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Odisha State Open University, Sambalpur, Odisha
Established by an Act of Government of Odisha.

DIPLOMA IN RURAL DEVELOPMENT

RD-02

Rural Development in India

Block

3

APPROACHES TO RURAL DEVELOPMENT IN INDIA

Unit – 1

Broad Front Approach-Sectoral Approach-Participatory Approach-Area Approach-Target Group Approach-Integrated Approach-Gandhian Approach and its current relevance

Unit – 2

Technology Mission for Rural Development-Drinking Water-Sanitation-Communication-Oilseeds

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RURAL DEVELOPMENT

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Unit – 1

Broad Front Approach-Sectoral Approach-Participatory Approach-Area Approach-Target Group Approach-Integrated Approach-Gandhian Approach and its current relevance

Learning Objectives:

After completion of this unit, you should be able to:

- *understand different approaches to Rural Development in India*
- *distinguish between different approaches of Rural Development in India.*
- *describe different schemes and programmes associated with different approaches of Rural Development in India.*

Structure:

1.1. Introduction:

There are no universally accepted approaches to rural development. It is a choice influenced by time, space and culture. The term rural development connotes overall development of rural areas to improve the quality of life of rural people. In this sense, it is a comprehensive and multidimensional concept, and encompasses the development of agriculture and allied activities, village and cottage industries and crafts, socio-economic infrastructure, community services and facilities and, above all, human

resources in rural areas. So, the types of approaches to rural development are as follows:

i) Broad front Approach:

ii) Sectoral Approach:

iii) Participatory Approach:

iv) Area Development Approach:

v) Target Approach:

vi) Basic Needs Approach:

vii) Employment-oriented Integrated Approach to Rural Development:

viii) Integrated Development Approach:

ix) Growth Center Approach:

x) Community-driven development (CDD) or Approach:

xi) Gandhian Approach and its current relevance:

1.2. Broad Front Approach:

Community Development and Panchayat Raj were often described as ***Broad-front' or 'Multipronged*** development strategies as they aimed at development of villages covering all the major spheres like Agriculture, Animal Husbandry, Rural Industries, Communication, Health, Education, Women Welfare and Social Welfare(Desai, 1983). In the early 1960*s India revised its rural development strategy and adopted sectoral approach of development, due to financial limitations and pressing needs and priorities (Sharma, 1977)* In the process, it launched specific sectoral development programmes such as Intensive Agricultural District Programme, Intensive Agricultural Area Programme, Intensive Cattle Development Programme, etc.

While the sectoral approach to development was fruitful to a major extent in eleminating scarcity of food, it has also contributed to the growing regional imbalances and inequality among the people within the community, the later has affected significantly the rural poor, viz., the landless labour, artisans, marginal and small fanners. As a result, the development policy of India was revised once again in late 1970*s in which development of the rural poor became the primary concerned of rural development. Antyodaya, Integrated Rural Development Programme, National Rural Employment Programme are some of the programmes that were introduced in India for

the development of rural poor. The present study is an attempt to review the functioning of Integrated Rural Development Programme with specific reference to the progress made by the beneficiaries and the problems confronted by them in the development process. A theoretical introduction to the Integrated Rural 3 Development Programme (IRDP) covering the aspects of its history, meaning and scope is given hereunder.

In early fifties, rural development efforts began with multi-purpose approach which included activities related to agriculture, animal husbandry, co-operation, irrigation, village and small scale industries, health, sanitation, housing, transport and communication, welfare of women and rural employment. The Community Development Programmes (CDP) and National Extension Service (NES) initiated in 1952 fell under this approach. Though CDP, as a holistic approach, did not succeed as expected. The impact of programme was ephemeral. It was said that the community development programme has been like film of butter spread over a large loaf, thus provide ineffective in a complex society. Hence, it could not make a dent into social fabric as was expected. The critics also point out that; i) It brought about a great disparity between the rich and the poor, ii) It hardly touched the problem of meeting the felt needs of the people, iii) It failed to bring about the process of modernization through social education, and iv) Lack of people's participation. In spite of the criticisms leveled against CDP and NES, the fact cannot be denied that the programme added a new dimension to the process of change and generated community consciousness to solve community problems. 46 The multi-purpose approach was a significant approach, which laid the foundation stone for the upliftment of rural India.

1.3. Sectoral Approach:

Sectoral development planning in individual sectors like education, health, housing and social security are included in sectoral approach of development. This approach advocates compartmentalization of development in different sectors as if these are watertight compartments and have nothing to do with each other. Its inadequacies stem from this compartmentalized approach. Little attempts are to be made to integrate them.

By 1960's the situation was rather critical on the food front. The need for great concentration on food production led to strategy for locating potential sectors and well-endowed districts and areas capable of yielding higher agricultural production. More attention was paid in improving productivity per acre than on extending the acreage. Thus, the Intensive Agriculture Development Programme (1960) (IADP) and later in 1963 intensive Agricultural Area Programme (IAAP) were launched. Both IADP and IAAP constituted landmarks in the development of agriculture, indeed of the rural sector in India. The programmes placed agriculture on a qualitatively different footing with wide ranging repercussions on rural scenario. The programmes resulted in a spectacular breakthrough in total agricultural production and productivity per hectare but at the expense of social equality and social justice.

1.4. Participatory Approach:

This concept has been developed from participatory development.

“Participatory development is a process through which stakeholders can influence and share control over development initiatives, and over the decisions and resources that affect themselves”(ADB, 1996).

• A process to engage local populations in development projects.

• PD uses local decision making and capacities to steer and define the nature of an intervention.

• PD aims at achieving a localized capital accumulation process based on the skills development and local resources generation.

• The essential feature of PD is social mobilization

• PD gives a new self-confidence through which the community can engage in more ambitious projects involving collective action and management.

Scope and Applications of Participation

• Participation at the micro level of projects such as project planning and design decisions, project implementation, monitoring and evaluation.

• Participation at the macro level, for instance, participatory poverty assessments (PPAs) are designed to influence policy particularly in relation to development and poverty reduction strategies (Norton et al., 2001).

• Between the micro and the macro level, a number of exercises in participation at an intermediate or meso level such as participatory budgeting in local governments and various forms of territory-based rural development.

Types of Participation:

Passive Participation

People are told what is going to happen or has already happened. Top down, information shared belongs only to external professionals. Information giving People answer questions posed by extractive researchers, using surveys etc. People not able to influence the research. Consultation People are consulted and external agents listen to their views. Usually externally defined problems and solutions. People not really involved in decision making. Participation by material incentives Provision of resources, e.g. labor. Little incentive to participate, for example farm research, some community forestry.

Functional Participation

Groups are formed to meet predetermined objectives. Usually done after major project decisions are made, therefore initially dependent on outsiders but may become self dependent and enabling. Interactive Participation Joint analysis to joint actions. Possible use of new local institutions or strengthening existing ones. Enabling and empowering so people have a stake in maintaining structures or practices. Self-Mobilization Already empowered, take decisions independently of external institutions. May or may not challenge existing inequitable distributions of wealth and power.

Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) To enable people so that they can express and analyze the realities of their lives and conditions, to plan themselves what actions to take, and to monitor and evaluate the results. The difference is that PRA emphasizes processes that empower local people, whereas RRA is mainly seen as a means for outsiders to gather information (Chambers and Blackburn, 1996)

Key Elements of Participatory Development Process:

Growth of consciousness and group identity. The realization of the creative potential of the poor. Empowerment: The process of reconstructing a group identity, raising consciousness, acquiring new skills and upgrading their knowledge base. Participation: Power to break the vicious circle of poverty

Variations of Participatory Development Manifestations

• Enabling "mutual learning“to enhance “communication, listening and learning between development workers and those they serve.

Implementation

1. Information-sharing tools: News and updates via media

2. Consultation tools: Discussion forums, debates, focus groups etc.

3. Collaborative planning tools: Establishment of local-level planning committees

4. Benefits High start-up cost but less expensive and more sustainable in the long run

5. More relevant to local populations than traditional development projects

6. Addressing local needs Criticisms

7. Costly and slow

8. Smaller target population than traditional development

9. Treating everyone same in the communities.

10. Participatory Approaches to Rural Poverty Alleviation Diagnosis/ project identification, community planning, and formulation • Diagnosing the situations that

give rise to problems, setting priorities for their resolution, identifying and formulating project interventions that may help solve some of those problems. Research and extension, innovation, knowledge • The research and development realm consists of co-creative processes to identify needs and opportunities, generate new information and innovations, consolidate them with existing practices, and then translate them into learning objectives and activities for enhanced performance.

11. Natural resource management - Natural resource management development is a main area of application of participatory approaches to help poor in managing the natural resources available to them. Governance and Decentralization • Good governance makes it possible for citizens, individually or in groups, to articulate their interests, exercise their legal rights and negotiate their differences. • Within the broad area of governance, decentralization, which brings decision-making closer to the local level, is potentially important to participation, if it is done well, lead to more responsive government and new opportunities for citizens to participate.

1.5. Area Development Approach:

This approach contemplates that development of an area depends not only on the development of an adequate infrastructure network but also the way factors of the local economy are activated around the production infrastructure. In other words, for development of an area, spatial and functional integration is necessary. Thus, while rural growth centers provide ideal locations for the provision of infrastructural facilities, their hinterlands are regarded as basic planning units for integrated multi-sectoral planning to achieve integrated development of an area. The approach, while taking area poverty into consideration, provides a balance between various sectoral activities as well as spatial pattern of growth; however, it does not ensure that economic growth is being shared by all classes and communities of the rural areas.

1.6. Target Approach:

In order to accommodate the lagging sectors/regions rural development was re-conceptualized to highlight the improvement of the social and economic life of a specialized group of people. The target group comprised of marginal and small farmers, landless agricultural labourers for whom special programmes such as Small Farmer Development Agency 47 (SFDA) and Marginal Farmers Development Agency (MFALDA) were started. It was noticed that the target group approach showed a better results where information facilities were satisfactory and administrative and organizational arrangements were reasonably strong. This approach was for the correction of regional imbalance. In this connection, mention may be made of Tribal

Area Development Programme (TADP, 1972), Hill Area Development Programme (HADP, 1974-75), Drought Prone Area Programme (DPAP, 1970), Desert Development Programme (DDP, 1977-78), and Command Area Development Programme (CADP, 1975). These programmes were fairly successful in terms of implementation.

1.7. Basic Needs Approach:

The basic needs approach gives primacy to the need for a minimum standard of living of the poor as a central concern of development planning. It therefore contributes to the formulation of a development strategy, which aims at reducing poverty and inequality, promoting growth of employment and distributive justice. The basic needs concept is a wider scope covering personal and social consumption and also human rights, peoples participation, employment and growth with justice. 48 The Minimum Needs Programme (MNP) in India was introduced in 1974 during the first year of fifth plan period. The fifth plan proposed MNP with the objectives of establishing network of basic services and facilities of social consumption in all areas of upto nationally accepted norms within in a specified time frame. It is essentially a programme of investment in human resources development and seeks to improve the consumption of those living below poverty line and thereby improving productive efficiency of people and their quality of life. The main components of MNP are: (1) Rural health, (2) Rural education, (3) Rural roads, (4) Rural drinking water, (5) Rural electrification, (6) House sites for landless, (7) Environmental improvement in slums, and (8) Nutrition.

1.8. Employment-oriented Integrated Approach to Rural Development:

With a view to overcome the limitations of earlier approaches and to improve the quality of life of the poor living in the rural areas, a multilevel, multi-sector, with multi-section concept of integrated rural 49 development was launched in 1978-79. The different programmes were brought under single umbrella of Integrated Rural Development Programme (IRDP). It aimed at ensuring accelerated welfare and development of the poorest of the poor based on Gandhian concept of Antyodaya. Several programmes for providing employment to rural poor, namely, rural works programme, rural employment guarantee programme, IRDP, Training Rural Youth for Self-Employment (TRYSEM), Development of Women and Children in Rural Areas (DWCRA) and Jawahar Rozgar Yojana (JRY) were introduced.

