The top-down approach of implementing soil and water conservation measures was replaced by bottom-up approach to ensure creation of a self supporting system essential for sustainability of the watershed. While carrying out watershed development activities, it has to be ensured that natural resources of watershed particularly soil and water are not adversely affected and ecological balance is not disturbed.

A number of national and international organizations are engaged in activities related to watershed management such as Food and Agriculture Organization (FAO), International Association of Scientific Hydrology, International Union for Conservation of Nature and Natural Resources, International Union of Forest Research Organization, World Meteorological Organization, etc.

1.4.1 Watershed Development in India

Watershed activities with respect to hydrological monitoring were initiated in 42 small watersheds located in 8 Centres of Central Soil and Water Conservation

Research and Training Institute (CSWCRTI) in 1956. Subsequently watershed based Operational Research Projects (ORPs) were taken up in different parts of the country in 1974, in order to reduce soil loss, increase water availability so as to enhance cropping intensity, agricultural productivity and generate employment.

The central and state governments have undertaken various development programmes based on watershed approach as outline below. The Ministry of Rural Development, Government of India is a front runner in these efforts and has implemented special area development programmes for water harvesting.

i) Soil Conservation in Catchment of River Valley Project

The programme was initiated during the Third Five Year Plan to treat catchment area for reducing silt production rate and subsequent siltation of reservoirs, checking soil erosion and consequently improving agricultural productivity. The programme is being implemented in 27 watersheds covering 17 states including Damodar Valley Corporation area. Soil and water conservation measures are also being adopted in critically degraded watersheds ranging between 2,000 and 4,000 ha area.

ii) Integrated Agricultural Development in Drought Prone Areas

Rainfed farming is totally dependent on unreliable and widely variable rainfall resulting in very low agricultural productivity. Monsoon failure further complicates the situation causing unbearable misery and suffering to the people. The Drought Prone Area Programme (DPAP) of Government of India aimed at promoting integrated agricultural development in dry farming regions based on ecologically balanced approach instead of providing temporary relief. The programme also envisaged setting up of productive infrastructure for providing immediate employment in emergencies to the weaker sections.

In this programme, a planned methodology in terms of detailed soil survey, hydrological survey and topographic survey was proposed for preparation of the master plan. Based on this, activities such as land use capability classification, installation of wells depending up on existing conditions of the area; water harvesting programmes (construction of tanks or check dams in the catchment areas etc.) were intended.

iii) Desert Development Programme (DDP)

The programme was initiated in 1977-78 to control desertification of the desert area by integrating and linking other related state/central programmes and conserve and harness land, water and other natural resources including rainfall for restoration of long term ecological balance. The programme aims at achieving afforestation with special emphasis on sand dune stabilization and shelter belt plantation and grassland development, soil and moisture conservation and water resources development. This programme fully financed by the central government covered about 36.2 m ha of 131 blocks of 21 districts in five states namely Rajasthan, Haryana, Gujarat (hot arid region), Jammu and Kashmir and Himachal Pradesh (cold arid region).

iv) Himalayan Watershed Management Project in Uttar Pradesh

Himalayan watershed management project funded by the World Bank was taken up in 1983 in two watersheds namely Nayar in Garhwal and Panar in Kumaon

regions in Uttrakhand covering an area of 2.47 lakh ha. It aimed at minimizing further deterioration of the Himalayan eco-system caused by depletion of forest cover, over grazing, awful land use and careless road construction.

v) Operational Research Projects on Integrated Watershed Management

These projects were taken up in 47 watersheds spread over 16 states (Andhra Pradesh, Bihar, Gujarat, Haryana, Madhya Pradesh, Maharashtra, Orissa, Punjab, Himachal Pradesh), Jammu and Kashmir, Karnataka, Kerala, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal) in 1983 covering an area of 35739 ha with the financial assistance of Ministry of Agriculture and Rural Development, Government of India and under the technical guidance of Indian Council of Agricultural Research (ICAR). The projects aimed at developing a programme with people' participation for arresting the deterioration of environment and building up permanent assets in the form of water, sustainable vegetation and improved productivity of cropped land.

