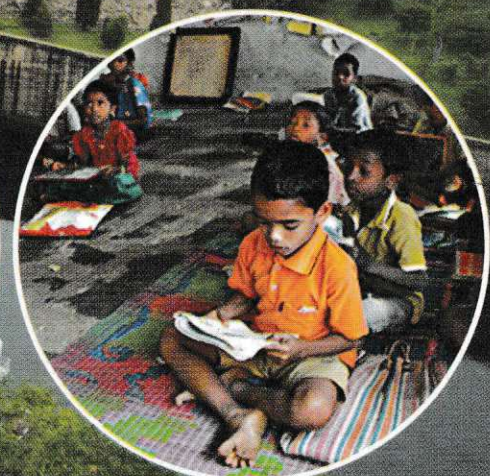




Introduction to Sustainable Development

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Indira Gandhi
National Open University
School of Extension and
Development Studies

Block

1

INTRODUCTION TO SUSTAINABLE DEVELOPMENT

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COURSE MAEE-001 SUSTAINABLE DEVELOPMENT

Block 1 Introduction to Sustainable Development

Unit 1 Sustainable Development: Concept and Scope

Unit 2 Sustainable Development: Approaches and Strategies

Unit 3 Challenges to Sustainable Development

Block 2 Rural Development

Unit 4 Rural Development: Indian Context

Unit 5 Rural Development Administration

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Block 4 Urban Development

Unit 11 Introduction to Urban Development

Unit 12 Urban Development: Issues and Challenges

Unit 13 Urban Development Policies and Programmes

Unit 14 Urban Planning, Governance and Management

MAEE 001 SUSTAINABLE DEVELOPMENT

Introduction to the Course

Sustaining the development of the present generation allowing enough resources, space and scope for development of future generations assumes greater significance in the context of emerging global concerns. This course titled "Sustainable Development" introduces you to the concept, scope, concerns, approaches and strategies of sustainable development and presents a judicious mix of policies and programmes that have relevance to sustainable development. It consists of the following four Blocks together containing 14 Units.

Block 1 is on "*Introduction to Sustainable Development*". It focuses on the concept, scope, dimensions, principles and concerns of sustainable development. It highlights the approaches and strategies of sustainable development with an emphasis on the challenges to sustainable development at national and global levels and the commitment required on the part of the national governments to implement the solutions to the global challenges. It contains three Units.

Block 2 titled "*Rural Development*" presents the Indian context of rural development touching upon the approaches, strategy and policy of rural development along with relevant issues and challenges. It draws out the distinction between 'development administration' and 'administrative development' and explains the concept of 'rural development administration'. It highlights the significance of rural credit and decentralized rural development administration. It presents wide range of rural development programmes meant for development of rural individuals, families as well as development of infrastructure and other facilities/amenities for holistic and sustainable development of rural areas. It is divided into four Units.

Block 3 "*Tribal Development*" explains the concepts such as 'tribes', 'indigenous people', 'de-notified tribes' and 'nomadic tribes', and highlights their significance/relevance in the Indian context. It presents the broad characteristics and the status of the Scheduled Tribes including their major types existing in India. It discusses different aspects of development as well as deprivation of the Scheduled Tribes along with broad approaches to their development including special measures, policies, programmes, etc., aimed at protection and promotion of their rights and interests. It also presents a comprehensive picture of tribal welfare policy planning, implementation and management, among other relevant things. It consists of three units.

Block 4 "*Urban Development*" focuses on: the concept, processes, components, features, patterns and indicators of urbanization; the scenarios of urban development; and the functions, levels, criteria, structures and trends of urban development administration in India. It discusses different issues and challenges of urbanization and presents a perspective of the policies, strategies and programmes of urban development including urban reforms, role of urban local bodies, and disaster management, among others, for promotion of sustainable urban development. It has four Units.

BLOCK 1 INTRODUCTION TO SUSTAINABLE DEVELOPMENT

Introduction to the Block

This Block deals with introduction to sustainable development. It touches upon the concept, scope, dimensions, principles and concerns of sustainable development. It discusses the approaches and strategies for sustainable development along with relevant concerns. It highlights the challenges to sustainable development at national and global levels and emphasizes the need for commitment on the part of the national governments to implement the solutions to the global challenges. It contains the following three units.

Unit 1 “*Sustainable Development: Concept and Scope*” presents the concept, meaning, scope and purpose of sustainable development. It presents social, economic, environmental, institutional and digital dimensions of sustainable development. It highlights the basic principles underlying sustainable development, the concerns of sustainable development and the ingredients of good vision required for sustainable development.

Unit 2 titled “***Sustainable Development: Approaches and Strategies***” traces the origin of sustainable development and highlights its basic aspects, principles and approaches including traditional, social, human capital and international approaches as followed by the Governments, and other agencies. It explains the concept of sustainable development strategy with an emphasis on its aspects including minor differences which may vary from context to context depending upon the degree of concern at given time and place, but within its broad contours.

Unit 3 is about “***Challenges to Sustainable Development***”. It focuses on the challenges and problems of sustainable development which go beyond those such as extreme poverty, political instability, environmental deterioration, rapid population growth, HIV-AIDS, malaria and marginalization. It discusses the relationship between sustainable development and growing population and exploitation of natural resources, growing disparities among the people resulting in their migration leading to urbanization, deforestation, pollution, climate-change and global-warming which are major challenges at the global level. It emphasises the need for global solution with serious commitment for its implementation by the national governments, ensuring which is a major challenge by itself.

UNIT 1 SUSTAINABLE DEVELOPMENT: CONCEPT AND SCOPE

Structure

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Concept of Sustainable Development
 - 1.2.1 Conceptual Aspects and Issues
- 1.3 Scope of Sustainable Development
 - 1.3.1 Dimensions of Sustainable Development
 - 1.3.1.1 Social Dimension
 - 1.3.1.2 Economic Dimension
 - 1.3.1.3 Environmental Dimension
 - 1.3.1.4 Institutional Dimension
 - 1.3.1.5 Digital (ICT) Dimension
 - 1.3.2 Principles/Premises of Sustainable Development
 - 1.3.3 Sustainable Development: Concerns and Ingredients of Good Vision
 - 1.3.3.1 Nature of Our Concerns of Sustainable Development
 - 1.3.3.2 Essential Ingredients of Good Vision of Sustainable Development
- 1.4 Let Us Sum Up
- 1.5 Answers to 'Check Your Progress' Questions
- 1.6 Glossary of Relevant Terms Used
- 1.7 References

1.0 INTRODUCTION

We all know that most societies aspire to achieve economic development to secure higher standards of living, both for themselves and for future generations. They also seek to protect and enhance the quality of their environment, now and for their children. Reconciling these two aspirations is at the heart of sustainable development. Sustainable development aims at meeting the basic needs of all people in general and the poor majority in particular – their employment, food, energy, water, housing, etc., by ensuring the growth of agriculture, manufactures, power and services with due consideration for environmental concerns.

Therefore, in this Unit, we attempt to present you the concept, meaning and scope of sustainable development with focus on its purpose and dimensions, and set out some basic principles and essential ingredients of good vision for sustainable development.

1.1 OBJECTIVES

After studying this unit, you should be able to:

- Explain the concept and meaning of sustainable development;
- Describe the scope and purposes of sustainable development;
- Appreciate the underlying principles and premises of sustainable development;

- Analyse various dimensions of sustainable development and the need for integration of the various dimensions of sustainability; and
- Appreciate the nature of our concern for sustainable development.

1.2 CONCEPT OF SUSTAINABLE DEVELOPMENT

Sustainable development basically merges economics and environmental science both in theoretical and practical perspectives. Several other articulations consider sustainable development as a process of development by which various environmental, economic and social benefits can be simultaneously and concurrently maximized. These articulations suggest that sustainable development, in short, is a blend of economic, social and ecological approaches, each of these being indispensable and complimentary to each other. Sustainable development (SD) is, in fact, a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only for the present generation, but also for generations to come.

Sustainable development is a socio-ecological process characterized by the fulfillment of human needs while maintaining the quality of the natural environment indefinitely. The linkage between environment and development was globally recognized in 1980, when the International Union for the Conservation of Nature published the *World Conservation Strategy* and used the term “sustainable development”. This term has been used as a unifying theme in presenting environmental and social concerns about worrisome trends toward accelerated environmental degradation and social polarization in the 1970s and 1980s. The concept came into general usage after the Brundtland Commission Report (1987), formally called the Report of World Commission on Environment and Development (WCED). WCED was set up by the United Nations General Assembly. Thus, the term ‘sustainable development’ was widely adopted by mainstream development agencies following the publication in 1987 of “*Our Common Future*” by the World Commission on Environment and Development (WCED), chaired by the then prime minister of Norway, Gro Harlem Brundtland. It stated that “sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

It is now considered to be one of the most widely recognised definitions. As we can notice, it contains within it two key concepts:

- the concept of ‘needs’, in particular the essential needs of the world’s poor, to which overriding priority should be given; and
- the idea of limitations imposed by the state-of-art technology and social organization on the environment’s ability to meet present and future needs.”