1.9. Integrated Development Approach:

In the context of problems in the area development approach to tackle the problems of rural poverty, a new strategy of development, i.e. the integrated development approach has been developed because the area development approach by and large failed to address the question of inequalities in the distribution of employment, incomes and assets. A mere geographical emphasis, as is the case with the area development approach, has been found to be inadequate in solving the problems. The Indian economy and social structure are characterized by widespread poverty, poor health conditions, illiteracy, exploitation, inequitable distribution of land and other assets and lack of infrastructure and public utilities (roads, communications etc). Clearly, this means that the problem requires an approach that will take into account all these factors in devising a comprehensive strategy to further rural development. The concept of "integrated rural development" came into vogue with the need for a multipurpose thrust to rural planning. It stresses that various facets of rural development, which have an impact on rural life, are interrelated and cannot be looked at in isolation. Thus, an integrated approach towards rural development is essential. The various dimensions of rural life---growth of agriculture and allied activities, rural industrialization, education, health, public works, poverty alleviation and rural employment programmes -- all form a part of an integrated approach to the problems of rural development.

1.10. Growth Center Approach:

It is most appropriate for planning integrated rural development. Based on the principle of "equal accessibility", this approach can bring all these facilities, services and local administration [panchayats] within easy reach of the population. The growth center should be equipped with all the required facilities such as:

[a] Training center to impart practical training and build capacity to enhance productivity of agriculture and rural/cottage/agro-based industries

[b] Mobile training-cum-demonstration unit to provide on the spot training, repair and maintenance, services for agricultural and industrial machineries

[c] Marketing-cum-warehousing facilities that can provide safe storage and marketing of farm produce and cottage industries products

[d] Forest and grass nursery to provide fruits, fuel, fodder and forest cover

[e] Developmental school based on the " earning while learning principle" and oriented to develop a cadre of self-employed workers in the area of human, animal, plant and soil-health care and

[f] Residential housing complex for workers in the project area.

1.11. Community-driven development (CDD) or Approach:

It is derived from community-based development (CBD),which is a developmental initiative that provides control of the development process, resources and decision making authority directly to community groups. The underlying assumption of CDD projects are that communities are the best judges of how their lives and livelihoods can be improved and, if provided with adequate resources and information, they can organize themselves to provide for their immediate needs. Moreover, CDD programmes are motivated by their trust in people (Naidoo and Finn, 2001) and hence it advocates people changing their own environment as a powerful force for development. By treating poor people as assets and partners in the development process, previous studies have shown that CDD is responsive to local demands, inclusive, and more cost-effective compared to centrally-led NGO-based programmes. CDD can also be supported by strengthening and financing community groups, facilitating community access to information, and promoting an enabling environment through policy and institutional reform.

1.12. Gandhian Approach and its current relevance:

It is available in Unit – 2 of Block-2 (Rural Development and Regional Disparity) of Course -2 (Rural Development in India)

Check Your Progress I

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) What are the different types approaches of rural development in India ? Explain atleast any five in detail?

Ans.

2) Describe Integrated Development Approach according to the Rural Development programmes in India?

Ans.

1.13. Let Us Sum Up:

There are no universally accepted approaches to rural development. It is a choice influenced by time, space and culture. The term rural development connotes overall development of rural areas to improve the quality of life of rural people. In this sense, it is a comprehensive and multidimensional concept, and encompasses the development of agriculture and allied activities, village and cottage industries and crafts, socio-economic infrastructure, community services and facilities and, above all, human resources in rural areas. So, there are various types of approaches to rural development like Sectoral Approach, Area Development Approach, Integrated Development Approach, Growth Center Approach and Community-driven development (CDD) or Approach.

1.14. Key Words:

- ***Participatory Development:*** "Participatory development is a process through which stakeholders can influence and share control over development initiatives, and over the decisions and resources that affect themselves"

- ***Growth Centre Approach:*** It is most appropriate for planning integrated rural development. Based on the principle of "equal accessibility", this approach can bring all these facilities, services and local administration [panchayats] within easy reach of the population

- ***Democracy:*** The word Democracy derived from Greek language **Democ** means the people and **Cracy** means rule of. It is leading of the people by the people, for the people.

- ***Decentralization:*** Devolution of central authority among local units close to the area served.

- ***Community Driven Approach:*** It is derived from community-based development (CBD),which is a developmental initiative that provides control of the development process, resources and decision making authority directly to community groups

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UNIT 2 TECHNOLOGY MISSIONS FOR RURAL DEVELOPMENT

2.0 LEARNING OBJECTIVES

After completion of this unit, you should be able to:

- explain the significance of S&T for rural development and illustrate the experiences of those working on S&T applications in rural development;
- describe the nature of interaction among the generators, the carriers and the users of technology, particularly in the rural areas;
- identify the areas requiring technological interventions and the related mechanisms for the generation and diffusion of S&T;
- describe some of the major programmes of rural development launched after independence which involved significant S&T inputs.
- critically analyse some of the major factors associated with the utilization of S&T and explain the role of spatial technologies and their applications in rural development.

Structure:

2.1 INTRODUCTION

The importance of science and technology (S&T) to rural societies has been recognised since long. Though enormous strides have been made in the area of S&T in India since 1947, there is an urgent need to deliver them to the most needy so that they are able to meet the challenges of a technologically sophisticated world. Advances in technology continue to create newer methods of communication and information management, which have produced profound impact on the society at large. They have offered unprecedented opportunities and challenges for scientific endeavours. Though science has a universal character, it is supported or constrained by practices, which are influenced by local customs and values. In rural areas, behaviour patterns and practices are deeply rooted in traditional beliefs and superstitions that are not easily displaced by science or modern approaches based on new knowledge. The S&T policies for rural development need to take into account the nature of the local environment to effectively deliver the benefits of S&T to the rural society. Herein lies the challenge for the management of rural natural resources and environment.

Rural areas need to explore the socio-economic implications of new technologies, especially to predict their impact on society, identify emerging opportunities, and serve as an early-warning system for natural disasters. The rapid growth and unprecedented influence of new technologies, especially the information and communication technologies, including the Internet, are raising global awareness about the power of technology as a whole.

There is also a need to bridge the ‘digital divide’ between the urban and the rural areas by making these technologies more and more accessible by improving connectivity, computerisation and content areas. Similarly, in the context of pollution, environmental degradation and the need for sustainable development, harnessing the potential of S&T for systematic and coordinated use of local resources is a matter of paramount importance.

This unit covers the broad aspects of the use of S&T for rural development. Firstly, the significance, role and contribution of scientific and technological inputs [including that of spatial technologies, like Geographic Information System (GIS), Global Positioning System (GPS) and Remote Sensing (RS)], in the various aspects of rural development planning and management are discussed in brief. This is followed by a description of the factors related to the application of S&T. In the concluding section, an attempt has been made to explain how S&T may be integrated effectively in the strategies related to rural development programmes.

2.2 S&T INPUTS FOR RURAL DEVELOPMENT

2.2.1 Significance of S&T

There are several reasons why focusing S&T for the benefit of the rural poor in India is both appropriate and timely. S&T is the most important means for empowering the poor. The rural areas, which have not addressed the issue of acquiring scientific and technological knowledge so far, must now redouble their efforts with a strategy that begins with popularising science and its application to rural development in concrete terms. It is now an imperative for the governments to invest in these technologies or risk widening of the gap between the urban and the rural areas. It is this realisation that should make S&T work for development, and take the country's rural development agenda to the top.

In order to appreciate the role of S&T in the process of development, it is necessary to understand that *S&T is the means of enhancing productivity and the physical and mental capabilities of human beings. It is the instrument for transforming natural resources into useful goods. It is also the means for effecting social change*. S&T has made major contributions to many fields, including agriculture, industry, utilization of resources (like physical, biological, financial and infrastructure), medicine and health, transport, environment, and the quality of life in general.

The scarce resources can be put to rational use through S&T. Those who own or use precious natural resources, particularly land and water, can increase their efficiency levels through judicious use of S&T. New technologies facilitate the processing of raw materials, by-products and waste materials. The application of S&T can help in making improvements in land and water resources and also in starting agro-industries, and thus create additional jobs for the unemployed and underemployed persons.

Many of our achievements in agricultural and rural development can be traced to the application of S&T. The diffusion and adoption of innovations in rural areas have generated changes in almost all aspects of rural life. Farm mechanisation has enhanced productivity and due to modem technology farming got commercialised and moving away from the traditional farming techniques farmers are fast adopting entrepreneurial production systems. The use of electricity has revolutionized farming. Better means of transportation and communication have shown deep impact on the socio-economic life of the rural people.

As you know, women have been a disadvantaged group in many ways. Amongst the rural masses, the brunt of hardships is borne by women. The situation is further complicated by the fact that women are heading an increasing number of households in the villages due to the migration of men to cities. It is therefore essential to strive for introducing and applying technology in spheres directly affecting the well-being of rural women.

Removal of poverty and generation of employment are major objectives of our development plans. The achievement of these objectives is possible by drawing up scientific strategies for rural development based on a comprehensive survey of resources, their planned utilization and management based on technological appropriateness to the local environment and mass mobilization of people through education, and equitable sharing of the benefits of development.

Several instruments are now available to educate the general public about the scientific and technical aspects of the related issues such as agro-techniques, community healthcare and other matters concerning daily life. The instruments we are talking about are formal, open distance and on-line education; media presentations by experts and practitioners; broadcasts of relevant S&T messages; and exhibitions, fairs, and science competitions. All of them offer opportunities to the public to visualize how S&T can and does contribute to development, seek information and get their queries clarified and learn more and more about various new products and processes.

These initiatives provide answers to such questions as: How should technology be used to facilitate development? What role should the private sector and the non-governmental sector play? What technologies should be promoted? And what type of educational structure and curricula would facilitate the achievement of development objectives? The strategies of delivery would include a) restructuring of science education with a focus on the utility of scientific culture, b) use of familiar materials and processes, and c) teaching through and about indigenous S&T practices using local languages.

2.2.2 S&T Schemes and Programmes

Rural development is determined by the efficient, scientific and optimum assessment, conservation, utilization and distribution of rural resources. Science & technology and rural development are thus inter-related and inter-dependent.

Let us now have a look at some of the developmental areas in the context of S&T inputs.

In the field of agriculture, advances in agricultural technology have revolutionized agricultural production. These include the use of high yielding and disease resistant seeds, fertilizers, pesticides, improved implements, irrigation and drainage, crop rotation and cropping patterns, storage, processing and marketing.

Various programmes linking S&T and rural development have been launched in recent times. The major ones are as follows:

- Science and Society Programme of the Department of Science and Technology (DST), the Government of India. It includes S&T Application for Rural Development (STARD).
- S&T Application for Weaker Sections (STAWS).
- S&T for Women.
- S&T for Practical and Strategic Needs of SC Population

- Empowering Tribal Groups through S&T
- Scheme for Young Scientists.

Several other programmes are also available for the development of animal husbandry and fisheries, which are integral parts of agriculture in rural India. These include:

- Dairy Development Programme (DDP),
- Fodder Development Programme (FDP),
- Intensive Cattle Development Programme (ICDP) and
- Special Livestock Production Programme (SLPP).

Awareness regarding S&T inputs arising from the researches being done in genetics and breeding, botany, microbiology and biochemistry are made available to one and all under these programmes. Setting up of poultry, piggery, fisheries and sheep production units and rearing of cross-heifers by small and marginal farmers and agricultural labourers are encouraged through these programmes.

Special programmes have been launched for the development of hill areas, tribal areas, drought-prone and desert areas, command areas, etc. by adopting area-specific approaches. Notable among these are:

- Hill Area Development Programme (HADP),
- Tribal Development Programme (TDP),
- Intensive Agricultural District Programme (IADP),
- Drought Prone Area Programme (DPAP),
- Desert Development Programme (DDP),
- Command Area Development Programme (CADP) and
- Whole Village Development Programme (WVDP).

In the field of rural housing, suitable indigenous building materials and improved cost-effective construction techniques are being developed and made available to the rural masses. Indira Awaas Yojana (IAY) was launched in May 1985 as a sub-scheme of Jawahar Rozgar Yojana (JRY). It is being implemented as an independent scheme since January 1, 1996. The other two important schemes in this field are: Pradhan Mantri Gramodaya Yojana (Gramin Awaas) and Samagra Awaas Yojana, which came into effect from April 1, 1999. The National Mission for Rural Housing and Habitat was also set up on the same date to facilitate the induction of S&T inputs on a continuous basis in the rural housing sector.

Health and sanitation continue to remain an important component of rural development. Preventive, curative and rehabilitative services are being extended all over the country through different health care programmes. For the improvement of environmental sanitation in rural

areas, improved low cost sanitation techniques have been developed for disposal and/or recycling of human and animal wastes.