vi) National Watershed Development Programme of Rainfed Agriculture (NWDPA)

The programme initiated in 1986-87 in the unirrigated arable lands in 25 states mostly had rainfall ranging between 500 and 1125 mm and more. The districts with over 30 % area under irrigation were usually excluded. The programme was restructured in the Eight Five Year Plan in order to achieve sustainable production of bio-mass as well as restoration of ecological balance in the vast rainfed areas of the country. It mainly focused on conservation and utilization of land, water, plant, animal and human resources in a harmonious and integrated manner with low-cost, simple, effective and replicable technology, generation of massive employment and reduction of inequalities between irrigated and rainfed areas.

The main activities of the project included:

- land and moisture management including optimal cropping system, dry land horticulture, fodder production and farm forestry;
- contingency seed and planting material stocking;
- training, seminars, study tours for staff and farmers within the state/regional/national level;
- adoptive research trials on different crops in small and marginal farmers land;
- procurement, fabrication and supply of survey equipment and prototype implements; and
- preparation of field manuals and publicity materials.

The programme has been able to achieve the following:

- unified command approach of multi-disciplinary team for effective organizational set-up for effective implementation of watershed development programmes;

- increased productivity of different crops in both black and red soil regions by contour farming;
- significant *in situ* moisture conservation, cropping intensity and productivity in different farming systems based on contour vegetative barriers.

vii) Integrated Wasteland Development Programme (IWDP)

The programme initiated in 1989 aimed at developing wastelands on a watershed basis and mainly focused on silvi-pasture and soil moisture conservation on wastelands.

viii) Integrated Watershed Management in the Catchments of Flood Prone Rivers

The programme was undertaken during Fourth Five Year Plan in eight flood prone rivers of Gangetic basin namely, Ajoy, Gomti, Punpun, Roop Narayan, Sahibi, Sone, Upper Ganga and Upper Yamuna covering watershed area of 16.7 million ha spread over the states of Bihar, Haryana, Himachal Pradesh, Madhya Pradesh, Rajasthan, Uttar Pradesh, West Bengal and Union Territory of Delhi. The programme aimed at enhancing ability of the watershed by absorbing large amount of rainwater, reducing erosion and consequent silt load in rivers and thus mitigating the effect of floods in productive plains.

ix) Integrated Watershed Development Project for Hills and Plains

The World Bank projects in Himachal Pradesh, Jammu and Kashmir, Punjab and Haryana covering an area of 1.24 lakh ha aimed at slowing and reversing degradation of the natural environment through the use of appropriate soil and water conservation practices.

x) Integrated Watershed Development Project (Plains)

The World Bank project covering an area of 4.33 lakh ha in Gujarat, Orissa and Rajasthan aimed at slowing down and reversing ecological degradation in a variety of agro-ecological zones by promoting sustainable and replicable production system.

xi) Other Watershed Management Projects

Internationally funded watershed management projects are also being implemented in the country.

1.5 GUIDELINES FOR WATERSHED PROGRAMMES

In 1994-95, Ministry of Rural Areas and Employment, Government of India came up with strict guidelines for watershed programmes to achieve optimum utilization of the watershed's natural resources, employment generation and over all socio-economic development. Subsequently, Ministry of Rural Development revised the guidelines in 2001 to make them more focused, transparent and easy to follow. The guidelines for watershed development provided a detailed institutional framework at all levels of implementation, particularly people organizations called the Watershed Association, the Watershed Committee, the Self Help Groups, the

User Groups at the village level. The guidelines were further refined with the launch of new initiative "Hariyali" in 2003. Hariyali sought to empower Panchayat Raj Institutions (PRIs) both administratively and financially in the implementation of the watershed development programmes. The guidelines for Hariyali were applicable to IWDP, DPAP, DDP and any other programme notified by the GOI. Common Guidelines for Watershed Development Projects were issued by the Department of Land Resources, Ministry of Rural Development in 2008 and are based on the following features:

Equity and Gender Sensitivity: Watershed Development Projects should be considered as levers of inclusiveness. Project Implementing Agencies must facilitate the equity processes such as (a) enhanced livelihood opportunities for the poor through investment in their assets and improvements in productivity and income, (b) improving access of the poor, especially women to the benefits, (c) enhancing role of women in decision-making processes and their representation in the institutional arrangements and (d) ensuring access to usufruct (legal) rights from the common property resources for the resource poor.