The United Nations 2005 World Summit outcome document refers to economic development, social development and environmental protection as the “*interdependent and mutually reinforcing pillars*” of sustainable development.

Many definitions and images (visualizing sustainability) of sustainable development may coexist. Broadly defined, the sustainable development mantra enjoins current generations to take a systems-approach to growth and development and to manage natural, produced and social capital for the welfare of their own and future generations.

1.2.1 Conceptual Aspects and Issues

Sustainable development does not focus solely on environmental aspects and issues. More broadly, sustainable development policies encompass three general policy areas:

economic, environmental and social. In support of this, several United Nations documents including the 2005 World Summit Outcome Document, refer to economic development, social development, and environmental protection as the “interdependent and mutually reinforcing pillars” of sustainable development.

Sustainable development helps in maintaining a delicate balance between the human need to improve lifestyles and feeling of well-being on the one hand, and on the other hand, preserving natural resources and ecosystems on which we and future generations depend. Sustainable development is an eclectic concept as a wide array of aspects and views fall under its umbrella. The concept has included notions of *weak sustainability*, *strong sustainability* and *deep ecology*. Different conceptions also reveal a strong tension between *eco-centrism* and *anthropocentrism*.

Indigenous peoples have argued, through various international forums such as the United Nations Permanent Forum on Indigenous Issues and the Convention on Biological Diversity, that there are *four* pillars of sustainable development, *the fourth being cultural*. The Universal Declaration on Cultural Diversity (UNESCO, 2001) further elaborates the concept by stating that “...cultural diversity is as necessary for humankind as biodiversity is for nature”; it becomes “one of the roots of development understood not simply in terms of economic growth but also as a means to achieve a more satisfactory intellectual, emotional, moral and spiritual existence”. In this vision, *cultural diversity is the fourth policy area* of sustainable development. Of course, it can be considered as part of social development.

i) Building Blocks of Sustainability: Agenda 21, an action plan of the United Nations (UN) related to sustainable development, clearly identified *information, integration and participation* as key building blocks to help countries achieve development that recognizes these interdependent pillars – *economic development, environmental development, social development and cultural development*. It emphasizes that in sustainable development everyone is a user and provider of information. It stresses the need to change from old sector-centred ways of doing business to new approaches that involve cross-sectoral co-ordination and the integration of environmental and social concerns into all development processes. Furthermore, Agenda 21 emphasizes that broad public participation in decision-making is a fundamental prerequisite for achieving sustainable development.

According to Hasna Vancock, (2007) sustainability is a process which tells of a development of all aspects of human life affecting sustenance. It means:

- a) it needs to resolve the conflict between the various competing goals;
- b) it involves the simultaneous pursuit of economic prosperity, environmental quality and social equity famously known as three dimensions (triple bottom line) with the resultant vector being technology.

Hence, it is a continually evolving process; and its ‘journey’ (the process of achieving sustainability) is of course vitally important, but only as a means of getting to the destination (the desired future state). However, the ‘destination’ of sustainability is not a fixed place in the normal sense that we understand destination. Instead, it is a set of wishful characteristics of a future system.

ii) Green Development and Sustainable Development: Green development is generally differentiated from sustainable development in the sense that the former prioritizes what its proponents consider to be environmental sustainability over economic and cultural considerations. On the other hand, the proponents of sustainable

development argue that it provides a context which is to improve overall sustainability where cutting-edge green development is unattainable. For example, a cutting-edge treatment plant with extremely high maintenance costs may not be sustainable in regions of the world with fewer financial resources. An environmentally ideal plant that is shut down due to bankruptcy is obviously less sustainable than the one that is maintainable by the community, even if it is somewhat less effective from an environmental standpoint.

The United Nations Division for Sustainable Development lists the following areas as coming within the scope of sustainable development:

- Agriculture
- Atmosphere
- Biodiversity
- Biotechnology
- Capacity-building
- Climate Change
- Consumption and Production Patterns
- Demographics
- Desertification and Drought
- Disaster Reduction and Management
- Education and Awareness
- Energy
- Systems ecology
- Finance
- Forests
- Fresh Water
- Health
- Human Settlements
- Indicators
- Industry
- Information for Decision-making and Participation
- Integrated Decision-making
- International Law
- International Cooperation for Enabling Environment
- Institutional Arrangements
- Land management
- Major Groups

- Mountains
- National Sustainable Development Strategies
- Oceans and Seas
- Poverty
- Sanitation
- Science
- SIDS
- Sustainable tourism
- Technology
- Toxic Chemicals
- Trade and Environment
- Transport
- Waste (Hazardous)
- Waste (Radioactive)
- Waste (Solid)
- Waste Water

During the last ten years, different organizations have tried to measure and monitor those in proximity to what they consider sustainability by implementing what has been called sustainability matrix and indices.

iii) Real Purpose (Agenda) of Sustainability Development: Various writers have commented on the population control agenda that seems to underlie the concept of sustainable development. Maria Sophia Aguirre (2002) writes: “Sustainable development is a policy approach that has gained quite a lot of popularity in recent years, especially in international circles. By attaching a specific interpretation to sustainability, population control policies have become the overriding approach to development, thus becoming the primary tool used to “promote economic development in developing countries and to protect the environment.”

Mary Jo Anderson (2002) suggests that the real purpose of sustainable development is to contain and limit economic development in developing countries, and in so doing control population growth. It is suggested that this is the reason the main focus of most programmes is still on low-income agriculture. Joan Veon (2004), a business-woman and international reporter, who covered 64 global meetings on sustainable development posits that: “Sustainable development has continued to evolve as that of protecting the world’s resources while its true agenda is to control the world’s resources. It should be noted that Agenda 21 sets up the global infrastructure needed to manage, count, and control all of the world’s assets.”

Sustainable development is said to set limits on the developing world. While current first world countries polluted significantly during their development, the same countries encourage third world countries to reduce pollution, which sometimes impedes growth. Some consider that the implementation of sustainable development would mean a reversion to pre-modern lifestyles.

In fact, all these broad aspects together give us an idea of the scope of sustainable development. In order to understand the scope of sustainable development in its true perspective, let us discuss its dimensions, principles and concerns in the following section.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

1) Explain the concept of sustainable development.

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1.3 SCOPE OF SUSTAINABLE DEVELOPMENT

Sustainable development is viewed as the mutually beneficial interaction between the legitimate interests of business and the economy, government and the polity, and civil society and culture. However, these societal interactions do not exist in a vacuum. On the physical and material side, society is bounded by the *carrying capacity of the varied ecosystems*, landscape ecology, and ultimately the biosphere of the Earth or the nature. On the psychological and spiritual side, the three-fold functional differentiation of society is contextualized by the *caring capacity of individuals*. Thus, sustainable development is a multidimensional concept, involving no less than four dimensions.

1.3.1 Dimensions of Sustainable Development

Basically, sustainable development has four main pillars (dimensions) — social, economic, environmental and institutional. However, in recognition of the growing importance of information and communication technologies and the role they play in development, a *fifth dimension* i.e. ICT is added. This integration of social, economic, environmental, institutional, and ICT is an imperative widely recognized by the community. Following are brief definitions of these dimensions.

1.3.1.1 Social Dimension

The imperative of the twenty-first century is sustainability: to raise the living standards of the world’s poor and to achieve and maintain high levels of social health among the affluent nations while simultaneously reducing and reversing the environmental damage wrought by human activity.

Sustainability issues are generally expressed in scientific and environmental terms, but implementing change is a social challenge that entails, among other things, international and national law, urban planning and transport, local and individual lifestyles and ethical

consumerism. Development is considered to be socially sustainable when it achieves social justice via equitable resource allocation, eradicates poverty and provides social services such as education, health, etc., to all members of the society, especially the most needy ones. The social dimension of sustainable development is, thus, based on the notion that man constitutes an important means of development and its prime target should be to strive to achieve this notion for both present and the future generations.

Social sustainability is one aspect of sustainable development. Social sustainability encompasses human rights, labour rights and corporate governance. In common with environmental sustainability, social sustainability is the idea that future generations should have the same or greater access to social resources as the current generation. Social resources include ideas as broad as basic human rights and all other cultures.

1.3.1.2 Economic Dimension

Economically, sustainability means providing economic welfare to people at present and in the future, while paying more attention to the “natural capital”. It means and includes the natural resources of economic value, considered as the bases for the economic system, such as plants, soil, animals, fish; and bio-environmental system such as air and water purification.

Sustainability, thus, interfaces with economics through the social and ecological consequences of economic activity. Sustainability economics represents a broad interpretation of ecological economics where environmental and ecological variables and issues are basic but part of a multidimensional perspective. Social, cultural, health-related and monetary / financial aspects have to be integrated into the analysis. However, the concept of sustainability is much broader than the concepts of sustained yield of welfare, resources or profit margins. At present, the average per capita consumption of people in the developing world is sustainable but population numbers are increasing and individuals are aspiring to high consumption — Western lifestyles. The developed world population is increasing only slightly but consumption levels are unsustainable. The challenge for sustainability is to curb and manage Western consumption while raising the standard of living of the developing world without increasing its resource depletion and environmental impact. This must be done by using strategies and technology that break the link between economic growth on the one hand, and on the other, environmental damage and resource depletion.