Poor quality of curriculum in the formal education system is one of the key issues. There are weaknesses and deficiencies in the curricula for science education and the techniques of their delivery in the education system. First, the school enrolment is low in rural areas, particularly that of girls. A significant percentage of youths thus does not access even the feeble S&T programmes that exist in the curricula. Secondly, there are few incentives to draw the youth into careers in S&T. The teaching of S&T needs a special form of instructional material and skills. Science teachers, particularly those working in rural areas, are not adequately trained in such skills. For example, they are seldom able to show any relation between science and everyday living. In addition, teachers in rural areas are often poorly paid. Consequently, the rural masses do not become enlightened citizens or "intelligent users" of their natural resources.

Improper delivery of non-formal education is an equally important issue. The major weakness here lies in the sources of knowledge and information. The non-formal approaches often miss the underlying principles of science, as they tend to concentrate on a shallow interpretation of scientific applications without touching the requisite knowledge base.

Among the rural masses, the explanatory theories that shape their environmental understanding stem from the cultural beliefs and traditions, as well as from the age-old superstitions. These influences are not easily displaced by general science or the programmes that aim at popularising it.

Some missions related to the major socio-economic sectors were launched during the Seventh Five Year Plan. They have a large S&T component and may provide a higher visibility when accomplished. As a result of this strategy, the technology missions that came into being relate to the areas of: (i) drinking water, (ii) immunization of vulnerable populations, especially children, (iii) eradication of illiteracy, (iv) self-sufficiency in edible oils, (v) better communications, and (vi) wastelands development. Besides, several S&T projects (in the mission mode) have been initiated to cover areas like immunological approaches to fertility control; integrated vector-control of malaria, filaria and other vector-borne diseases; control of iodine-deficiency disorders; development of immuno-diagnostics and cattle herd improvement using embryo transfer; together with the operationalisation of the National Natural Resource Management System (NNRMS), the Natural Resource Data Management System (NRDMS), National Centre for Medium Range Weather Forecasting (NCMRWF) and the development of agro-meteorological services. The significance, implementation and impact of these technology missions and S&T projects in mission mode for rural development constitute major efforts of the government in the process of rural development.

The Technology Mission for Drinking Water in Villages and the Related Water Management: It aims at providing safe drinking water, and locating and developing new sources

of water using high technology inputs. It also aims at eradicating guinea worm, controlling fluorosis, controlling brackishness and reducing excessive iron in water to tolerable limits. Conservation of water and recharging of aquifers are given priority. Remote sensing techniques are being used extensively in hydrological and geophysical surveys being conducted all over the country. The problem villages, affected by bacteriological and chemical contamination, have been identified and the quality of water available to them too has been tested. Work on the installation and operation of tube wells, desalination plants, defluoridation plants and excess iron removal plants has been undertaken. A computerised information system on drinking water has also been developed. In this way scientific inputs are being utilized on a large scale for locating water sources, hydrological and groundwater mapping and for constructing water conservation structures.

The immunization Mission: It aims at: a) reducing morbidity and mortality due to diphtheria, whooping cough, tetanus, polio, measles and tuberculosis among children, b) reducing mortality due to tetanus among pregnant women, and c) achieving self-sufficiency in vaccine production. Efforts have been made under this mission to establish systems for disease surveillance and epidemiological monitoring, create linkages with other programmes like the Integrated Child Development Services (ICDS) programme, modernize existing vaccine production units, strengthen the cold chain maintenance system, establish vaccine testing facility, promote the use of indigenous systems of medicine in specific areas, and arrange for field testing the new kinds of polio and quadruple vaccines. The strategy for the introduction and development of BCG vaccine with fewer doses was also developed by the same mission.

The National Literacy Mission: It aims at imparting functional literacy to adults in the age group of 15-35 years. The strategy adopted by the mission includes improvement in the learning environment, motivating instructors and learners, institutionalization of post-literacy activities, ensuring the availability of standard learning material and the adoption of an area approach. Use of improved technology inputs such as better blackboards, modern mobile audio-visual aids and innovative mobilization techniques are being encouraged. Under this mission, stress is laid on the dissemination of information and the creation of awareness about rural development programmes.

The Oilseeds Mission: It aims at accelerating the process of reaching self-sufficiency in edible oils within a specified period. It was, in fact, an import substitution effort. It also had a strong equity angle as a large number of small and marginal farmers cultivate oilseed crops on rain-fed land with poor soil in some of the most backward areas. The aims of the mission include use of crop technology and new varieties, modern post-harvest and processing technology and identification and adoption of new sources of oil.

The Telecom Mission: It was meant to increase connectivity and accessibility. The main emphasis was on improving the quality of services, improving delivery of telegrams, provision of telex on demand, improvement in communication and building up of a national digital

network. Under this mission, the key contribution was the introduction of modern digital technology and communication techniques, including setting up of rural automatic telephone exchanges. The large number of ISD/STD/ PCO booths that you see spread throughout the country is a visible aspect of this contribution.

As you must have noticed from the above details, S&T inputs are important in all the sectors of rural development. However, unless appropriate technologies are developed, diffused and adopted, the contribution of S&T to rural development in particular, and national development in general, will be only marginal.

Check Your Progress I

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) Explain the importance of S&T in rural development with reference to agriculture.

(Hint: Refer to Section 4.3)

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2.3 SPATIAL TECHNOLOGIES AND RURAL DEVELOPMENT

2.3.1 Geographic Information System (GIS)

The Geographic Information System (GIS) is a computer system capable of capturing, storing, analyzing, and displaying geographically referenced information, i.e. data identified according to a location that can be used for scientific investigations, resource management, and development planning. It can be used purposefully for rural development planning and monitoring.

A GIS is a powerful tool to relate different pieces of information in a spatial context and to reach a conclusion about this relationship. The spatial context of any place on the globe is outlined with the help of a location reference system comprising longitude, latitude, elevation, etc. Using this system, GIS enables us to relate any geographical information to any point on the globe. For example, to know about the possible changes in the weather of our village/town at a given point

in time, we may collect general information about rainfall around that time, and then use the location reference of our village/town to forecast what may be expected there in the immediate future.. Further, comparing the information on rainfall with other information, such as the location of crops across the landscape, may show that certain crops are likely to receive little rainfall and thus likely to dry up. This inference can help us make the most appropriate decisions about how this situation may be handled, and in general how humans should interact with the crops. A GIS, therefore, can bring forth significant insights that should lead to better decision-making in the rural areas.

Some questions that may be asked about GIS are: What about information retrieval? What do you know about the swampy area at the end of our street? With a GIS you can "point" at a location, object, or area on the screen and retrieve recorded information about it from off-screen files. Using scanned aerial photographs as a visual guide, you can ask and get information from a GIS about the geology or hydrology of the area or even about how close a swamp is to the end of a street. This type of analysis allows you to draw conclusions about the swamp's environmental sensitivity. Have there ever been gas stations or factories that operated next to the swamp? Were any of these within 1 or 2 kilometres of the swamp? A GIS can recognize and analyse the spatial relationships among mapped phenomena. Conditions of adjacency (what is next to what), containment (what is enclosed by what), and proximity (how close something is to something else) can be determined with a GIS quite easily.

A critical component of a GIS is its ability to produce graphics on the screen or paper to convey the results of analyses to the people who can make decisions about resources. Wall maps, Internet-ready maps, interactive maps, and other graphics can be generated, allowing the decision makers to visualize and understand the results of analyses or simulations of potential events.

The early records followed the two-element structure of modern geographic information systems (GIS)— a graphic file linked to an attribute database. Maps are generally easy to make using a GIS and they are often the most effective means of communicating the results of the GIS process. The users of a GIS must be concerned with the quality of the maps produced, because the GIS normally does not regulate the common cartographic principles. One of these principles is the concept of generalisation, which deals with the content and details of information at various scales. Map makers have long recognized that content and detail need to change as the scale of the map changes. For example, states can be mapped at various scales, from the small scale of 1: 500,000 to the larger scale of 1: 250,000 and the yet larger scale of 1: 100,000, but each scale requires an appropriate level of generalisation.

Traditional maps are abstractions of the real world; each map is a sampling of important elements portrayed on a sheet of paper with symbols to represent physical objects. People who use maps must interpret these symbols. Topographic maps show the shape of the land surface with contour lines. Maps have traditionally been used to explore the Earth. GIS technology has

enhanced the efficiency and analytical power of traditional cartography. As the scientific community recognizes the environmental consequences of human activity, GIS technology is becoming an essential tool in the effort to understand the process of global change. Maps and satellite information sources can be combined in models that simulate interactions of complex natural systems.

Through a process known as visualization, a GIS can be used to produce images not just maps, but drawings, animations, and other cartographic products. These images allow researchers to view their subjects in ways that they never could imagine before. The images often are helpful in conveying the technical concepts of a GIS even to non-scientists. Through Internet map server technology, spatial data can be accessed and analyzed over the Internet. For example, current wildfire perimeters are displayed with a standard web browser, allowing fire managers to better respond to fires while in the field and helping homeowners to take precautionary measures.

The future of GIS in the context of rural development is very bright. Environmental studies, geography, geology, planning, business, marketing and other disciplines have benefited from GIS tools and methods. Together with cartography, remote sensing, global positioning systems, photogrammetry, and geography, the GIS has evolved into a discipline with its own research base, known as geographic information sciences. An active GIS market has resulted in lower costs of and continual improvements in GIS hardware, software, and data. These developments will certainly lead to a wider application of the technology in government, business, and industrial sectors.

2.3.2 Global Positioning System (GPS)

Global Positioning System (GPS) is a Satellite Navigation System. It was designed for and is being operated by the US military. It is funded by and controlled by the US Department of Defense (DOD), though today there are many civil users of GPS worldwide.

Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. The Space Segment of the system consists of the GPS satellites. These space vehicles (SVs) send radio signals from space. The GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity and time.

The nominal GPS Operational Constellation consists of 24 satellites that orbit the earth in 24 hours. The satellite orbits repeat almost the same ground track once each day. The orbit altitude is such that the satellites repeat the same track and configuration over any point approximately every 24 hours. There are six orbital planes (with nominally four SVs in each), equally spaced (60 degrees apart), and inclined at about fifty-five degrees with respect to the equatorial plane. This constellation provides the user with five to eight SVs visible from any point on the earth. GPS data can directly be uploaded into a GIS database and can be put to use in various applications of rural development.

2.3.3 Remote Sensing (RS)

Remote Sensing (RS) is the science and art of obtaining information about a phenomenon without being in contact with it. RS deals with the detection and measurement of phenomena with devices sensitive to electromagnetic energy such as light (cameras and scanners), heat (thermal scanners) and radio waves (radar).

RS is very useful in many ways, e.g. it provides a unique perspective from which to observe large regions, sensors can measure energy at wavelengths that are beyond the range of human vision (ultra-violet, infrared, microwave) and global monitoring is possible from nearly any site on earth. Today RS data are used independently or in conjunction with other data sets for different rural development applications.

Check Your Progress II

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) Explain GIS and comment on the current status of its development.

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2) Describe Global Positioning System briefly.

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3) Explain what you understand by the science of remote sensing.

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2.4 FACTORS ASSOCIATED WITH THE UTILISATION OF S&T

You are aware of the beneficial effects of S&T, and also of the fact that the rural masses have by and large shown resistance to the adoption and utilization of S&T inputs. Why does this state of apparent contradiction prevail?

Studies have indicated that the major reasons for non-adoption of improved technologies by the rural people are:

- The complexity of the technologies.
- Socio-cultural and economic incompatibility.
- Non-accessibility of the technologies.
- Very rapid changes in technologies and the resultant digital transformation leading to e-governance, e-commerce, e-health, e-education, e-crime, etc.
- Capital-intensive nature of technologies.
- Low income, scarce capital/credit (financial limitations) of the rural people.
- Social inequalities.
- Lack of information about technologies.
- Lack of infrastructural facilities.
- Lack of easy, timely and adequate availability of S&T inputs.
- Lack of marketing facilities.
- Risk and uncertainty involved in the use of the new technologies.
- Uncertain profitability or benefits of new technologies. ;
- Sponsoring the innovations as independent entities rather than as parts in an integrated package.
- Illiteracy, i.e. low level of education in the rural sector.

Jaiswal and Arya (1981) in their paper, *"Transfer of farm Technology in India: An overview"* have made an attempt to classify the factors, which influence the adoption of new technologies. Some of the items listed above may be classified, in the following way:

Client-centred factors: Caste, class, age, education, knowledge, attitudes, value-orientation, social status, etc.

Client-environmental factors: Infrastructure, farm size, availability of resources, etc.