Decentralization: Project management would improve with decentralization, delegation and professionalism. Establishing suitable institutional arrangements within the overall framework of the Panchayati Raj Institutions and the operational flexibility in norms to suit varying local conditions will enhance decentralization. Empowered committees with delegation to rationalise the policies, continuity in administrative support and timely release of funds are the other instruments for effective decentralization.

Facilitating Agencies: Social mobilization, community organization, capacities building of communities in planning and implementation, ensuring equity arrangements etc. need intensive facilitation. Competent organizations including voluntary organizations with professional teams having necessary skills and expertise would be selected through a rigorous process and may be provided financial support to perform the above specific functions.

Centrality of Community Participation: Involvement of primary stakeholders is at the centre of planning, budgeting, implementation and management of watershed projects. Community organizations may be closely associated with and accountable to Gram Sabhas in project activities.

Capacity Building and Technology Inputs: Considerable stress would be given on capacity building as a crucial component for achieving the desired results. This would be a continuous process enabling functionaries to enhance their knowledge and skills and develop the correct orientation and perspectives thereby becoming more effective in performing their roles and responsibilities. With current trends and advances in information technology and remote sensing, it is possible to acquire detailed information about the various field level characteristics of any area or region. Thus, the endeavour would be to build in strong technology inputs into the new vision of watershed programmes.

Monitoring, Evaluation and Learning: A participatory, outcome and impact-oriented and user-focused monitoring, evaluation and learning system would be put in place to obtain feedback and undertake improvements in planning, project design and implementation.

Organizational Restructuring: Establishing appropriate technical and professional support structures at national, state, district and project levels and developing effective functional partnerships among project authorities, implementing agencies and support organizations would play a vital role.

1.6 WATERSHED MANAGEMENT ACTION PLAN

Watershed management action plan needs to be prepared for all the arable and non-arable lands including degraded forestlands, government and community lands and private lands. The following activities may have to be incorporated in the action plan depending up on agro-climatic conditions of the region as well as socio-economic condition of people:

- Development of small water harvesting structures such as low-cost farm ponds, nalla bunds, check-dams, percolation tanks and other groundwater recharge measures;
- Renovation and augmentation of water sources, desiltation of village tanks for drinking water/ irrigation/ fisheries development;
- Fisheries development in village ponds/tanks, farm ponds etc;
- Afforestation including, block plantations, agro-forestry and horticultural development, shelterbelt plantations, sand dune stabilization etc;
- Pasture development either by itself or in conjunction with plantations;
- Land Development including *in situ* soil and moisture conservation measures like contour and graded bunds equipped with plantation, bench terracing hilly terrain, nursery raising for fodder, timber, fuel wood, horticulture and non-timber forest product species;
- Drainage line treatment with a combination of vegetative and engineering structures;
- Repair, restoration and up-gradation of existing common property assets and structures in the watershed to obtain optimum and sustained benefits from previous public investments;
- Crop demonstrations for popularizing new crops/varieties or innovative management practices; and
- Promotion and propagation of non-conventional energy saving devices, energy conservation measures, bio-fuel plantations etc.

You may now like to have your progress further checked by yourself.

Check Your Progress 2

- Note:** a) Check your answers with those given at the end of the unit.
b) Use the space given below for your answers.

1) List three watershed development programmes.

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2) List any three activities that can be undertaken during a watershed development project.

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3) What are the main components of NWDPPRA?

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4) Explain two main features of common guidelines 2008.