1.3.1.3 Environmental Dimension

An ecologically sustainable system maintains a solid base of natural resources and avoids excessive use of such resources. This involves the conservation of biodiversity, attaining atmospheric balance, productivity of soil as well as other systems of natural environment which are usually classified as non-economic resources. In tackling sustainable development problems, environmentalists tend to focus on what is known as “environment borders”. As a concept it means that each natural environment system has certain limits that should not be exceeded by excessive consumption, or else a deterioration in natural system is irrevocable and inevitable. Therefore, from an environmental point of view, sustainability means setting limits for consumption, population growth, pollution and the faulty ways of production including wasting waters, cutting the forests or erosion of the soil.

Healthy ecosystems provide vital goods and services to humans and other organisms. There are two major ways of reducing negative human impact and enhancing ecosystem services.

- i) ***Environmental management:*** This direct approach is based largely on information gained from earth science, environmental science and conservation biology. However, this is ultimately the management of a long series of indirect causal factors that are initiated by human consumption; so a second approach is through demand-management of human resource-use.
- ii) ***Management of human consumption of resources:*** It is an indirect approach based largely on information gained from economics. Herman Daly (1973) has suggested three broad criteria for ecological sustainability:
 - renewable resources should provide a sustainable yield (the rate of harvest should not exceed the rate of regeneration);
 - for non-renewable resources there should be equivalent development of renewable substitutes; and
 - waste-generation should not exceed the assimilative capacity of the environment.

1.3.1.4 Institutional Dimension

The institutional dimension of sustainable development is concerned with the participation of all community members in the decision-making process and the acquisition of the information that affects their lives transparently and accurately. It is also concerned with the organizations, such as councils and committees charged with the implementation of various aspects of Millennium Development Goals (MDGs).

1.3.1.5 Digital (ICT) Dimension

Information and communication technologies (ICTs) are closely related to the abovementioned four dimensions of sustainable development. The millennium development goals and the recommendations of the international summit for information and communication technology held in Geneva in November, 2003 provided a suitable methodological framework on how to make use of ICT in achieving sustainable development. Therefore, the digital dimension has been added as a fifth dimension of sustainable development.

1.3.2 Principles/Premises of Sustainable Development

Some of the principles/premises underlying the concept of sustainable development include the following:

- 1) Sustainable development is an alternative design for development, which, by definition should be environmentally benign and eco-friendly.
- 2) That the present generation should meet its needs without compromising the ability of future generations to meet their needs, i.e. to ensure that the productive assets available to future generations are not unfairly diminished.
- 3) That those who enjoy the fruits of economic development today must not make future generations worse-off by excessively degrading the Earth's exhaustible resources and polluting its ecology and environment.
- 4) That there is a symbiotic relationship between consumerist human race and producer natural systems.
- 5) That environment and development are not mutually exclusive — healthy environment is essential to sustainable development and healthy economy as well.

- 6) That economic development which erodes natural capital is often not successful.
- 7) That environmental mistakes of the past need not be repeated, as the past-patterns of environmental degradation are not inevitable.
- 8) That development is not growth only, it should stand for broader goals of social transformation.
- 9) That sustainable development in the long run has to do with ecology, resources and people, along with their service agencies, institutions and other aspects of their social organization.
- 10) That sustainable development has two major aspects – internally sustainable development and externally sustainable development – without both, no real sustainable development would exist.
- 11) That sustainable development is largely accountable to the poor, and hence, it should ensure that the poor have adequate access to sustainable and secure livelihoods.

1.3.3 Sustainable Development: Concerns and Ingredients of Good Vision

We need to articulate and address our concerns of sustainable development with a good vision thereof. So, in this section, we will focus on our concerns and also elucidate our vision of sustainable development, so that our approaches and strategies thereof may become meaningful in achieving such a development.

1.3.3.1 Nature of Our Concerns of Sustainable Development

We are now clear that sustainable development is not a new-found revelation. It is, however, true that more recent discussions on it are the result of the Rio Conference in 1992, which provided a blue-print for moving towards an alternative vision of development that represents the coming together of different concerns. After Rio Declaration, known as 'Earth Charter', we have started becoming more serious in our discussions and debate which seek to establish a basis in principle for guiding the state in formulating sustainable development policies that balance environmental safeguards with the satisfaction of human needs in contemporary times. With the coming of the concept of sustainable development, the development debate is not dominated by economists alone; it has other participants too – the environmentalists, the sociologists and a host of citizen groups – who are playing their role in the development arena.

The current concern for sustainable development is rooted in the firm realization that the bounties of nature are drying up and there is going likely to be an acute scarcity of basic resources. The rampage of technology has killed the feeling of continued abundance. The folly of reckless environmental degradation is finally being realized, and the elitist techno-economic model of development is being increasingly questioned. The environmentalists parade the frightening facts and warn us that no issue seems to be more central and vital today than the protection of the environment. If timely action is not taken the time will run out, and we will sit on an ash-pile of degraded environment. The critiques of development, also ring the alarming bells, not only for conveniently ignoring the environmental considerations in the development planning but also for the distortions of development, i.e. unjust and inequitable development.

The facts they (critiques) present are highly disturbing:

- More than 200 million people in the country live below the poverty line.

- More than 200 million people have no access to safe drinking water.
- More than 500 million people have no access to proper sanitation.
- More than 150 million people are without proper shelter.
- More than 500 million people are illiterate.
- More than a million children die each year before they see their first birthday.

In the face of such a grim scenario, the question ‘development for whom’ needs an honest answer. There is no place here to present a detailed critique of development. But, at least a one-line statement is necessary – that development has failed the poor, and they need a development which is participatory, equitable and infused with strong considerations of social justice. Labels of such a development – sustainable or whatever – do not matter to the poor; what matters to them is the equitability, call it sustainability, if one likes.

This is the backdrop that constitutes really the concerns of the current debates and discussions on sustainable development. The concerns are essentially related to:

- global and transnational nature of threats (for example, climate change, ozone layer depletion, etc);
- degradation of natural habitats (for example, forests and other eco-systems);
- depletion of non-renewable natural resources (for example, stock of water, soil, minerals, wilderness areas);
- diminution of land for agricultural purposes;
- migration of people from rural to urban areas;
- pollution of rivers, ponds and other water sources; and
- environmental pollution in urban industrial areas, especially in large cities.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

2) What are the dimensions and premises of sustainable development?

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1.3.3.2 Essential Ingredients of Good Vision of Sustainable Development

Towards a Good Vision: The current explorations on sustainable development in our midst today exemplify an approach that will permit continuing improvements in the present quality of life at a lower intensity of resource-use, thereby leaving behind for

future generations an undiminished or even enhanced stock of natural resources and other assets. The search is basically on for that process of development by which people develop themselves and their institutions in ways that enhance their ability to mobilize and manage available resources to produce sustainable and justly distributed improvements in the quality of life, consistent with their own aspirations.

For us (in India), sustainable development is both a challenge and an opportunity. The obstacles are, however, great and making the concept of sustainability precise is difficult. It is not possible to argue that there should be zero or bare minimum use of natural resources for development; successful development will inevitably involve some amount of depletion of natural resources, resulting in some degree of environmental damage. Further, policies and programmes of accelerating environmentally-responsible development will not happen by themselves. It is, therefore, important to seize the current opportunity to bring about real, if not radical, change. The challenge can be converted into opportunity when due consideration is given to its essential ingredients that determine our vision of sustainable development.

Ingredients of good vision: Some ingredients identified are presented below.

- 1) *Recognizing the Complementarity of Economic Development and Sound Environmental Management:* Economic development and sound environmental management are complimentary aspects of the same agenda (World Bank, 1992, p.25). Without adequate environmental protection, development will be undermined; and, without development, environmental protection will fail. Across the globe, there is growing consensus that policies of both economic growth and environmental management are not much in conflict with each other; they are more often complimentary. Good economic policies are good environment policies and *vice versa*, says World Development Report (1992). Economic growth need not be an enemy of environment, and the best policies for environmental protection will help, not hurt, economic development (World Bank, 1992, p.178).
- 2) *Planning and Providing for the Basic Needs of the Poor:* For the poor, environment is an integral part of development. In their impoverished state, the poor depend on the environment for their livelihood and sustenance. With few assets on which they can draw upon, the poor have no choice but to excessively degrade natural resources. They have to meet their urgent, short-term needs by preying upon the natural resources available in their surrounding environment. They care more about extracting what they can do today from environmental resources than about conserving them for tomorrow; the result is often the very opposite of sustainability with excessive exploitation of their natural habitat.