Technology factors: Cost, profitability, compatibility, etc.

Communication factors: Physical accessibility, media exposure, contact with extension agencies, etc.

Other variables: Pricing policies related to inputs and outputs, etc.

These factors do not act independently or in isolation. They rather interact with each other and produce a barrier-complex. This barrier of resistance comes in the way of adopting new technologies and varies in intensity with regard to different innovations, different farming communities, and different categories of peasantry.

A lot of research has been done with regard to the diffusion and adoption of new technologies and the factors influencing the rate of their adoption, i.e. the relative speed with which members of a social system adopt an innovation. The rate of adoption is generally expressed as the percentage of receivers who adopt a new idea out of the total number who receive the idea, in a specified time period.

Rogers (1971), in his book entitled Communication of Innovations, described that the relative advantage, compatibility, 'trial ability', and observability of an innovation, as perceived by the members of a social system, are positively related to its rate of adoption. On the other hand, complexity of the innovation has been found to be negatively correlated to the rate of adoption. In this context, you must bear in mind that it is the way the target population perceives the attributes of innovations that influences their rate of adoption, rather than the perception of experts and change agents.

The transfer of technology from academic institutions and national laboratories to industry has been limited. In spite of several governmental initiatives, the participation of private industry in promoting S&T has been extremely restricted. Our institutional structures and ambience have also limited the growth of intensely collaborative research, an almost essential ingredient for success in today's world.

Check Your Progress III

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) What is your understanding of the significance of S&T for Rural Development? Please illustrate your experiences.

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2) With biogas as an example, outline the factors that influence the adoption or otherwise of S&T.

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3) Classify the factors that influence the adoption of a new technology.

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Activity 1

Visit a village and talk to the villagers and field level workers about any technology that is being propagated and try to identify the factors that are contributing to its adoption or non-adoption/rejection.

2.5 STRATEGY FOR THE APPLICATION OF S&T FOR RURAL DEVELOPMENT

The benefits of the achievements in scientific and technological fields have, by and large, accrued only to limited groups, especially the urban-centred groups. Their trickle-down effect to the rural masses has been grossly inadequate. This disconcerting dualism does not exist only between the urban and the rural sectors, but is also perceptible even within the rural sector, e.g. in the case of 'Green Revolution', the benefits of new technologies are being reaped primarily by the land owners and the rich farmers in rural areas. The gravity of the situation has been brought out by a number of studies, which suggest that in a society marked by inequalities, technological changes often enlarge these inequalities. What may be beneficial for the members in one society, need not be so in another. The potential of technology in improving the quality of life of the masses remains largely untapped. The task of effecting technological change in the rural areas is extremely complex. It requires a multi-disciplinary approach, which is sensitive to the actual needs of the rural community and attends to the reality of the rural scene. Also, development and transfer of scientific and technological solutions should be based on an objective assessment of

the actual needs of the people. For the successful diffusion and adoption of a technology, active participation of the target population is not only necessary but also crucial.

While formulating the S&T Policy-2001, the Government of India has been conscious that a concerted plan of action is necessary to infuse a new sense of dynamism into our S&T institutions. There is also a clear felt-need for restructuring the administrative and management structures controlling the government science departments, agencies and S&T institutions. While the Government can make necessary budgetary commitments (may enhance to at least 2% of the GDP in the next five years) for higher education and the S&T sector, it is essential to enhance the participation of the private sector, in order to ensure that the maximum benefit may be derived from the new S&T Policy.

Various programmes and schemes are being implemented for popularizing sciences and their applications. Initiatives in the public understanding of sciences would consist largely of finding the means to deliver scientific information to lay people, and training the scientists on how to get their messages across. Instruments that capture the interest and imagination of the general public are usually effective in popularising sciences and the simple application of technology. Such programmes should seek to:

1) Encourage creativity and innovation in everyday scientific and technological activities, and provide incentives for participation in them.
2) Provide opportunities to general public, especially the youth and women, to appreciate S&T and participate in their development.
3) Demonstrate the linkages between the basic and applied sciences and show their role in rural development.
4) Increase the visibility of successful projects that have an impact on society's progress and rural development.
5) Honour and recognize scientists and technologists who make significant contributions in their fields.

During the decades of development endeavour, a large number of schemes and projects have been, and are being, tried out in rural areas. Almost all of them suffer from the defect of being 'imposed from above' and hence do not have sustained impact. To promote the acceptance and application of S&T inputs, it is important to fully mobilize public participation at the grass roots level. In such a case, the members of the target population would take greater interest in the improved technology. They would appreciate that their previous knowledge and experience are not going to be wasted and what is being offered to them is based on their choices and decisions and is for the betterment of their skills and economy.

A programme for popularising science needs to be started by an institution that has a clear mandate for this purpose. Such a focused institution has to be both regulatory and advisory, under the direct control of the government. The institution needs to be invested with enough

authority to be able to command the respect and cooperation of other institutions and organizations, both public and private that are associated with the task of popularizing science. The government should demonstrate its political will towards such a programme through appropriate funding and political patronage.

Mobilization of people's participation is not possible only through the official machinery like the District Rural Development Agency (DRDA), for instance. The revitalization and involvement of local democratic institutions, specifically the three tire system (particularly that came into existence after the 73rd Constitutional Amendment), viz Zilla Parishads, Panchayats Samitis, and Gram Panchayats, and also the various voluntary, non-governmental and civil society organizations based in rural areas, is a must. These institutions would help in identifying areas for new research and innovation. Feedback from them would help in evaluating technologies that need to be extended.

While talking about voluntary contributions, it is worth mentioning the name of CAPART (Council for Advancement of People's Action and Rural Technology), which is an autonomous body under the Ministry of Agriculture, the Government of India. The objectives of CAPART include (i) strengthening and promoting voluntary efforts in rural development with focus on injecting new technological inputs, and (ii) to act as a catalyst for the development of technology appropriate for rural areas, by identifying and funding research and development efforts and pilot projects by different agencies and institutions, particularly voluntary organizations. Though this agency has made some efforts but a lot more is required from it and the way it should revitalized its working.

A close link between research training and extension is necessary. Research scientists should be made aware of the problems at the field level through feedback received either directly from the rural people or indirectly via the extension agencies. In practice, the researchers get little feedback and as a result, the research work often goes on without being in harmony with the conditions and requirements of the target population. It is important that the new technology is extensively field tested before being introduced to avoid any operational field- level problems. For instance, in agricultural sector, studies indicate that many high-yielding varieties of seeds that were introduced could not establish themselves in different agro-climatic environments and soil conditions in the various regions of our country.

The need of the hour is to develop 'appropriate technologies'. Though there is no consensus, on the meaning of this term, it is generally agreed that appropriate technology should be labour intensive (capital saving), involve maximum utilization of local resources, use renewable sources of energy and materials which can be recycled, have minimum destructive impact on the environment, be adaptable to local socio-economic and cultural conditions and be comprehensible, accessible and easy to maintain.

In today's world of rapidly developing sophisticated technology, the term 'appropriate technology' is sometimes misunderstood to mean some kind of second-rate technology. This certainly is not so. As was clearly stated in the Sixth Five Year Plan document (and this continues to be generally accepted), "Rural technology would not be taken to mean primitive technology or technology of yesterday. A determined effort is needed to take modern S&T to the rural areas so that it is brought well within the material, financial and skill resources of the rural people".

Check Your Progress IV

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) Why is it important to have a close link between research and extension?

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2) Describe the role of S&T in Rural Development with reference to spatial technologies.

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2.6 RECENT DEVELOPMENT OF SCIENCE & TECHNOLOGY IN RURAL DEVELOPMENT

Nearly 70 per cent of the country's population lives in rural areas. Thus, the development of rural India shall reflect development of the whole country. For this to happen, an intensive focus on conservation of natural resources and use of sustainable technologies will have to become a prerequisite. In our villages, millions still cook using fossil fuels in earthen wares. Their exposure to smoke causes serious health hazards. The present government has launched a new initiative of providing LPG connections to poor people. The users who can afford LPG at market price may give up the subsidy on their gas connections and help provide clean fuel to a BPL family. Dr. Harsh Vardhan, Union Minister for Science and Technology has launched equipment called 'Solar Dome' in April 2016. The device will help illuminate houses of people living in

rural areas where electricity has not reached. The photovoltaic cells in this device, store sunlight and can provide light for 8 to 10 hours. Such innovative methods of alternative/ renewable energy will allow the people to do their routine work during night hours. This will also prove to be a boon to the school going children who can complete their assignments and save their eyes from the impact of dim light of candle or lantern.

Science and technology have contributed significantly in promoting agriculture in our country over the decades. Some of the initiatives are described as below:

Agriculture Information System (AIS) plays a vital role in ensuring the reach of agriculture related information to farmers. Through different Information Processing Tools monitoring, we are able to know the situation of natural resources and environmental impact such as analysis of environment deterioration, soil erosion, deforestation, etc.

DD Kisan Channel is providing dedicated programmes on agriculture.

Facebook, Twitter and Whatsapp has caused wider promotion of this channel among urban and rural India. Content of the channel and its presentation are also innovative. Therefore this channel is gaining popularity.

Vigyan Prasar, an autonomous organisation of Department of Science and Technology, Government of India is engaged in public outreach for S&T communication. In rural areas, this organisation organises street plays, puppet shows and science exhibitions.

The Government is actively promoting use of ICT to reach the farmers. Some of the initiatives are described as below:

Kisan Vikas Kendras (KVK) forms the backbone of information and technology dissemination in India. At present, around 630 KVKs are in operation whereas several new ones are being established. These KVKs work as a link between scientific community and the Indian farmer by demonstrating new technology at district level. The present Government has asked KVKs to use more and more ICT tools in their work to reach the remotest farmer. Generous funding is being provided for this.

Mera Gaon Mera Gaurav is a scheme in which Agri-Scientists would go to villages and help farmers adopts new technologies. Again, ICT can be very effective in this. Scientists can form whatsApp and facebook groups with youth of the villages and interact with them more frequently.

Digital India Initiative: Easy access to internet is a problem in India, especially in rural hinterland. In many villages network coverage is poor. Further, not everybody can afford a laptop or smart phone in rural India. The problem of connectivity would be largely solved by connecting all Gram Panchayats through cable broadband under Digital India Initiative.

Kisan Call Centre is an expert advisory system. The farmers need to call the toll free number 1800-180-1551 to seek expert advice on different matters related to agriculture and allied sectors. mKisan Portal It (http://mkisan.gov.in) is an effort to provide information to the farmer at the single place.

mKisan SMS Portal : We know that internet penetration in the countryside is still abysmally low, therefore, mobile messaging can be the most effective tool. So an SMS service on this portal was also launched on July 16, 2013 by the President of India. This mKisan SMS Portal for farmers enables all Central and State government organisations in agriculture and allied sectors to give information/ services/advisories to farmers through SMS in their language, preference is given to agricultural practices and location. Semi-literate and illiterate farmers have also been targeted to be reached through voice messages. In addition to above, various farming related apps can be downloaded from mKisan portal.

Kisan Suvidha: it is an omnibus mobile app developed to help farmers by providing relevant information to them quickly. This app has following information on weather of current day and next 5 days, - market prices, - agro advisories, - plant protection, - Integrated Pest Management (IPM) practices

Pusa Krishi: The app will provide farmers with information related to new varieties of crops developed by Indian Council of Agriculture Research (ICAR), resource conserving cultivation practices as well as farm machinery.

Bhuvan Hailstorm App: A mobile app has been developed to capture crop loss ocewel due to hailstorm. Agriculture Officer will go to the field with mobile or tablet loaded with this mobile app. The captured data will automatically be plotted to Bhuvan Portal and analysis can be done easily. This will reduce the delays in the payment of compensation to the farmers.

Crop Insurance App: It will provide all the information about government crop insurance scheme. It can be used to calculate the Insurance Premium for notified crops based on area, coverage amount and loan amount in case of loanee farmer.

AgriMarket- This mobile app can be used to get the market price of crops in the markets within 50 km of the device's location. There is another option to get price of any market and any crop in case person does not want to use GPS location.