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1.7 LET US SUM UP

- The watershed is a hydrologic, biological and socio-economic political unit for the planning and management of natural resources.
- The watershed management programmes aim at improving soil health, drainage and using harvested and stored rainwater efficiently for supplemental irrigation and consequently enhancing productivity and higher economic returns leading to overall socio-economic development of the entire farming community.
- Watershed management is based on the concept of sustainability and ecological balance and meeting the needs of present population without compromising the interests of future generation.
- Watershed management programmes have always received highest priority by the government for long term agricultural sustainability and socio-economic upliftment of the people. Different watershed management programmes funded by national and international organizations have been implemented over the last 50 years aiming at solving region specific problems.

- In order to implement watershed management programmes effectively and efficiently, comprehensive guidelines on technical, financial and institutional setup have been formulated and revised time to time by the expert committee.

1.8 KEYWORDS

- Flood** : An overflow of water into the lands that are used or usable by man and not normally covered by water. Floods have two essential characteristics: The inundation of land from a river, stream, lake or ocean is temporary.
- Flood Plain** : A strip of relatively flat and normally dry land alongside a stream, river or lake that is covered by water during a flood.
- Freshwater** : Water that contains less than 1,000 milligrams per litre (mg/L) of dissolved solids; generally, more than 500 mg/L of dissolved solids is undesirable for drinking and many industrial uses.
- Irrigation** : The controlled application of water for agricultural purposes through man-made systems to supply water requirements not satisfied by rainfall.
- Livestock Water Use** : Water used for livestock watering, feed lots, dairy operations, fish farming and other on-farm needs.
- Malthusian Effect** : It states that the population tends to increase faster than the means to feed it.
- Organic Matter** : Plant and animal residues or substances made by living organisms. All are based upon carbon compounds.
- Precipitation** : Rain, snow, hail, sleet, dew and frost.
- Tributary** : A smaller river or stream that flows into a larger river or stream. Usually, a number of smaller tributaries merge to form a river.
- Watershed** : Watershed is a topographically delineated area drained by a stream system i.e. the total land area above some point on a stream or river that drains down the slope to the lowest point.

1.9 SUGGESTED READING

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1.10 MODEL ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) Watershed is a topographically delineated area drained by a stream system i.e. the total land area above some point on a stream or river that drains down the slope to the lowest point.
- 2) Watershed programmes focuses mainly on the following:
 - i) Village common lands as well as private lands;

- ii) Institutionalized community participation;
 - iii) Sustainable rural livelihood support system;
 - iv) Decentralized planning and decision making;
 - v) Ridge to valley treatment approach;
 - vi) Integrated and holistic development of the watershed unit;
 - vii) Protecting natural resources through stakeholders' participation; and
 - viii) Providing best unit for planning a development programme.
- 3) Malthusian Effect states that that population tends to increase faster than the means to feed it. Watershed development activities minimize its effect by augmenting natural resources, increasing productivity and generating employment.
- 4) ● Utilization of natural local resources for improving agriculture and allied occupation or industries (small and cottage industries) so as to improve socio-economic conditions of the local residents risks during aberrant weather conditions.
- Employment generation.
- 5) ● Water harvesting for supplemental and off season irrigation.
- Maximizing agricultural productivity per unit area per unit time and per unit of water.

Check Your Progress 2

- 1) Drought Prone Area Development Programme (DPAP), Desert Development Programme (DDP), Integrated Watershed Development Programme (IWDP).
- 2) Development of small water harvesting structure, desiltation of village ponds, afforestation, land treatment through various soil and moisture conservation measures.
- 3) Land and moisture management, contingency seed and planting material stocking; training, seminars, study tours for farmers, adoptive research trials on different crops and preparation of field manuals and publicity materials.
- 4) (i) *Equity and Gender Sensitivity*: Watershed activities mainly aim at providing livelihood to sections of watershed including the landless and empower women by their active involvement in various activities.
- (ii) *Capacity Building and Technology Inputs*: The watershed programmes can be successfully implemented by enhancing the knowledge and skills of watershed community particularly by using information technology and remote sensing.