In the process of meeting their basic needs through over-exploitation of natural resources, the poor become both the victims and agents of environmental damage. The rural poor resort to cultivating erosion-prone land sides and moving into tropical forest areas where crop-yields on cleared fields usually drop sharply after a few years. They 'mine' natural capital through, for example, excessive felling of trees for firewood, polluting rivers and ponds, and over-using some of the exhaustible and non-renewable natural resources. While the basic needs of the poor are partly met by excessive exploitation of natural resources within their reach, the poor usually bear the brunt of environmental degradation. They may also be the ones who suffer most when forests, which provide them free-fuel and cattle-feed are logged, or when factories pollute rivers that provide them water, fish, etc. The poor, in this process, become the victims of their own as well as 'other people's' damage to environment. To make development sustainable, what is therefore

required is strong poverty-alleviation strategy that meets the basic needs of the poor (called 'safety net'), and empower them in a manner which reduces their direct dependence on natural resources. Alleviating poverty is both a moral imperative and a requisite for environmental sustainability (World Bank, 1992, p.30), and there exist substantial synergies between alleviating poverty and protecting environment.

- 3) *Dovetailing Development Planning with Measures Aimed at Population Control:* Like poverty, rapid population growth is a serious constraint to sustainable development. Population growth off-sets development gains. It exacerbates the mutually reinforcing effects of poverty and environmental damage. Rapid population growth puts too much pressure on precious natural resources like water, air, energy, forests, land and ecology. Population growth also increases the demand for goods and services, and thus, implies increased use of natural resources that cause environmental damage. More people not only consume more resources but also produce more wastes, threatening local health conditions and putting additional stress on Earth's assimilative capacity. In our context, the issue of population control is of fundamental importance if planning for sustainable development is to make much headway. Without population control sustainable development is neither possible nor feasible, however great may be the efforts.
- 4) *Making Considerations of 'Social Justice' Enter into Strategies of Sustained Economic Growth:* Equity and social justice are avowed objectives of sustainable development. It is in the backdrop of this objective that sustainable development has been viewed "as a development with a humane face", a development that humanizes rather than dehumanizes. It has also been viewed as a development that puts the last first. In short, sustainable development is equitable development, the development that does not bypass the poor, and does not deceive the disadvantaged. It is the development that takes due care of the weakest and the most deprived; a development that is economically more just, more humane and that which promotes human welfare. Sustainable development, as Gale (1991, p.230) argues is three-pronged construct – economic construct, environmental construct and social construct. As a social construct, it, among other things, implies the following:
 - that access to resources and the distribution of costs and benefits must be fair and equitable to both the rich and the poor;
 - that development must be appropriate to the status and concerns of the local people, especially for those living in conditions of extreme marginality; and
 - that the decision-making should be participatory, liberating, collaborative and consensus-building.

If these three conditions are to be met, the considerations of 'social justice' should effectively enter into the formulation and implementation of strategies aimed at sustainable development, which, by all means, is a socially infused development; talking and taking care of those who presently stand disillusioned at the current pace and processes of industrial, technical or economic growth, which is capitalistic in character and elitist in its approach. The only sobering conclusion is that as long as economic development does not become equitably distributive development, it cannot maintain its sustainability.

- 5) *Attending to Problems Created by Accelerated Pace of Industrialization and Urbanization:* While there is a lot of breast-beating on sustainable development

in the quarters that play a major role in the planning and execution of economic growth and industrial expansion, there is little regard to attending to the problems arising out of the pace and processes of industrial growth. Also, while there is no dispute about the need for industrialization, the cause of worry is the environmental degradation on a frightening scale. The industrial units, no matter big or small, are pollutant in nature. Most of these units flout the regulatory controls with impunity and care little about the problems of pollution they create in the short- and long-run. The obsession with growth-oriented strategy has side-tracked the vital issues of environmental protection and desirable modes of production. Besides problems of pollution, there is another awesome problem of industrial growth, namely, the problem of “project displaced persons” (PDPs). There are many instances of development projects — factories, mines and dams — that have resulted in bringing untold misery to poor people whose land has been acquired in the name of ‘public interest’ without paying adequate market price. The ousted are always those people for whose interests nobody cares. The pet argument is that, displacement and human sacrifices are always unavoidable in economic development.

The mad rush to cities, i.e. the menacing pace of urbanization, the booming of cities and towns, has created mounting problems of sewage disposal, environmental sanitation, scarcity of space, paucity of safe drinking water, congestion on roads, sprouting of big slums and squatter colonies, large number of motor vehicles causing deafening noise and immense air pollution, and conversion of agricultural lands into habitation lands. The crisis of cities is growing each day and the pattern of urbanization seems frightening.

There are no easy answers to the twin problems of industrialization and urbanization. These are linked with different models of growth that we have pursued in the past five decades. The Gandhian strategy of economic development may perhaps provide a solution. If that be so, robust revival of village-based small and medium cottage industries and highest priority to rural development, seem to be the promising areas of planning for sustainable development.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

3) What are the essential ingredients a good vision for sustainable development?

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1.4 LET US SUM UP

During the past 20 years, there has been a growing realisation that the present practices of development are unsustainable in nature. In other words, we are living beyond our normal means. The loss of biodiversity due to felling of rainforests, over-fishing to the negative effect, our consumption-patterns, etc., is impacting our environment and climate. Our way of life is placing an increasing burden on the planet with a great stress on sustainability of development.

Though sustainable development means different things to different people, the widely-used, accepted, most-frequently quoted international definition of sustainable development is from the report *Our Common Future* (also known as the Brundtland Report): “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” But, surprisingly, globally we are not even meeting the just needs of the present in just manner, let alone considering the needs of future generations.

Sustainable development focuses on improving the quality of life of all of the Earth’s citizens without increasing the use of natural resources beyond the capacity of the environment to supply them indefinitely. It requires an understanding that inaction has consequences and that we must find innovative ways to change institutional structures and influence individual behaviour. It is about taking action, changing policy and practice at all levels, from the individual to the international.

Sustainable development is not a new idea. Many cultures over the course of human history have recognized the need for harmony between the environment, society and economy. What is new is an articulation of these ideas in the context of a global, industrial and information society.

Progress on developing the concept of sustainable development has been rapid since the 1980s. In 1992, leaders at the Earth Summit built upon the framework of Brundtland Report to create agreements and conventions on critical issues such as climate change, desertification and deforestation. They also drafted a broad action-strategy – Agenda 21 – as the work-plan for environment and development issues for the coming decades. Throughout the rest of the 1990s, regional and sectoral sustainability plans have been developed. A wide variety of groups – ranging from businesses to municipal governments to international organizations such as the World Bank – have adopted the concept and given it their own particular interpretations. These initiatives have increased our understanding of what sustainable development means within many different contexts.

Unless we start to make real progress towards reconciling these contradictions we face a future that is less certain and less secure. We need to make a decisive move toward more sustainable development. Not just because it is the right thing to do, but also because it is in our own long-term best interests. It offers the best hope for the future and whether at school, in the home or at work, we all have a part to play. Our small, every-day actions add up to make a big difference in this regard.

1.5 ANSWERS TO ‘CHECK YOUR PROGRESS’ QUESTIONS

- 1) Sustainable development (SD) is a pattern of resource-use, that aims to meet human needs while preserving the environment so that these needs can be met not only in the present but also for generations to come. Sustainability is a process which tells of a development of all aspects of human life affecting sustenance. It

means resolving the conflict between the various competing goals, and involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Sustainable development focuses on improving the quality of life for all of the Earth's citizens without increasing the use of natural resources beyond the capacity of the environment to supply them indefinitely. The universally recognized / accepted definition of sustainable development is the one given by WCED. It states that "sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".

- 2) Sustainable development is viewed as the mutually beneficial interaction between the legitimate interests of business and the economy, government and the polity, and civil society and culture. However, these societal interactions do not exist in a vacuum. On the physical and material side, society is bounded by the carrying capacity of the varied ecosystems, landscape ecology, and ultimately the biosphere of the Earth or Nature. On the psychological and spiritual side, the three-fold functional differentiation of society is contextualized by the caring capacity of individuals.

Basically, sustainable development has four main pillars (dimensions): *social, economic, environmental and institutional*. Thus, sustainable development is a multi-dimensional concept involving no less than four dimensions. However, in recognition of the growing importance of information and communication technologies and the role they play in development, a *fifth dimension* on ICT is added. This integration of social, economic, environmental, institutional and ICT is an imperative widely recognized by the community.

Some of the principles/premises underlying the concept of sustainable development are:

- i) That it is an alternative design for development, which, by definition should be environmentally benign and eco-friendly;
- ii) That the present generation should meet its needs without compromising the ability of future generations to meet their needs, i.e. to ensure that the productive assets available to future generations are not unfairly diminished.
- iii) That those who enjoy the fruits of economic development today must not make future generations worse-off by excessively degrading the Earth's exhaustible resources and polluting the Earth's ecology and environment.
- iv) That there is a symbiotic relationship between consumerist human race and productive natural systems.
- v) That environment and development are not mutually exclusive – healthy environment is essential to sustainable development and healthy economy.
- vi) That development is not growth only, it should stand for broader goals of social transformation.
- vii) That sustainable development, in the long run, has to do with ecology, resources and people along with their service-agencies, institutions and other aspects of their social organization.
- viii) That sustainable development has two major aspects – internally sustainable development and externally sustainable development – without both, no real sustainable development would exist.