ICT in Rural Education and Skill Training

Thanks to the relentless efforts by the government and schemes like mid day meal, India has achieved universal enrollment at primary level. But one worrying fact is that learning outcomes of enrolled children are very abysmal. Attention needs to be focused on this now. Using ICT tools in education can help improve the learning among the kids e.g. through projector and computer, teachers can make children understand complex concepts easily. But problem here

would be to train the teachers in use of ICT tools so that their attitude towards teaching may be changed. The Government is promoting use of ICT through Rashtriya Madhyamik Shiksha Abhiyan. Under this following steps are being taken,for

- the establishment of smart schools, which shall be technology demonstrators.
- Provision for engagement of an exclusive teacher for ICT, training all teachers in use of ICT. Development of e-Content.
- National Award for teachers using ICT in schools in the teaching learning process.
- Also a project called e Basta is conceived under Digital India Initiative to make school books accessible in digital form as e-Books to be read and used on tablets and laptops.

Further, ICT can be used in skilling rural youth under various Government skilling programmes e.g. Skill India, PM Kaushal Vikas Yojana.

ICT for Rural Health Sector

Healthcare is the right of every individual but lack of quality infrastructure, dearth of qualified medical functionaries, and non- access to basic medicines makes it difficult for the poor to access Medicare. There are few Primary Health Centres in villages and many of them do not have doctors as no one wants to be posted in remote rural areas. This can be solved effectively through Telemedicine in which a doctor sitting in a city can interact with the patient in the remote village and prescribe medication. This is not only cheap but also convenient and less time consuming. Also apps like '**Mera Doctor'** is launched by private sector which offers WhatsApp-like chat sessions between patients and licensed doctors to answer questions. Government has also adopted ICT in health by issuing biometric smartcards to the beneficiaries under Rastriya Swasthya Bima Suraksha Yojana.

Skill India Mission:

In India, just 2.2 per cent persons of age group 15 to 59 years received formal vocational training against 8.6 per cent of this group that received non-formal vocational training. This means, about 90 per cent persons did not receive any kind of vocational training here. Passing down the hereditary skills, self and on the-job-learning, are still very common in village community. This, in fact, produces here the skilled work-force, even more than the training institutions. Driving and motor-mechanic training are found more preferred by 22.3 per cent males. And about 32.2 percent rural males take to textile work. There is dire need to make the work force in India technically skilled in their respective areas of vocations and occupations. Nearly 25 crore people are engaged in work in different areas in India and about 1.2 crore people add to it every year. As such there is a need to skill about 31 crore people in the next five years here. While the degrees granted by Engineering colleges are not of much help to securing the jobs, only 12-month course of intensive training and skill development, prove to be of greater help for self employment or working in organisation. The present Government of India has embarked on an ambitious target

of imparting vocational skills to 42 crore workers, drawn mostly from villages, by 2022. The target is praiseworthy, though challenging. The young generation of the villages is largely looking for job outside, maybe civil jobs in Government and private sectors, leaving out its traditional occupation. This situation has resulted in creating a big army of unemployed youths in the villages. Solution lies in creating small-scale rural industries, to do the low-cost manufacturing. And these industries should be given access to proper roads and electricity. The rural Hathakargha Udhyog (Handloom industry) and such textile units, house construction provides many jobs. Several village institutions are being reconstructed today, to lend their proper support and services to the rural India. Village Panchayats, patterned on the grandiose idea of Gandhi Ji as a system to liberate the rural masses, are being strengthened and reinforced to address the village-issues properly.

Conclusion:

The utility of S&T will be paramount in achieving aim of rural development as it is most important and effective tool for ensuring poverty alleviation, food security, life skilling, and educating masses. But only scientific and rational outlook can help us determine whether a technology is in harmony with nature or not. Else it may adversely affect our natural resources, flora and fauna. Only on inculcating this rational and logical thinking, we will be able to achieve the goal of sustainable development. One must remember that survival of human beings is linked with the survival of living organisms and environment. Technologies should be used in a sustainable manner and only to the extent they do not interfere with the nature and ecosystem. The key to a developed and prosperous village lies in the sensible and rational usage of technologies which are in harmony with nature.

2.7 LET US SUM UP

The use of S&T is a crucial determinant for the realisation of the objectives of rural development. Thus, S&T must be integrated effectively into our strategies related to rural development programmes. Unless appropriate indigenous technologies are developed, diffused and adopted, the contribution of S&T towards rural development cannot be significant.

Although the beneficial effects of S&T are many, the rural masses in our country have by and large, shown resistance to the adoption and utilization of S&T inputs. This has been due to many reasons—complexity, cultural incompatibility and capital-intensive nature of the innovations coupled with the lack of information, low income and the risks involved, among others. There are other factors too that influence the adoption of innovations, such as the relative advantage, compatibility, trial ability and observability of the innovation, as perceived by the members of the target group.

This unit covered the broad aspects of the use of S&T for rural development. First, the significance, role and contribution of scientific and technological inputs, including those of spatial technologies like Geographic Information System (GIS), Global Positioning System (GPS) and Remote Sensing (RS), in the various facets of rural development planning and management were discussed in brief. It was followed by a description of the factors related to the application of S&T. In the concluding section, an attempt was made to understand how S&T can be integrated effectively in the strategies related to rural development programmes.

2.8 KEY WORDS

Area Approach **:** Area approach is concentration of activities in a selected geographical region.

Aquifers **:** Sub-soil water sources

Client-centred factors: are those factors which are related to users, e.g. Caste, class, age, education, knowledge, attitudes, value-orientation, social status, etc.

Client-environmental: are those factors which are related to user's factors environment such as infrastructure, farm size, resource availability, etc.

Cold Chain **:** A process required to maintain, store and transport the vaccines at required cold temperature.

Communication factors: are those factors which are related to communication, e.g. physical accessibility, media exposure, contact with extension agencies, etc.

GIS Applications : are used to study and analyse the spatial variations in various fields such as agriculture, industry, health, environment, resource analysis, decision making, etc

GPS Applications : are used to compute positions in three dimensions and the time offset in the receiver clock.

Immuno-diagnostics : The use of the antibody or antigen reaction is testing for the presence of or the body's response to diseases organisms is called immunodiagnostics.

Immunological Approach: Adopting immune based approach to reduce the infant, child and maternal morbidity and mortality

by protecting against six major vaccine preventable diseases viz. tuberculosis, diphtheria, pertussis, tetanus, polio and measles is known as Immunological Approach.

Other variables **:** include factors such as pricing policies related to the inputs and outputs, etc.

Photogrammetry **:** Photogrammetry is an important part on Remote Sensing which consists of three Greek words i.e. Photo – meaning light

i. Grama meaning
ii. graphy or drawing
iii. Metry meaning

measurement. Thus, Photogrammetry may be defined as the art, science of obtaining reliable information through the process of recording and taking measurements from photographs

RS Applications :are used to detect and measure phenomena with devices sensitive to electromagnetic energy such as light (cameras and scanners), heat (thermal scanners) and radio waves (radar).

Spatial Technologies :are those technologies which are applied to objects that exist in space and differ from one another in two or three dimensions The GIS, GPS, RS are the main spatial technologies

Rural Development Planning :is the process by which the strategy of developing rural areas is analyzed and designed.

Technology factors :are those factors which are related to technology and its cost, such as cost, profitability, compatibility, etc.

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2.10 CHECK YOUR PROGRESS – POSSIBLE ANSWERS

Check Your Progress I

1) S&T have made major contributions in rural development and also in agriculture. Many achievements in agriculture can be traced to the application of S&T, such as farm mechanization that has enhanced productivity. Modem technology applications have made agriculture a commercial activity. Advances like high yielding and disease resistant seeds, fertilizers, pesticides, improved implements, irrigation and drainage have revolutionized agricultural production. S&T have contributed significantly to programmes such as Intensive Agricultural District Programme (IADP), missions like 'self-sufficiency in edible oils' and 'wastelands development' and the 'Oilseeds Mission' which was also an import substitution effort with a strong equity angle. Thus application of S&T has played an important role in our development programmes including those meant for agriculture.

Check Your Progress II

1) GIS, a computer system capable of capturing, storing, analyzing and displaying geographically referenced information, is a powerful tool to relate different pieces of information in a spatial context, e.g. information about climate, by collecting data about rainfall, its location, direction of winds, etc. GIS can reveal/ give important insights that may lead to better informed decisions and therefore better plans of action. Map and satellite data can be combined in models. Further, GIS can be used to produce images, not just maps but also drawings, animations and other cartographic products that help visualization. Also, using Internet, spatial data can be accessed world wide and analyzed for local use/ purposes. The future of GIS, in the context of rural development, is bright as it has a prominent role to play in fields like environmental studies, geography, geology or planning. Together with other spatial technologies, it has evolved into a discipline with its own research base, known as geographic information sciences.

2) GPS, a Satellite Navigation System, was designed for and is being operated, funded and controlled by the US military. Currently, it has many civil users worldwide. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock. The space segment and space vehicles are its important components, which provide specially coded satellite signals that are processed in a GPS receiver, enabling the receiver to compute position, velocity and time. The nominal GPS Operational Constellation consists of 24 satellites that orbit the earth in 24 hours. The orbit altitude is such that the satellites repeat the same track and configuration over any point approximately every 24 hours. There are six orbital planes, equally spaced 60 degrees apart, and inclined at about fifty-five degrees with respect to

the equatorial plane. GPS data can directly be uploaded into a GIS database and can be put to use in various applications for purposes of rural development.

3) RS is the science and art of obtaining information about a phenomenon without being in contact with it. This deals with the detection and measurement of phenomena with devices sensitive to electromagnetic energy such as light, heat and radio waves—cameras or scanners for light, thermal scanners for heat and radar for radio waves. It provides a unique perspective for observing large regions. Its sensors can measure energy at wavelengths which are beyond the range of human vision (ultra-violet, infrared, microwave) and global monitoring is possible from nearly any site on earth. Today, RS data are used independently or in conjunction with other data sets for different applications in the process of rural development.

Check Your Progress III

1) There are several ways in which the significance of S&T for rural development can be demonstrated. S&T is the most important means of empowering the poor. The ural areas, which have not acquired S&T or the related applications sufficiently so far, must now redouble their efforts with a strategy that begins with popularizing those applications for purposes of development. There is a realization now that S&T should be used extensively for rural development. Removal of poverty and the generation of employment are the major objectives of development plans. To achieve these, it is necessary to draw scientific strategies for rural development based on comprehensive surveys of resources, their planned utilization and management based on S&T applications, mass mobilization, people's education, and equitable sharing of developmental benefits. General public needs to be educated through formal and informal education, mass media presentations, broadcasts of relevant S&T messages, exhibitions, fairs, and science competitions, regarding the issues such as agro-techniques, community healthcare and those concerning daily life. This way the public can visualize the developments in S&T, seek information, get their queries clarified and thus move closer to appreciating the utility of S&T and adopt the related applications willingly.

2) There are various factors which influence the adoption of S&T. Studies have shown that the major factors that cause resistance to improved technologies include their complexity, capital-intensiveness, non-accessibility, socio-cultural and economic incompatibility, people's low income and scarce capital/credit facilities. In case of biogas, the major factors that influenced its non-adoption include: socio-cultural incompatibility like caste, class, age, education, knowledge, attitudes, value-orientation, social status, etc; economic and technological incompatibility such as cost, profitability, compatibility, etc; infrastructural incompatibility such as farm size, resource availability, etc. and communication factors like physical accessibility, media exposure, contact with extension agencies, etc. Further, these factors did not act independently or in

isolation, rather they interacted with each other and resulted in a barrier-complex, which caused resistance to biogas technology. Most of the researches, which have been done with regard to the diffusion and adoption of biogas technology, demonstrate more or less the same factors.

3) The factors that influence adoption of a new technology may be classified in many ways. However, Jaiswal and Arya (1981) have classified the factors as follows:

a) **Client-centred factors:** Caste, class, age, education, knowledge, attitudes, value-orientation, social status, etc.
b) **Client-environmental factors:** Infrastructure, farm size, resource availability, etc.
c) **Technology factors:** Cost, profitability, compatibility, etc.
d) **Communication factors:** Physical accessibility, media exposure, contact with extension agencies, etc.
e) **Other variables:** Pricing policies related to inputs and outputs, etc.

These resistance factors do not act in isolation, rather they interact with each other and produce a **barrier-complex**.

Check Your Progress IV

1)The importance of a close link between research and extension (R&E) need not be over emphasized. This close link is necessary to encourage creativity and innovation in everyday S&T activities and thereby provide incentives for people's participation and opportunities particularly to general public, the youth and women. It is also necessary to demonstrate the links between basic and applied sciences. These relationships should be brought to the notice of the public giving greater visibility to successful projects which have positive impact on society's progress and rural development. In the process of building purposeful links between research and extension, research scientists should be made aware of the problems at the field level through feedback received either directly from the rural people or indirectly via the extension agencies. In practice, researchers get little feedback and as a result, the research work often goes on without being in harmony with the conditions and requirements of the target population. It is therefore necessary that before new technologies are introduced, they should be field tested extensively to avoid any operational field-level problems. Therefore, such close links are not only important but essential too.