- ix) That sustainable development is accountable to the poor, and hence, it should ensure that the poor have adequate access to sustainable and secure livelihoods.
- 3) Sustainable development is both a challenge and an opportunity. The challenge can be converted into opportunity when due consideration is given to its essential ingredients, some of which are identified here.
 - Without adequate environmental protection, development will be undermined; and, without development environmental protection will fail. Economic growth need not be an enemy of environment and the best policies for environmental protection will help, not hurt, economic development.
 - Alleviating poverty is both a moral imperative and a requisite for environmental sustainability, and there exist substantial synergies between alleviating poverty and protecting environment.
 - Without population control sustainable development is neither possible nor feasible, however great may be the efforts.
 - Sustainable development is equitable development; the development that does not bypass the poor and does not deceive the disadvantaged.
 - Attending to the problems created by accelerated pace of industrialization and urbanization is very essential for sustainable development.

1.6 GLOSSARY OF RELEVANT TERMS USED

- **Biodiversity:** It is a shorthand for biological diversity – the variability among living organisms. It includes diversity within species, between species and of ecosystems.
- **Ecosystem:** A dynamic complex of plant, animal and micro-organism communities and their non-living environment, interacting as a functional unit.
- **Genetic diversity:** The variation in the genetic composition of individuals within or among species; the heritable genetic variation within and among populations.
- **Greenhouse Effect:** The rise in temperature that the Earth experiences is because of certain gases in the atmosphere (water vapour, carbon dioxide, nitrous oxide, methane, etc.) which trap energy from the Sun. Because of their warming effect, these gases are referred to as green-house gases. Without them, more heat would escape back into space and the Earth's average temperature would be about 33°C, colder. Similarly, their rapid accumulation in the atmosphere can lead to rising temperatures.
- **Human capital:** The knowledge, skills and competence are attributes embodied in individuals that facilitate the attainment of personal well-being.
- **Natural capital:** The renewable and non-renewable resources that enter the production process and satisfy consumption-needs, as well as environmental assets that have amenity and productive use, and natural features such as the ozone layer that are essential for supporting life.
- **Public good:** A special kind of externality in consumption where the availability of a good to one individual does not reduce its availability to others (non-rivalry) and the supplier of the good cannot exclude anybody from consuming it (non-excludability).

- **Renewable resource:** A resource that is capable of being replenished through natural processes (e.g. the hydrological cycle) or its own reproduction, generally within a time-span that does not exceed a few decades. Technically, metal-bearing ores are not renewable, but metals themselves can be recycled indefinitely.
- **Social capital:** The networks and shared norms, values and understanding that facilitate co-operation within and between groups.
- **Stakeholder:** Somebody who has a “stake” or “interest” in a public policy, programme or, in some uses of the term, a corporation’s activities.
- **Sustainable development:** A development path along which the maximisation of human well-being for today’s generations does not lead to decline in future well-being.
- **Threshold:** When used in reference to a species, an ecosystem, or another natural system, it refers to the level beyond which further deterioration is likely to precipitate a sudden, adverse, and possibly irreversible change.

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UNIT 2 SUSTAINABLE DEVELOPMENT: APPROACHES AND STRATEGIES

Structure

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- 2.1 Objectives
- 2.2 Origin of Sustainable Development
- 2.3 Approaches to Sustainable Development
 - 2.3.1 Types of Capital and Assets in Sustainable Development
 - 2.3.2 Types of Approaches to Sustainable Development
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2.0 INTRODUCTION

You have studied the concept, scope, dimensions and concerns of sustainable development in Unit-1. Hence, you are aware that, though sustainable development has become very popular in the last two decades, its concept is complex as it is emerging and encompasses a range of different sectors. According to Andres R. Edwards (2005), the Sustainability Revolution paints a picture of this largely unrecognized phenomenon from the point of view of five major sectors of society: i) Community (government and international institutions); ii) Commerce (business); iii) Natural Resources (forestry,

farming, fisheries, etc.); iv) Ecological Design (architecture, technology); and v) Biosphere (biodiversity, conservation, etc.). It makes the approaches and strategies to sustainable development more difficult.

Sustainable development calls for different approaches and strategies that can effectively blend economic, social and ecological approaches in a manner indispensable and complementary to each other so as to meet the needs and requirements of not only the present generation but also leave scope for development of the future generations. In this Unit, we will, therefore, attempt to focus on the origin of sustainable development as well as the approaches and strategies followed by the Government and other agencies including the community-based organizations and the individuals for promoting sustainable development.

2.1 OBJECTIVES

After going through this Unit, we expect you to be able to:

- Trace the origin of sustainable development;
- Describe different approaches to sustainable development;
- Explain the principles and aspects of strategic approach to sustainable development;
- Discuss the challenges to strategy for sustainable development; and
- Analyse the role of Government, Development Agencies, Community-based Organisations and Individuals in the context of sustainable development.

In order to enable you achieve the above objectives, we wish you to go through the following sections thoroughly.

2.2 ORIGIN OF SUSTAINABLE DEVELOPMENT

The concept of sustainable development, in fact, has originated and developed through different phases of environmentalism. Basically, there are three phases of environmentalism which are discussed below (Rajrupasinhary, 2010).

- **First phase:** The environment protection action has been taken by the people of Europe at the time the Industrial Revolution in 17th century, which gave rise to modern environmental pollution as it is generally understood today. The emergence of great factories and consumption of immense quantities of coal and other fossil fuels gave rise to unprecedented air pollution and the large volume of industrial chemical discharges added to the growing load of untreated human waste. The first, modern environmental laws came in the form of the British Alkali Acts, passed in 1863, to regulate the deleterious air pollution (gaseous hydrochloric acid) given off by the Leblanc process, used to produce soda ash. Environmentalism, thus, grew out of the amenity movement, which was a reaction to industrialization, the growth of cities, and worsening air and water pollution. The common people took initiative for the protection of the environment.
- **Second phase:** The beginnings of an environmental movement in the United States can be traced as far back as 1739, when Benjamin Franklin and other Philadelphia residents, citing “public rights,” petitioned the Pennsylvania Assembly to stop waste-dumping and remove tanneries from Philadelphia’s commercial district. In the US, it was seen that great poets and other literary scholars protested against destruction of the environment through their work. The US movement further expanded in the

1800s, out of concerns for protecting the natural resources of the West, with individuals such as John Muir and Henry David Thoreau making key philosophical contributions.

Thoreau was interested in peoples' relationship with nature and studied this by living close to nature in a simple life. He published his experiences in the book *Walden*, which argues that people should become intimately close with nature. Muir came to believe in nature's inherent right, especially after spending time hiking in Yosemite Valley and studying both ecology and geology. With the initiative of common people first two National Parks – Yosemite and Yellowstone National Parks – were established in the US to save some wildlife.

- **Third phase:** Later, in 1960's, an incident which turned the whole situation was spraying of DDT in the farms of America. In 1962, *Silent Spring* was published by American biologist Rachel Carson. The book explained in detail the environmental impacts of the indiscriminate spraying of DDT in the US countryside farms, which contained large amount of chemicals causing harm to the migratory birds that usually came to have the crops. The book suggested that DDT and other pesticides may cause cancer and that their agricultural use was a threat to wildlife as well as to the human beings.

Then, in the 1970s, the Chipko movement was formed in India; influenced by Mahatma Gandhi, they set up peaceful resistance to deforestation by literally hugging trees (leading to the term "tree huggers"). Their peaceful methods of protest and slogan "ecology is permanent economy" were very influential.

Gradually, with increasing industrialization, globalization and liberalization, and concomitant effects on environment, environmentalism and sustainable development have assumed greater significance. It is significant to note that *the decade 2005-2014 has been declared as UN Decade of Education for Sustainable Development (DESD)*.

2.3 APPROACHES TO SUSTAINABLE DEVELOPMENT

Sustainable development approaches and programs often encompass a broad range of different types of capital and assets. Therefore, before we touch upon approaches to sustainable development, we will take a brief look at the types of capital and assets.

2.3.1 Types of Capital and Assets in Sustainable Development

Sustainable development programmes include a broad range of different types of capital and assets. Though the words "capital" and "asset" are often used interchangeably, when discussing these various stores of value, the term "capital" refers to stores of value that depreciate in value over time, while the term "assets" refers to stores of value that appreciate over time (Tietenberg, 1996). Capital and assets are any store of value that can provide income, benefits, goods, services, or other things of value. They are typically categorized into the following three types (Eric Larson, 1998).

- Manufactured and Financial Capital:** The most familiar type of capital is made by people and includes all financial assets and physical capital. It includes buildings, highways, pipelines, stock and bond investments, the permanent funds, and any other form of financial or physical asset that we as humans have created or manufactured.

- ii) **Human and Social Capital:** People and communities also have stores of value that can be passed on from one generation to the next. People embody human capital in the form of knowledge, education, skills, training and other valuable abilities. Communities and societies are stores of social capital in the form of traditions, customs, identity, organizations, laws and institutions that are passed on to future generations as well.
- iii) **Natural Capital:** It includes all aspects of the natural environment that provide income, services, resources or benefits. Natural capital includes raw resources such as mines, oil, timber, fish, etc. It includes life support services such as climate regulation, nutrient cycling, waste treatment, soil formation and other ecological processes that keep us alive. Natural capital also encompasses hunting, subsistence, and outdoor recreation of resources as well as aesthetic and cultural benefits derived from nature.

The sustainable development debate is based on the assumption that societies need to manage three types of capital (economic, social, and natural), which may be non-substitutable and whose consumption might be irreversible (Dyllick and Hockerts, 2002). Daly (1991), for example, points to the fact that natural capital cannot necessarily be substituted by economic capital. While it is possible that we can find ways to replace some natural resources, it is much more unlikely that they will ever be able to replace eco-system services such as the protection provided by the ozone layer, or the climate stabilizing function of the Amazonian forest. In fact natural capital, social capital and economic capital are often complementarities to one another. A further obstacle to substitutability also lies in the multi-functionality of many natural resources. Forests, for example, not only provide the raw material for paper (which can be substituted quite easily), but also maintain biodiversity, regulate water-flow, and absorb CO₂ (http://en.wikipedia.org/wiki/Sustainable_development#Three_types_of_capital_in_sustainable_development).

Many people may agree with the principle that current and future generations should have equitable access to different types of capital and assets to meet their needs. However, not everyone agrees on what those needs are and what *type* of assets and capital are needed to what extent.

2.3.2 Types of Approaches to Sustainable Development

Following are the important approaches to sustainable development (Eric Larson, 1998).

2.3.2.1 Traditional Approach

Traditional approach to development focuses on *economic* well-being as the primary measure of progress. This approach relies on economic measures of well-being such as personal income, number of jobs, financial returns on assets, and/or gross national product. Using these measures, traditional approach emphasizes that each generation should have equitable access to manufactured capital, financial assets and economic opportunities to meet their needs.

Traditional approach to sustainable development and programmes also expands this traditional understanding of wellbeing to include the social and environmental well-being of people. *Sustainable development programs under this approach typically define progress and well-being in broad terms that include measures of the health of the environment, communities, and the people living there.* The supporters of this approach argue that people need access to a healthy natural environment to meet their need for life support services and also to ensure their physical health and well-

being. They emphasize the need to sustain natural assets to preserve life support services and the need to conserve natural resources that future generations will depend on for life. They point to the finite quantity of our natural assets and argue that their depletion or degradation may lead to hardships for future generations or even the possible extinction of our species (Leibman and Anna, 1996; Dasgupta, 1996; Nelder, 1998; and Rees, 1996).

2.3.2.2 Social and Human Capital Approach

Leibman (1996), Dasgupta (1996), Nelder (1998) and Rees (1996) also emphasize the social well-being of communities, cultures and individuals. To help ensure social well-being, current and future generations should have access to the wealth offered by communities, institutions, and traditions. Besides accumulating financial wealth, creating jobs and building physical infrastructure, we also need to ensure that the social institutions and human capital that sustain our communities are also passed on to future generations.

Some critics (Simon and Herman, 1984) of sustainable development emphasize the accumulation of human capital alone. They argue that human ingenuity and innovation will use technology and natural resources more wisely to provide for the needs of future generation. They believe the accumulation of human knowledge and technology will provide what is needed for the well-being of future generations and that we should not be concerned about the depletion of natural assets. Instead, they argue, we should ensure that we pass on accumulated human capital to future generations.

At the core of this debate is a disagreement about what we mean by “well-being” and how much of each type of capital future generations will need. The definition of “well-being” and the “needs” of a generation are often contentious and hotly-debated topics in sustainable development approaches and programs. These debates on such definitions are based on fundamental individual values, and resolution of these debates are unique to each community, region and country.

2.3.2.3 International Approach

In Section 2.2 above, you might have noticed the environmental contexts and the ways in which the people have reacted through their movements which showed the differences in their approach to the environmental issues and concerns. All these environmental approaches and movements have led to the United Nations Conference on Human Environment held in Stockholm in 1972, the outcome of which is famously known as Stockholm Declaration. In this conference the concept of Sustainable development had been given a wider interpretation. In Principle 21 of Stockholm Action Plan, it is mentioned that it should be obligatory for the human being to use its natural resources in that manner by which his future generation can also avail all those resources. And, individual has to play an important role for the protection of the environment (Rajrupasinhary, 2010).

After the Stockholm Conference, in late 1970's the Brundtland Committee published a report which states that due to negligence of the human beings the environment has encountered so much destruction. Now, it is the time for the human beings to participate in the environment protection actions (Ibid).

In 1992, the Earth Summit was held in the Rio de Janeiro which is popularly known as Rio Declaration. In this Conference, many new aspects of Sustainable Development were identified and various principles such as the ‘precautionary principle’, ‘intergenerational equity’, ‘agenda 21’, ‘biodiversity’, etc were mentioned. In Rio Declaration and others, it has been discussed that due to high rate of population growth the sustainable use of natural resources is not possible (Ibid).

International Conference on Population and Development (ICPD) held in Cairo in 1994 had articulated and integrated the population issues into the context of development and more so for sustainable development and prepared 10-year programme of action and its follow-up till 2000 had effectively informed the MDGs. It has, thus, been well recognized that without the interference of the individual it is not possible to protect the environment. Later, people's participation, with due recognition to their rights and responsibilities in different aspects of social and national development through participatory decision-making has become important aspect of sustainable development.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

1) Write, in brief, about the origin of Sustainable Development.

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2) What are the types of capital and assets in sustainable development?

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3) What are the approaches to sustainable development?

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2.3.3 Basic Aspects and Issues of Approaches to Sustainable Development

Based on the above discussed approaches to sustainable development, we can now have a perspective of sustainable development. In the Indian context, Ministry of Environment and Forest (MoEF, Government of India, 2002, See http://envfor.nic.in/divisions/ic/wssd/doc4/consul_book_persp.pdf) provides a perspective of sustainable development covering its different aspects presented below.

2.3.3.1 Poverty Eradication and Sustainable Livelihoods

Poverty and degraded-environment are closely interrelated, especially where people depend for their livelihoods primarily on the natural resource-base of their immediate environment. Restoring natural systems and improving natural resource management practices at the grassroots level are central to a strategy to eliminate poverty. The

survival needs of the poor force them to continue to further degrade an already degraded environment. Removal of poverty is, therefore, a prerequisite for protection of the environment.

Poverty magnifies the problem of hunger and malnutrition. The problem is further compounded by the inequitable access of the poor to the food that is available. It is, therefore, necessary to strengthen the public distribution system to overcome this inequity. Diversion of common and marginal lands to 'economically useful purposes' deprives the poor of a resource-base which has traditionally met many of their sustenance needs. Market forces also lead to the elimination of crops which have traditionally been integral to the diet of the poor, thereby threatening food security and nutritional status.

While conventional economic development leads to elimination of several traditional occupations, the process of sustainable development, guided by the need to protect and conserve the environment, leads to the creation of new jobs and opportunities for the reorientation of traditional skills to new occupations.

Women, while continuing to perform their traditional domestic roles are increasingly involved in earning livelihoods. In many poor households they are often the principal or the sole breadwinners. A major thrust at the policy level is necessary to ensure equity and justice for them. Literacy and basic education are essential for enabling the poor to access the benefits offered by development initiatives and market opportunities. Basic education is, therefore, a precondition for sustainable development. A sizeable proportion (about 60 per cent according to some estimates) of the population is not integrated into the market economy. Ensuring the security of their livelihoods is an imperative for sustainable development.

2.3.3.2 Changing Unsustainable Patterns of Consumption and Production

With increasing purchasing power, wasteful consumption linked to market-driven consumerism is further stressing the resource-base of developing countries. It is important to counter this through education and public awareness. In several areas, desirable limits and standards for consumption need to be established and applied through appropriate mechanisms including education, incentives and legislation. Several traditional practices that are sustainable and environment-friendly continue to be a regular part of the lives of people in developing countries. These need to be encouraged rather than replaced by more 'modern' but unsustainable practices and technologies.

Development decisions regarding technology and infrastructure are a major determinant of consumption patterns. It is, therefore, important to evaluate and make development decisions which structurally lead to a more sustainable society. Technologies exist through which substantial reduction in consumption of resources is possible. Efforts to identify, evaluate, introduce and use these technologies must be made. Subsidies often lead to wasteful and unsustainable consumption by distorting the value of a resource. All pricing mechanisms must, therefore, be evaluated from a sustainable development point of view.

2.3.3.3 Protecting and Managing the Natural Resource-base of Economic and Social Development

The integration of agriculture with land and water management, and with ecosystem conservation is essential for both environmental sustainability and agricultural production. An environmental perspective must guide the evaluation of all development projects, recognizing the role of natural resources in local livelihoods. This recognition must be informed by a comprehensive understanding of the perceptions and opinions of local

people about their stakes in the resource base. To ensure sustainability of the natural resource-base, the recognition of all stakeholders in it and their roles in its protection and management is essential.