2) Spatial technologies play an important role in rural development. One spatial technology, i.e. GIS, is a computer system used in scientific investigations, resource management and development planning. It reveals new information that leads to better decision-making. It recognizes and analyses spatial relationships among mapped phenomena and conditions of adjacency, containment and proximity. Early records followed the two element structure of modern GIS— a graphic file linked to an attribute database. Map and satellite information sources are combined in models that simulate the interaction of complex natural systems. Similarly, GPS, another spatial technology, is a Satellite Navigation System which provides

specially coded satellite signals that are processed in a GPS receiver, enabling the receiver to compute position, velocity and time. Its data is directly uploaded into a GIS and put to use in various applications. Yet another spatial technology, i.e. Remote Sensing, obtains information about various phenomena without being in contact with them and then provides useful and up-to-date data which can be used independently or in conjunction with other data sets for different rural development applications.

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UNIT 3 INTEGRATED WASTELAND DEVELOPMENT PROGRAMME (IWDP)

3.0 LEARNING OBJECTIVES

After completing this unit, you should be able to:

- trace the evolution of Integrated Waste Land Development Programme;
- define what a wasteland is;
- describe the problems caused by wastelands;
- explain the salient features of the programme;
- outline the institutional framework for its implementation; and
- explain the ways of monitoring the performance of the programme.

Structure

3.1 INTRODUCTION

The most important natural resource, on which all human activity is based, is land. Man's inexorable progressive development has, however, damaged our land resource base considerably. Further, land also suffers from various kinds of soil erosion, degradation and deforestation. The estimates of the extent of area suffering from land degradation vary from 38.40 million hectares to 187 million hectares. The National Remote Sensing Agency (NRSA) of the Department of Space, Hyderabad, has estimated the extent of wastelands to be 63.85 million hectares, which is about 20% of the total geographical area of the country. To harness the full potential of the available land resources and prevent their further degradation, the development of wastelands is of great significance. The problem of degraded land and its management is complex and multi-dimensional and its development requires a scientific, holistic and innovative approach. The question is whether such land is really a waste or if it can be made suitable for farming again. This unit is an attempt to explain the guiding principles, the basic features and the institutional framework for the implementation of Integrated Wasteland Development Programme.

3.2 HISTORICAL BACKGROUND/EVOLUTION OF THE PROGRAMME

Unprecedented population pressure and demands of society on scarce land, water and biological resources and the increasing degradation of these resources are affecting the stability and resilience of our ecosystems and the environment as a whole. Globally, the expansion of human settlements and infrastructure, intensification of agriculture and expansion of farming into

marginal areas and fragile ecosystems, emphasizes the need for integrated planning and management of land resources.

These trends are also exacerbating conflicts over access and rights to land, water and biological resources; and also increasing competition between agriculture and other sectors for declining per capita land resources. They affect food security in many developing countries, global environmental balance and the well being of present and future generations. The challenge is to develop and promote sustainable and productive land use systems and to protect critical resources and ecosystems through balancing land, water and other resource uses, providing a basis for negotiation, participatory decision-making and conflict resolution among stakeholders, as well as providing an enabling political, social and economic environment.

To accelerate the pace of the development of wastelands and degraded lands and to give focused attention to the issues concerned, the Government set up a National Wastelands Development Board (NWDB) in 1985 under the Ministry of Environment and Forests. Later, a separate Department of Wastelands Development was created in the Ministry of Rural Development in 1992 by transferring the National Wastelands Development Board from the Ministry of Environment and Forests. With this, all non-forest wastelands have come under the purview of the Department of Wastelands Development for purposes of development. In April 1999, the nomenclature of the Department of Wastelands Development was modified to the Department of Land Resources (DoLR) to act as the Nodal Agency at the national level in the field of Land Resources Management. All land based Programmes/schemes, which were earlier being implemented by different Departments in the Ministry of Rural Development, have been brought within the purview of this new Department of Land Resources.

The Integrated Wastelands Development Programme (IWDP) had been under implementation since 1989-90 by the NWDB in the Ministry of Environment and

Forests, and was transferred to the Ministry of Rural Development in July 1992. The IWDP envisages development of all the non-forest wastelands in the country. The basic approach in implementation of this programme was modified in April 1995 when the Guidelines for Watershed Development for the development of problem lands through watershed approach came into force.

3.3 OBJECTIVES OF IWDP

The basic purpose of the programme is to develop wastelands/degraded lands in the country in an integrated manner based on village/micro watershed treatment plans. Specifically, the programme aims at fulfilling the following objectives:

1) Developing wastelands/degraded lands on watershed basis, keeping in view the capability of land, site-conditions and local needs.

2) Promoting the overall economic development and improving the socio-economic condition of the resource poor and disadvantaged sections inhabiting the programme areas.

3) Restoring ecological balance by harnessing, conserving and developing natural resources, i.e. land, water, vegetative cover.

4) Encouraging village community:

a) to undertake sustained community action for the operation and maintenance of assets created and to further the development of the potential of the natural resources in the watershed; and
b) to adopt simple, easy and affordable technological solutions and institutional arrangements that make use of, and build upon, local technical knowledge and available materials.

5) Employment generation, poverty alleviation, community empowerment and development of human and other economic resources of the village.

3.4 WASTELANDS: DEFINITION, CATEGORIES, AREA ESTIMATES AND WASTELANDS ATLAS

Definition: As per the Report of the Technical Task Group constituted by the Planning Commission (1987), wastelands are "degraded lands which can be brought under vegetative cover with reasonable efforts and which are currently under-utilized and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes."

Broadly, the following are the causes of degradation.

i) Increasing biotic pressure on the fragile ecosystem.
ii) Population pressure, unplanned urbanization and rural poverty.
iii) Breakdown of traditional institutions that manage the Common Property Resources.
iv) Lack of appropriate management practices.

There are various estimates on the extent of wastelands/degraded lands in the country.

These estimates are presented in the table below.

SL No.	Source	Estimated area of wastelands (m.ha.)
1	National Commission on Agriculture (1976)	175.00
2	Directorate of Economics & Statistics, Dept. of Agriculture & Cooperation (1978-79)	38.40

3	Dept. of Environment & Forests (1980)	175.00
4	National Wastelands Development Board (1985)	123.00
5	National Bureau of Soil Survey & Land Use Planning, ICAR (1994)	187.00
6	Indian Agriculture in Brief, Dept. of Economics & Statistics (1994)	174.97
7	National Remote Sensing Agency (NRSA) (2000)	63.85

The variation in the area estimates by these agencies is due to the type and nature of secondary data used and the methodology of estimation. While all the above estimates, except that of NRSA, were made using secondary sources of information, the NRSA estimate is based on remote sensing technology using satellite imageries. The Department of Land Resources, which sponsored the NRSA study, follows the NRSA estimates in planning for its land development programmes.

During 2000, the National Remote Sensing Agency, Hyderabad, under the sponsorship of the Department of Land Resources, the Ministry of Rural Development brought out the "Wastelands Atlas of India" which contains maps on a 1:50000 scale and provides district-wise estimates of various types of wastelands in the country. The boundaries of micro-watersheds have also been incorporated in the maps. As a result an authoritative figure on the extent of wastelands in the country has emerged for the first time on a highly scientific basis. According to these estimates, out of 329 million hectares of total geographical area, 63.85 million hectares (20.17%) are wastelands comprising 14.06 million hectares of forest wastelands and 49.79 million hectares of non-forest wastelands. The details of category-wise wastelands in India are given below.

SL No.	**Category**	**Total Wastelands (in m.ha.)**	**% to total Geographical Area**
1	Gullied and/or Ravenous land	2.06	0.65
2	Land with or without scrub	19.40	6.13
3	Waterlogged and Marshy land	1.66	0.52
4	Land affected by salinity/alkalinity-coastal/inland	2.06	0.65
5	Shifting Cultivation Area	3.51	1.11

6	Under utilized/degraded notified forest land	14.06	4.44
7	Degraded pastures/grazing land	2.60	0.82
8	Degraded land under plantation crops	0.58	0.18
9	Sands— Inland/Coastal	5.00	1.58
10	Mining/Industrial wastelands	0.13	0.04
11	Barren rocky/stony waste/sheet rock area	6.45	2.04
12	Steep sloping area	0.77	0.24
13	Snow covered and/or glacial area	5.58	1.76
	Total Wasteland Area	**63.85**	**20.17**

3.5 PROGRAMME GUIDELINES AND GUIDING PRINCIPLES

In April 1993, the Ministry of Rural Development constituted a high-level Technical Committee under the chairmanship of Prof. C.H. Hanumantha Rao, who was earlier a Member (Agriculture) of the Planning Commission, to thoroughly review and recommend suitable means of implementing the Central Sector Area Development Programmes (being administered by the Ministry, namely the Drought Prone Areas Programme and the Desert Development Programme) more effectively so as to bring about visible and perceptible impact in drought proofing and the control of desertification in the problem areas covered by these programmes. After a critical examination of the mode of implementing and the performance of the programmes, field visits and interaction with all the stakeholders, the Technical Committee brought out its Report in April 1994, which inter alia recommended that:

1) All the Area Development Programmes being administered by the Ministry of Rural Development, including the Integrated Wastelands Development Programme (IWDP), should have a watershed as the basic unit of development.
2) Small watersheds, each of a size of about 500 hectares, which may cover one village as far as possible, be identified for development.
3) The small watershed, so identified at the village level, should be managed in terms of its planning, implementation and maintenance by the local people themselves with the Government and the non-Government Organizations providing the necessary technical and financial support services.

On the basis of the recommendations of the Hanumantha Rao Committee (1994), the Ministry of Rural Development issued "Guidelines for Watershed Development" and brought the three Area Development Programmes of the Ministry, viz. DPAP, DDP and IWDP under the purview of these Guidelines. These Guidelines became operational with effect from April 1,1995.

Since then, watershed development approach for area development and people's participation in all aspects of the implementation of the area development programmes of the Ministry have become the Guiding Principles in the administration of these programmes.

3.5.1 Revision of Guidelines

After implementing the programme for over 5 years, a need was felt by both the State Governments as well as the Department of Land Resources for fine-tuning certain provisions of the Guidelines to make them more suitable to the local requirements. Accordingly, the Guidelines for Watershed Development were revised in August 2001 to make them more focused, transparent and easy to follow.

Role of Panchayati Raj Institutions: In order to ensure people's participation in the implementation of watershed projects under the three Programmes, the Guidelines for Watershed Development provided for a detailed institutional framework at all levels of implementation, particularly people's organisations called the Watershed Associations, the Watershed Committees, the Self Help Groups, the User Groups, etc. at the village level. In this institutional framework, the Gram Panchayats and other PRIs were not given the pivotal role, since the PRI framework was not strong enough at the time of framing the Guidelines for Watershed Development in 1994- 1995. The revision of Guidelines in 2001 did envisage a role for PRIs in the implementation of watershed projects. However, the concept of Watershed Association and Watershed Committee at the village level was retained for implementing the projects.

Following the 73rd and the 74th Amendments to the Constitution of India, the Panchayati Raj Institutions (PRIs) have been mandated with an enlarged role in the implementation of developmental programmes at the grass-roots level. The Ministry of Rural Development is committed to empower PRIs and have been impressing upon the State Governments to devolve the necessary financial and administrative powers to the PRIs for self-governance, particularly in planning, implementation and the management of economic development activities in rural areas. Watershed Development has been included in the list of subjects to be devolved to the PRIs. The institutional framework of Watershed Associations and Watershed Committees depicted them as parallel bodies at the village level as far as the implementation of Watershed Programmes was concerned, and there was very little coordination between them and the Gram Panchayats/Gram Sabhas. On devolution of the necessary powers, the PRIs are expected to perform far better than the Watershed Associations/Committees, as they are:

- equipped with the statutory rights and a mandate for natural resource planning,

- in a position to plan according to people's wishes and integrate watershed management into wider development activities,
- in a position to draw the services of line departments in an integrated way and press for political pressure on line departments at higher levels,
- potentially equipped with the powers to impose local taxes or user charges and
- committed to making " reservations" for the representatives of women and the weaker sections as per the Constitutional provisions.

Thus, for the Ministry of Rural Development to fulfill their constitutional obligation of empowering PRIs, it was felt necessary to bring in suitable modifications in and amendments to the existing institutional framework for the implementation of Watershed Development Programmes. With this objective, the Prime Minister of India launched a new initiative called Hariyali on 27th January 2003. It seeks to empower the PRIs, both administratively and financially, for the implementation of the Watershed Development Programmes of the Ministry of Rural Development. Accordingly, the Ministry have modified the existing provisions and incorporated the new initiative in the Guidelines. The guidelines so modified are now called the Guidelines for Hariyali, which are commonly applicable to IWDP, DPAP and DDP. These Guidelines became operational with effect from April 1, 2003.

3.5.2 Salient Features of the Guidelines

1) The Guidelines are designed in such a way that the user communities have to take the center stage in the implementation and management of area development programmes in which the Government participates.

2) Since degradation usually occurs and gets aggravated through over exploitation of lands under public/common ownership, emphasis is on the development of common/community lands and not on the privately owned lands.

3) The watershed community comprises landed as well as landless people, agricultural and non-agricultural labour, village artisans, weaker sections like the scheduled castes and scheduled tribes, women, etc. Though watershed development benefits primarily the landed people, emphasis is given to equitable distribution of benefits resulting from the development of the watershed area among all the sections of people inhabiting this area.

4) An exclusive institutional framework has been prescribed for bringing about active community participation in all the aspects of watershed project management, viz. watershed planning, execution of development works and post-project maintenance.

5) Emphasis is placed on sustainable rural livelihood support systems through Self-Help Groups from the landless and the weaker sections of the watershed community and the User Groups built around each of the community assets created under the project, thus securing the participation of women as well as the landless also in watershed development.

6) In order to enable the village community and all other stakeholders participate actively in the watershed development activities, specific provisions have been made for their capacity building and skill development which is a vital component of the programmes and is a pre-requisite to initiate actual development works on the ground.

7) Decentralisation of the processes of planning and decision-making is achieved through delegation of necessary powers to various levels of programme administration and management, i.e. the State, the District and the village/watershed levels.

8) Community participation and the feeling of owning the assets created under the programme are brought about through insistence on public contributions to the project cost, either in cash or kind or voluntary labour. The beneficiaries of various development works/assets of the project are required to contribute at least 10% of the project cost by these means.

9) For watershed development, emphasis is placed on the adoption of low-cost technologies that use local materials and are easily operable and maintainable by the local people. Use of indigenous technical knowledge is encouraged in all aspects of watershed development.

10) Post-project management and sustainability of the project is ensured by maintaining a Watershed Development Fund created out of public contributions. It is placed at the disposal of the village level managing body for purposes of maintaining the public assets after the project gets completed and whenever such necessity arises.

Check Your Progress I

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) What is the basic purpose of Integrated Wasteland Development Programme?

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2) What is a Wasteland and what are the causes of the formation of Wastelands?

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3.6 WHAT IS A WATERSHED?

Simply stated, a watershed is a geo-hydrological unit of landmass, from where rainwater drains through a common drainage point. The ridges of the watershed form its boundaries, which slope down to the valley and flat land and the rainwater falling in this catchment area runs off from the uplands downwards through small streams and gullies into the main natural drainage system of the watershed, usually a river. If the land surface of the watershed area is not adequately covered with vegetation, surface soil gets carried away by the rainwater run off causing severe soil erosion problems, widening of gullies and silting of streams and water bodies downstream.

Watershed development, therefore, involves scientific treatment of the watershed area from the ridges to the flat lands, in that order of priority. To control water run off, suitable vegetative cover in the form of plantations, horticulture, agro-forestry, pastures and agricultural crops, as demanded by the land capability, are required to be taken up along with soil conservation measures, like contour bunds, gully plugs, contour trenches, rock fill dams, etc. These measures, besides aiding in soil retention and arresting erosion, will also help in improving the in situ soil-moisture conservation. For water resource conservation, its optimal utilization and for recharging of ground water aquifers, water-harvesting structures like check dams, farm ponds, percolation tanks, etc. are usually taken up.

3.7 COMPONENTS OF WATERSHED DEVELOPMENT

The various steps and components involved in watershed development comprise:

i) Identification and demarcation of the watershed area on scientific basis.
ii) Prioritisation of watershed areas on the basis of pre-determined criteria and prioritisation index prepared for the execution of developmental works in the worst affected watersheds first.
iii) Conducting a benchmark survey of the watershed to assess the extent of the problem and pre-project socio-economic situation of the local community. This provides the base to assess project benefits through a post-project impact evaluation.

iv) Land use capability studies and land use planning aspects: these are necessary to reorient the present production systems to the desirable cropping patterns and activities that are in consonance with what various soils in the watershed are capable of supporting on a sustainable basis.

iv) Identification of suitable technologies, local as well as improved, for the development of agriculture, horticulture, forestry, pastures, etc. on the one hand and soil and water conservation on the other.

v) Building of a suitable institutional framework for effective participatory approach in all the aspects of watershed management (planning, execution and maintenance) at the State, the District, the Block and the Village/watershed levels.

vi) Mobilisation and organisation of the watershed community involving massive contact programmes to inform, educate and familiarize the local population about the importance of watershed development in resource conservation, economic development, for improving people's quality of life and their environment.

vii) Training of project functionaries at the various levels of government. This involves two distinct components. One is concerned with reorientation and changing the general mindset of the government personnel from that of providers to that of facilitators in a people-led programme. The other is concerned with the technical training of both the government functionaries at various levels and the village leaders vested with the responsibility of project management at the local level.

viii) Preparation of the watershed development plan for each selected watershed by people's organisations with the technical support of subject matter specialists from the government/non-government organisations acting as the project implementers. This plan must consist of a perspective treatment map and the treatment plan for the watershed, time phasing of physical works and the financial requirements over the project period, details of the post-project management arrangements, etc.

ix) Project execution and release of funds in suitable instalments in accordance with the project performance in terms of progress achieved in physical works and financial expenditure.

x) Project monitoring, concurrent evaluation and mid-course corrections.

xi) Project completion, approval of Completion Report and withdrawal of external agencies from the project after the post-project management arrangements are made and the project and its assets are transferred to the peoples' organizations/ village panchayat concerned for maintenance.

xii) Post-project impact evaluation.

Check Your Progress II

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) Define watershed?

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3.8 SALIENT FEATURES OF THE PROGRAMME

3.8.1 Coverage of the Programme

The programme is implemented in all those districts and blocks that are not covered under either DPAP or DDP. To avoid duplicity, it is ensured that no other development work of similar nature was taken up or is under way in the area identified for the IWDP watershed project.

3.8.2 Project Mode

The programme is implemented exclusively on watershed development project basis.

A Watershed Development project has to be implemented over a period of 5 years during which period financial assistance is provided to the implementing agencies.

3.8.3 Criteria for the Selection of a Watershed Project

a) The watershed area selected for development should have a preponderance of wastelands.

b) The area identified for treatment should include a preponderance of common lands and lands belonging to SCs/STs, small and marginal farmers and other weaker and poor sections of the project area.

c) The watershed selected for development should have a large population of SCs/ STs dependent on it.

d) Watersheds should be selected for development in such a way that they are contiguous to one another to derive the maximum benefit out of the development works.

e) Preference should be given to those areas that have not received attention previously for comprehensive development.

3.8.4 Major Activities of a Watershed Project

These can be broken down into three categories: (a) pre-project activities like building of the relevant village level organizations, community mobilization, capacity building/ training of the watershed functionaries, survey and preparation of the watershed treatment plan and its approval, (b) development works for soil-moisture conservation, water resources development and development and/or regeneration of green cover on the reclaimed lands and (c) post-project

activities like adoption of suitable production technologies, maintenance of public assets created under the project, etc.

It is important that development works indicated in (b) above are taken up following the ridge-to-valley principle of watershed development. That is, the uplands or the ridge region of a watershed should be treated first, followed by the development of slopes and drainage lines and finally the development of the low lands or the valley region. This will ensure control of the water run-off and the resulting soil erosion and silt flow from the upper ridges to the valleys and river systems downstream. An indicative list of these development works is given below.

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

3.8.5 Funding Pattern

IWDP is a Central sector scheme and watershed development projects under the programme are sanctioned at a cost norm of Rs. 6,000 per hectare of the area identified for treatment. This project cost is required to be shared between the Central and State Governments in the ratio of Rs. 5,500 : Rs. 500 per hectare respectively.

3.8.6 Allocation of Funds within a Project

Broadly, funds earmarked for a watershed project must be spent on the following components in accordance with the percentage indicated against each head.

1) Community mobilization and capacity building : 5%

2) Works component : 85%

3) Administrative overheads : 10%

3.9 INSTITUTIONAL FRAMEWORK FOR IMPLEMENTATION

For the implementation of projects under IWDP, there is an elaborate and well-defined institutional structure covering various levels. This structure is described below.

National level: The Department of Land Resources, the Ministry of Rural Development, the Government of India, New Delhi, is the nodal agency at the national level responsible for getting the programme implemented. The Department is responsible for evolving policies for smooth implementation of the programme, its funding, monitoring its progress and evaluating the overall impact of the programme in relation to its objectives. The Department also plays an advisory role in so far as assisting the State governments and District administrations in the smooth implementation of the programme.

State level: Normally, the Department of Rural Development is the nodal agency responsible for the implementation of IWDP at the State level also. However, the State Government may designate any other related department like Agriculture to be the State nodal agency. The State level nodal department acts as an intermediary between the Central Government and the Districts in so far as the implementation of IWDP is concerned. It is responsible for programme policy implementation, advising, assisting and guiding the districts and for monitoring, reviewing and evaluating the progress of implementation in the State. It is also responsible for assessing the training requirements of all the state/district functionaries involved in the implementation of the programme and then for coordinating the organization of the required training activities.

District level: The Zilla Parishad (ZP) or the District Rural Development Agency (DRDA), as the case may be, is the nodal agency at the district level for the implementation of the programme. In the states where the ZPs have yet to come into operation with adequate powers and resources as envisaged under the Panchayati Raj Legislation and so have yet to acquire adequate technical capacity in watershed

development, DRDAs have been designated to supervise the implementation of IWDP. The district nodal agency works under the supervision and guidance of the State and Central Governments and is responsible for the selection of watersheds for the implementation of IWDP projects; identification and appointment of suitable implementing organizations; approval of the action plans/watershed treatment plans in the district and for reviewing, monitoring and evaluating the progress of the implementation of the IWDP projects. The agency is also responsible for arranging the requisite training programmes for the functionaries involved in watershed development in the district including district officials, Project Implementing Agencies and Watershed Development Team members.

The IWDP projects sanctioned to a district are, generally, implemented by the ZP/ DRDA through Project Implementation Agencies (PIAs) specifically identified for the purpose. Preferably, an Intermediate Panchayat/Panchayat Samiti may be the PIA for all projects sanctioned to that particular Block/Taluka. In cases where these Panchayats are nor adequately empowered or technically equipped, the ZP concerned can act as the PIA itself or may appoint a suitable district level line department like Agriculture, Forestry/Social Forestry, Soil Conservation, etc. or an agency of the State Government or the local university or any other suitable institute or a reputed Non-Governmental Organization as PIA. Nonetheless, the State Governments should make efforts to empower the Panchayats and build their capacities so that they may ultimately be in a position to take up the responsibility of implementing the projects independently.

The PIA carries out its responsibility through a multi-disciplinary team called the Watershed Development Team (WDT) which has at least four subject matter specialists from the disciplines of forestry/plant sciences, animal sciences, civil/agricultural engineering and social sciences. The PIA may utilize the services of its own staff for this purpose or may hire outside experts wherever necessary. The PIA, through this WDT, is responsible to create awareness about the importance and the advantages of area development on watershed basis and mobilize the requisite public participation in the project areas allocated to it. Arranging for training of all functionaries at the village and watershed level in different aspects of watershed project management is also its responsibility.

Watershed/Village level: At the field level, IWDP projects are implemented by the Gram Panchayats concerned, under the overall supervision and guidance of the WDT. All works executed by the Gram Panchayats should have the final approval of the Gram Sabha, which exercises overall control of the functioning of the Gram Panchayat. If necessary, the Gram Panchayat may get specific project works, involving a higher degree of technical competence, executed by outside agencies like the government technical departments, non-governmental organizations, etc.

3.9.1 Procedure for Sanctioning Projects

Procedure for the sanction of projects under IWDP in a financial year: The Department of Land Resources, in consultation with the State Governments, first prioritises the districts for the purpose. In doing so, the following factors are considered.