There is a need to establish well-defined and enforceable rights (including customary rights) and security of tenure, and to ensure equal access to land, water and other natural and biological resources. It should further be ensured that this applies, in particular, to indigenous communities, women and other disadvantaged groups living in poverty. Water-governance arrangements should protect ecosystems and preserve or restore the ecological integrity of all natural water bodies and their catchments. This will maintain the wide range of ecological services that healthy ecosystems provide and the livelihoods that depend upon them. Biomass is, and will continue for a long time to be, a major source of fuel and energy, especially for the rural poor. Recognizing this fact, appropriate mechanisms must be evolved to make such consumption of biomass sustainable, through both resource management and the promotion of efficient and minimally polluting technologies, and also technologies which will progressively reduce the pressures on biomass, which cause environmental degradation.

The traditional approaches to natural resource management such as sacred groves and ponds, water harvesting and management systems, etc, should be revived by creating institutional mechanisms which recapture the ecological wisdom and the spirit of community management inherent in those systems.

2.3.3.4 Sustainable Development in a Globalizing World

Globalization, as it is taking place today, is increasing the divide between the rich and the poor. It has to be steered so that it serves not only the commercial interests but also the social needs of development. Global business thrives on and, therefore, encourages and imposes high levels of homogeneity in consumer preferences. On the contrary, for development to be locally appropriate and sustainable, it must be guided by local considerations which lie in cultural diversity and traditions. Hence, recognition at the policy level of the significance of diversity, and the need to preserve it is an important precondition for sustainable development. In an increasingly globalizing economy, for want of the appropriate skills, the developing countries are often at a disadvantage in negotiating and operating multilateral trade agreements. Regional cooperation for capacity-building is, therefore, necessary to ensure their effective participation in all stages of multilateral trade.

Globalization is driven by a vast, globally-spread human resource-engine involving millions of livelihoods. Their security is sometimes threatened by local events causing global distortions (e.g. the impact of the WTC attack on jobs in India, or in a wider context, sanctions against countries not conforming to 'international' prescriptions in human rights or environment-related matters). Mechanisms to safeguard trade and livelihoods, especially in developing countries, must be evolved and negotiated to make globalization an effective vehicle of sustainable development. War and armed conflicts are a major threat to sustainable development. It is imperative to evolve effective mechanisms for mediation in such situations and to resolve contentious issues without compromising the larger developmental goals of the conflicting parties.

2.3.3.5 Health and Sustainable Development

Human health, in its broadest sense of physical, mental and spiritual well-being, is, to a great extent, dependent on the access of the citizen to a healthy environment. For a healthy, productive and fulfilling life, every individual should have the physical and economic access to a balanced diet, safe drinking water, clean air, sanitation,

environmental hygiene, primary health care and education. Access to safe drinking water and a healthy environment should be a fundamental right of every citizen. Citizens of developing countries continue to be vulnerable to a double burden of diseases: Traditional diseases such as malaria and cholera, caused by unsafe drinking water and lack of environmental hygiene, have not yet been controlled; and in addition, people are now falling prey to modern diseases such as cancer and AIDS, and stress-related disorders. Many of the widespread ailments among the poor in developing countries are occupation-related, and are contracted in the course of work done to fulfill the consumption demands of the affluent, both within the country and outside.

The strong relationship between health and the state of the environment in developing countries is becoming increasingly evident. This calls for greater emphasis on preventive and social medicine, and on research in both occupational health and epidemiology. Because of this close link, there needs to be greater integration between the Ministries of Health and Environment, and effective coordination and cooperation between them. Basic health and educational facilities in developing countries need to be strengthened. The public health services must give preventive health care equal emphasis as curative health care.

People should be empowered through education and awareness to participate in managing preventive health care related to environmental sanitation and hygiene. Most developing countries are repositories of a rich tradition of natural resource-based health care. This is under threat, on the one hand, from modern mainstream medicine, and on the other, from the degradation of the natural resource-base. Traditional medicine in combination with modern medicine must be promoted while ensuring conservation of the resource-base and effective protection of intellectual property rights of traditional knowledge. Developing countries should also strive to strengthen the capacity of their health care systems to deliver basic health services and to reduce environment-related health risks by sharing of health awareness and medical expertise globally.

2.3.3.6 Means of Implementation

Effectiveness of every programme of sustainable development depends upon its approach and the means of implementation. Following are the important of these means.

- **Finance:** Overseas Development Assistance (ODA) is declining. The commitments made by industrialized countries at the Earth Summit in Rio a decade ago remain largely unmet. This is a cause for concern which has been voiced by several developing countries. Industrialized countries must honour their ODA commitments. The new instruments and mechanisms, e.g. the Clean Development Mechanism, that are trying to replace ODA need to be examined closely for their implications for the developing countries. In view of the declining trend in ODA, developing countries must explore how they can finance their sustainable development efforts such as by introducing a system of ecological taxation. Private investment cannot replace development aid as it will not reach sectors relevant for the poor. Such investments and other mechanisms can at best be additional to, not replacements for, development assistance.

Conditions attached to financial assistance need to be rigorously scrutinized, and the assistance accepted only if the conditionalities are acceptable. Financial support for sustainable development programmes must not be negatively influenced by political considerations external to the objectives of the assistance.

- **Trade:** Trade regimes, specifically WTO, are sometimes in conflict with sustainable development priorities. Imperatives of trade, the concerns related to environment,

and equity and social justice however need to be dealt with independently. Environmental and social clauses which are implicitly or explicitly part of international agreements must not be used selectively to erect trade barriers against developing countries. Developing countries will suffer a major trade disadvantage if the efforts to put in place globally acceptable Process and Production Methods (PPMs) are successful. Instead, existing disparities between the trade regimes and multilateral environmental agreements such as those between Trade Related Intellectual Property Rights (TRIPS) regime and the Convention on Biological Diversity (CBD), should be thoroughly addressed. Mechanisms to resolve such conflicts between multilateral agreements should be set up.

- **Technology:** Developing countries need not follow the conventional path to development with regard to technologies but must use to their advantage the cutting-edge technology options now available to 'leapfrog', and put the tools of modern technology to use. Mechanisms must be put in place to make available to developing countries the latest technologies at reasonable cost. Technology transfer must be informed by an understanding of its implications in the social, economic and environmental contexts of the receiving societies. Technologies must be usable by and beneficial to local people. Where possible, existing local technologies must be upgraded and adapted to make them more efficient and useful. Such local adaptations should also lead to the upgradation of local technical skills. Local innovations and capacity-building for developing and managing locally-relevant and appropriate technologies must be encouraged and supported. Integrating highly sophisticated modern technology with traditional practices sometimes produces the most culturally-suited and acceptable solutions, which also make them more viable.
- **Science and Education:** The paramount importance of education in effecting social change is well-recognized. Mainstream education must now be realigned to promote awareness, attitudes, concerns and skills that will lead to sustainable development. Basic education which promotes functional literacy, livelihood skills, understanding of the immediate environment and values of responsible citizenship is a precondition for sustainable development. Such education must be available to every child as a fundamental right, without discrimination on the basis of economic class, geographical location or cultural identity. Adequate resources and support for education for sustainable development are essential. An understanding must be promoted among key decision-makers of the potential of education to promote sustainability, reduce poverty, train people for sustainable livelihoods and catalyze necessary public support for sustainable development initiatives. The empowerment of women and girls must be supported by actions to improve their access to basic and higher education, training and capacity-building. The emphasis should be on gender-mainstreaming.

Greater capacity needs to be built in science and technology through improved collaboration among research institutions, the private sector, NGOs and government. Collaborations and partnerships between and among scientists, government and all stakeholders, on scientific research and development and its widespread application need to be improved.

- **Population:** With India's population crossing a billion in the year 2000, the National Population Policy announced in that year assumed special significance. Its change in focus from merely setting target population figures to achieving population control through greater attention to socio-economic issues such as

child health and survival, illiteracy, empowerment of women, and increased participation by men in planned parenthood, gives it greater breadth and depth, thereby holding forth better promise of achieving its long-term objective of a stable population by mid-century. The official realization that population is not merely about numbers but about the health and quality of life of people in general and women in particular, must be reinforced and sustained by an informed debate to bring key population issues into ever sharpening perspective at various levels of policy-making from the national and state legislatures to local government institutions.

There is need for a better and more widespread understanding that the number of children desired by any couple depends on a large and complexly interrelated number of socio-economic and cultural factors, and that any policy action seeking to control population must seriously take all these variables into account. An important part of empowering women in matters pertaining to population is to explicitly recognize and respect their rights over their bodies and their reproductive behaviour. This recognition must permeate society in general, and religious, judicial and law-enforcement institutions in particular, through continual campaigning and dialogue. The pursuit of population control must not be allowed to compromise human rights and basic democratic principles as well.

2.3.3.7 Strengthening Governance for Sustainable Development at the Local, National and International Levels

Effective management of resources requires participation by all stakeholders at all levels.