1) Preference is given to the districts that (i) have a large area of wastelands, and (ii) have not been sanctioned any watershed projects earlier or do not have any ongoing projects.
2) Those districts, which reflect a high degree of backwardness and incidence of poverty are considered on priority basis.

3.9.2 Flow of Funds

For sanctioned projects, the Central share of funds is released directly to the districts (ZPs/DRDAs), where the projects are under implementation, in 5 instalments over a period of 5 years. The State Governments concerned are also required to release their share of the project cost to the districts soon after the Central releases. Funds so received by the ZP/DRDA are further released to the PIA (administrative and training components) and the Gram Panchayats (administrative and works component) within 15 days.

3.9.3 Convergence of the Related Development Programmes and Activities

Successful implementation of a watershed project is expected to considerably enhance the economic condition of the project area in terms of the productivity of land and overall availability of agricultural, horticultural, forest and other related products. This improved situation requires that efficient backward and forward linkages for the provision of inputs for the production, storage and sale of the final products are in place. It also requires that suitable production and post-harvest technology in the project area is made available, the requisite infrastructural facilities are provided and other social inputs like health, sanitation, education, etc. are easily accessible to the local people. With these requirements in view, emphasis is placed on the convergence of all the relevant developmental schemes and activities in IWDP project areas. These should form part of the district development plan along with the watershed development plan.

3.9.4 Size of the Problem Area and the Extent of Coverage under the Programme

According to NRSA estimates, out of the 329 million hectares of total geographical area of the country, 63.85 million hectares are wastelands. Of this, approximately 51 million hectares, including 14 million hectares of degraded forest area, are treatable. In addition, 89 million hectares of cultivated area is rainfed, most of which is subject to severe erosion problems, needing comprehensive treatment under one or the other watershed development programme. Thus, the extent of the area that requires to be treated under various programmes is as follows.

		In m. ha.
1.	Rainfed areas	89.00 (approx.)
2.	Treatable non-forest Wastelands	37.00
3.	Degraded Forest areas	14.00
	Total	**140.00**

Against this problem area requiring treatment, projects under various watershed development programmes of the Department of Land Resources (IWDP, DPAP and DDP) sanctioned since April 1995 cover an area of about 19 million hectares, including about 5 million hectares under IWDP.

3.10 FUNDS: REQUIREMENT AND AVAILABILITY

Out of the estimated 37 million hectares of treatable non-forest wastelands, about 32 million hectares need development assistance as on date. At the present cost norm of Rs. 6,000 per hectare of treatment, the funds required to treat this area under IWDP may be estimated at Rs.19,200 crores. For the implementation of IWDP during the Tenth Five Year Plan (2002-07), the Planning Commission has approved an allocation of Rs.1,800 crores, which translates into an average of Rs.360 crores that would be available annually.

In Twelfth Five Year Plan (2012-17), the Integrated Watershed Management Programme (IWMP) aims at restoring the ecological balance by harnessing; conserving and developing degraded natural resources. This prevents soil erosion, encourages rain water harvesting and groundwater recharging and enables multi-cropping and diverse agro-based activities. All these aim at achieving sustainable livelihoods for those residing in the watershed area. A total of 8,214 projects covering an area of 39.07 million ha have been sanctioned till March, 2015. Against the total cost of the sanctioned projects of Rs. 50,739.58 crore, about 22 per cent (Rs 11,032.2 crore) could be provided to the States with over 97 per cent utilization till December, 2014. This is evident from the facts that out of 8,214 projects sanctioned so far, only 119 (1.5 per cent) are in the consolidation phase, while 4,613 (56 per cent) have moved to the work phase and 3,482 (42.5 per cent) are in the preparatory phase. It implies more effort is needed under IWMP for contribution to soil and water development, like augmentation of water resources and increase in cropping/plantations, etc. One of the reasons for less progress and long gestation period has been the initially slow progress in constituting State level implementing agencies. This eventually acquired momentum, with all States having constituted the State Level Nodal Agencies (SLNAs) for implementation of IWMP.

3.11 MONITORING THE PERFORMANCE

During its implementation, the programme is monitored at frequent intervals by all the relevant implementing agencies comprising the Central and the State Governments, the ZPs and the DRDAs. Independent evaluators from reputed government and non-government organisations, universities, research and training institutes and professional consultants are also engaged for mid-term evaluation of the programme to obtain feedback on the progress of implementation and to check whether it is being implemented an per the guidelines and approved action plans. The mid-term evaluation is conducted after 45% of the project cost is released to the districts and the outcome of the evaluation is utilised by the Department of Land Resources for mid-course corrections wherever necessary.

From these monitoring and evaluation exercises, certain drawbacks in programme implementation have been observed. These are briefly listed below.

i) Sometimes the watershed treatment plans do not reflect the local people's aspirations and requirements adequately as they are prepared on the basis of the perceptions of the PIA. This also indicates a low level of people's involvement in the project.

ii) Community mobilisation and training activities, which are more crucial for ensuring people's participation, have not been given due importance.

iii) In some cases, there have been undue delays at the level of ZPs/DRDAs in approving the watershed treatment plans and also in releasing funds received from the Central and the State Governments to the grass-roots implementing agencies. These delays lead to ad hoc execution of unapproved works as well as extension of project period much beyond the prescribed limit.

iv) Sometimes, development of private lands was taken up extensively at the cost of planning for and development of degraded community land in the project area.

v) In some cases people have not been adequately sensitised on the importance of public contributions to the Watershed Development, which is crucial to inculcate a sense of ownership of the project among the watershed community.

vi) In some cases, due importance has not been given to a) the formation of Self-Help Groups from amongst the landless and weaker sections of the village community and b) the provision of the necessary training and financial assistance to start suitable income generating activities.

vii) Plantation works that are necessary to improve the green cover of the degraded lands, particularly on those owned by the community, have been given the lowest priority in some cases.

viii) Even where plantation works were taken up, the arrangements for their proper upkeep, maintenance and management for the benefit of the village community have either been absent or weak.

ix) Arrangements made by the PIA for post-project maintenance of the assets created under the project and ensure their sustainability are not clear.

x) In some cases, the project action plan did not reflect any formal arrangements made for the equitable distribution of benefits from the project amongst various sections of the village community.

xi) Suitable production technologies for judicious utilisation of resources developed under the project, like water and land, have more or less been ignored resulting in improper and wasteful utilisation of these valuable resources.

xii) Convergence of the related development schemes in the watershed area has either been absent or weak.

In spite of these infirmities, the overall impact of the programme in the problem areas has been very positive and encouraging. The Department of Land Resources has taken suitable corrective measures by way of more stringent monitoring and financial control to eliminate the above weaknesses in programme execution, which should result in enhanced benefits and a more positive impact.

Check Your Progress III

Note: a) Use the space provided for your answers.

b) Check your answers with the possible answers provided at the end of this unit.

1) How are wastelands identified for treatment under IWDP?

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2) What monitoring mechanism is followed in IWDP?

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3.12 IMPACT EVALUATION

During the past few years, to assess the impact created by the programme in terms of both the physical and social benefits and the weaknesses in the implementation of the programme that might be diluting or hampering its full potential, the Ministry of Rural Development commissioned several evaluation studies in most of the states where IWDP is being implemented. As for the benefits that have accrued in the project areas, the evaluation studies reveal that:

1) overall productivity of land has improved, water table has increased, vegetative cover has improved and irrigation/drinking water wells have been recharged, suggesting a better position in terms of the availability of water and the improved natural resource base in the project areas as compared to non-project areas;

2) overall economic condition of the project areas has improved significantly;

3) the impact of drought was of a much lower intensity in the drought affected areas where watershed projects have been successfully executed;

4) public demand for watershed projects has increased significantly indicating improved social awareness about the programme; and

5) out migration of non-agricultural labour has reduced.

3.13 FUTURE STRATEGY

As has been seen earlier, due to financial constraints at the national level, annual allocations to the programme are not commensurate with the actual requirements and the problem at hand. Obviously, the Government alone cannot tackle the problem on its own and therefore, there is an urgent need to bring in other important players into picture for speedy and effective development of wastelands. Important among these other players, who are also interested in involving themselves in wasteland development, are the corporate sector, financial institutions and external donors. The roles of these actors whose support could be integrated into wastelands development strategies in future are indicated below.

Corporate Sector: It is worthwhile to consider giving the government land on lease to those corporate bodies that can improve its productivity and utilise it for commercial purposes. The private sector can come in a big way in this venture through a viable programme of contract farming.

Financial Institutions: With improved natural resource base of the project areas the village community would be requiring credit facilities for purchasing improved seeds, fertilizers and other such inputs for judicious utilisation of these developed resources. Further, to sustain the enhanced productivity and increased production levels of the project areas, it is necessary that suitable credit facilities are available to the local community to develop necessary forward linkages like godowns, safe storage of surplus produce and food-processing facilities, etc. Necessary infrastructure and marketing network also need to be developed. With the improving economic status of the people, demand for consumer goods from outside would increase progressively, for which local commercial ventures need to be encouraged. For all these requirements, NABARD and other commercial banks can contribute in a big way.

The Ministry of Rural Development has constituted a Task Force to examine the areas of support that can be obtained from corporate bodies, banks and other financial institutions for wastelands development.

External Donors: Traditionally, external assistance is available to several organisations in the country for the provision of social inputs like education, health, sanitation, livelihood activities, etc., particularly for the underprivileged. It is important that such assistance is channeled properly for comprehensive development of watershed areas.

3.14 LET US SUM UP

In this unit, you have read about the efforts made by the Government of India for the development of vast areas of wastelands, which can be improved to productive use. You have seen that the Integrated Wastelands Development Programme under implementation aims to develop the wastelands in an integrated manner so that the natural resource base of the degraded areas is regenerated and brought back to productive use resulting in the overall economic development of the rural communities depending on these areas for their livelihood.

You read that IWDP is implemented exclusively on watershed basis and by the people themselves inhabiting the project areas. This is a people's programme where the Government participates. We learnt about the Guidelines that govern the implementation of the programme, the institutional framework specified at various levels for the purpose and the salient features of the programme. Further, we learnt about some drawbacks in the process of implementing the programme and the corresponding efforts made to overcome them. Despite these weaknesses, we have seen that the programme has generated significant impact— land quality has improved, more water is available and more areas are under the green-cover now.

We have learnt that the problem of wastelands development is so large that the finances available for the programme annually are not adequate to tackle the problem speedily and in a time-bound manner. Obviously, we require active participation of other players like the corporate sector, financial institutions and external donors in order to comprehensively develop our wasteland areas.

3.15 KEY WORDS

Culturable Waste : Land which by upgradation can be put to cultivation

Aquifers : Sub-soil water sources

3.16 REFERENCES AND SUGGESTED READINGS

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3.17 CHECK YOUR PROGRESS – POSSIBLE ANSWERS

Check Your Progress I

1) The main purpose of the integrated wasteland development programme is to develop wasteland as well as degraded lands in an integrated fashion, with a clear understanding of the capability of the land, site conditions and local needs. This is also expected to help in restoring ecological balance and promoting overall economic development of the people residing in these areas.

2) Wastelands are 'degraded lands which are either completely or partially unfit for agriculture and also include such land as is deteriorating for lack of appropriate water and soil management or on account of natural causes'. The causes for the formation of wasteland are deforestation, unscientific cultivation, overgrazing and wrong methods of irrigation.

Check Your Progress II

1) A watershed is a land area from where rainwater flows down to a common drainage point. The ridges of the Watershed form its boundaries. The flow of water takes place on the surface of the land in the watershed area. If the land surface of the watershed area is not adequately covered with vegetation, surface soil gets carried away by the rain water run off, causing severe soil erosion problems and silting of streams and water bodies down stream. The watershed development, therefore, involves scientific treatment of the watershed area from the ridges to the flat lands, in that order of priority.

Check Your Progress III

1) Under IWDP, wastelands for treatment are identified using the following considerations:
   i. The districts are prioritised.
   ii. Preference is given to those districts that have large areas of wastelands and have not taken up any watershed project earlier.
   iii. The selected district should reflect a high degree of backwardness.

2) The programme implementation is monitored at frequent intervals at various levels by the Central and the State Governments as well as Zilla Parishads and DRDAs. Further, a mid-term evaluation is conducted after .45% of the project cost is released to the districts. The results of this mid-term evaluation are utilised by the department concerned for taking mid-course corrective action wherever necessary.

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