- i) **Local level:** At the local level, strengthening democratic institutions generally leads to better and more sustained management of natural resources. To enhance effectiveness of people's participation in local governance, committees comprising both elected and executive members of local bodies and representatives of community groups must be formed. Appropriate capacity- building would enable them to undertake local development activities according to community priorities, monitor project implementation and manage community assets. Where the conditions for such community empowerment have already been created, as in India through the 73rd and 74th amendments of its Constitution, effective implementation of the provisions should be ensured. All members of society are the stakeholders of sustainable development. Women make up half of this group. Affirmative action to ensure representation and power to women in local governance, and appropriate capacity-building, are necessary to make them effective and equal partners in the development process. Social groups which have been traditionally discriminated against must also be represented in local governance and empowered to ensure that they become effective and mainstream partners in development. Children are a valuable asset of every society. It is the responsibility not only of the parents but also of the community to ensure that the children realize their potentials fully, and are growing up in a healthy, enriching and fulfilling environment. Ensuring the provision of such an environment is a major challenge of governance at the local level. The occupational, cultural and economic heterogeneity of population is on the whole a major asset in making development sustainable; but there are times of crisis when the same heterogeneity can become the basis of conflict and social insecurity. It is imperative to evolve participatory mechanisms of governance involving citizen-groups and local authorities which will provide effective means of conflict-resolution.

- ii) **National level:** Sustainable development is achieved through optimizing gains from several variables, rather than maximizing those from a single one. This requires

government departments, by convention, sectorally organized to work together, or in some cases, as a single multi-disciplinary authority. For this, joint-planning, transparency and coordination in implementation are required. The richness of skills available in society must be harnessed through partnerships involving institutions in civil society such as NGOs, Community-based Organisations (CBOs), corporate (including private) bodies, academic and research institutions, trade unions, etc., which must be made an integral part of planning and implementation for sustainable development. There is, on the one hand, a surfeit of laws, many of them outmoded and irrelevant. On the other hand, effective enforcement is lacking in respect of laws relevant to contemporary concerns and conducive to governance. This calls for a thorough review of laws, elimination of those which are outmoded, and simplification of the procedures for implementing those which are relevant. Internal reviews as well as learning from international experience should be the basis of identifying and filling gaps in existing laws. It must, however, be recognized that laws in themselves do not provide solutions, unless there are mechanisms to effectively enforce them. There are many traditional systems and practices whose value and validity needs to be recognized and brought into the mainstream of governmental development thinking and policy. Appropriate mechanisms for integrating them need to be created. Many policies were framed either before sustainable development became a major concern or in a sectoral perspective. These need to be reviewed from the point of view of sustainable development. All future policies must be guided by considerations of sustainable development. Areas lacking policies should be identified and adequate policies compatible with the imperatives of sustainable development framed, taking into account successful examples of policies and initiatives in similar areas.

- iii) **International level:** There is both a need and a scope for regional and global cooperation in sustainable development. Some of the areas of common concern are marine and riparian issues, trans-boundary environmental impacts, management of bio-resources, technology-sharing and sharing of sustainable development experiences. Efforts must be made especially by developing countries, to work towards synergizing experiences and raising shared regional concerns as a strong united front in international forums. Mechanisms must be put in place to facilitate such international exchange of domestic and global experiences in sustainable development. There must be mechanisms for monitoring the compliance of countries to their obligations under various environmental agreements. Currently there is a multiplicity of institutions with fragmented responsibilities. A better governance regime is required to ensure cooperation and compliance.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

4) What are the basic aspects involved in the approaches to sustainable development?

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2.4 STRATEGY FOR SUSTAINABLE DEVELOPMENT: ASPECTS AND CHALLENGES

In this section, we will discuss the need, concept, components, principles, challenges and criticisms of a strategy for sustainable development.

2.4.1 Need for a Strategy for Sustainable Development

Achieving sustainable development will require deep structural changes and new ways of working in all areas of economic, environmental, social and political life. This will include promoting pro-poor economic growth and reforming fiscal policies which negatively affect the poor or cause environmental damage. In the long-term, countries will have to ensure that their net wealth (including natural, manmade and human capital) remains constant or increases. This will require ensuring that market prices reflect the full social and environmental costs of production and consumption. Issues of inequity and inequality of access to assets and resources need to be confronted. For example, it may be necessary to reform land tenure policies so as to increase access to the disadvantaged and marginalised groups. Equally, it may be important to strengthen social capital and formal safety nets to cope with both external and domestic shocks (OECD, 2001).

Sustainable development has important political, institutional and capacity implications. At the national and local level, it requires cross-sectoral and participatory institutions and integrating mechanisms to engage governments, civil society and the private sector in developing shared visions, planning and decision-making. Governments, corporations, development and co-operative agencies will also need to be more open and accountable for their actions. Innovation and investment in actions which promote sustainable development should be encouraged. More generally, economic planning and policy-making will have to become more participatory, prudent and transparent as well as more long-term-oriented, so as to respect the interests of future generations (Ibid).

2.4.1.1 Need for Structural Changes: Difficulties in Introducing Changes

There are many technical and political difficulties in integrating social, economic and environmental objectives and in adequately addressing the intergenerational dimension of sustainable development. In general, there is little documented experience in most countries of developing such mechanisms and there are no tried and tested methodologies. Integrating and making trade-offs between sustainable development objectives also requires strong legislative and judicial systems. These are often very weak in developing countries (Ibid).

Different challenges need to be addressed at different levels. Some of the challenges to sustainable development need to be addressed at the global level (e.g. climate change and ozone depletion); some need to be addressed at the national level (e.g. economic, fiscal and trade policy or legislative changes); and some can only be addressed at the local level. The impacts of decisions taken at different levels need to be looked into in an integrated and coherent way. Their consequences and implications across different sectors and for different interest-groups must be considered explicitly (Ibid).

There can be conflicts between global, national and local sustainable development priorities, especially in the short-term. But, there can also be complementarities. For example, the conservation of global biodiversity requires the preservation of habitats, while the need to feed growing populations may encourage their conversion to agriculture.

However, for long-term sustainability, preservation of habitats for essential ecosystem services such as crop pollination, flood-control and water purification ultimately benefits agricultural production. Similarly, improved energy-efficiency leading to reduced local air pollution, has important health benefits at the local level, in addition to reductions in green-house gas emissions. Often, there are costs involved in establishing or harnessing institutions and processes to move towards sustainable development (e.g. regular foray for participation, time and effort to engage in the process, mechanisms for collecting information and monitoring sustainable development indicators). These costs can be high in the short-term, particularly for developing countries and poor groups. But, the costs of taking no action are likely to be much greater. All these issues need to be taken into account in steering a track towards sustainable development. They cannot be effectively dealt with on an ad hoc or piecemeal basis. They require a strategic approach (Ibid).

2.4.2 Concept of Sustainable Development Strategy: What “Being Strategic” Means

Being strategic implies setting goals and identifying means of achieving them. This further implies adopting an approach which has an underlying vision, is based on solid evidence, sets of priorities, goals and direction, and sets out the main tactics for achieving them. In relation to sustainable development, ‘being strategic’ requires a comprehensive understanding of the concept of sustainable development and its implications, but not necessarily a comprehensive set of actions – at least at any one time. A *strategic approach to sustainable development* implies new ways of thinking and working so as to move (OECD, 2001):

- from developing and implementing fixed-plans, ideas and solutions towards operating an adaptive system that can continuously improve governance to promote coherence between responses to different challenges.
- from a view that it is the state alone which is responsible for development towards one that sees responsibility with society as a whole.
- from centralised and controlled decision-making towards sharing results and opportunities, transparent negotiation, co-operation and concerted action.
- from a focus on outputs (e.g. projects and laws) towards a focus on outcomes (e.g. impacts of projects and legal changes).
- from sectoral towards integrated planning.
- from a dependence on external assistance towards domestically-driven and financed development.
- towards a process which can accommodate monitoring, learning and improvement.

Such an approach will assist countries in participating more effectively in international affairs –providing opportunities to consider the adverse social and environmental effects of globalisation and identifying ways in which they can reap its benefits. It should also enable improved dialogue with foreign governments, corporations and NGOs to negotiate new ways of working towards and supporting sustainable development.

Sustainable development strategy: It is “a coordinated set of participatory and continuously improving processes of analysis, debate, capacity-strengthening, planning and investment, which integrates the economic, social and environmental objectives of society, seeking trade-offs where this is not possible” (OECD, 2000). It offers a set of

principles. These encompass a set of desirable processes and outcomes which, taken together, are likely to help ensure success of strategies for sustainable development. The principles emphasise local ownership of the strategy process, effective participation from all levels, and high-level commitment. They point to the importance of convergence and coherence between different planning frameworks, integrated analysis and capacity development.

An effective strategy for sustainable development brings together the aspirations and capacities of government, civil society and the private sector to create a vision for the future, and to work tactically and progressively towards it. It identifies and builds on 'what works, improves integration between approaches, and provides a framework for making choices where integration is not possible'. Focusing on what is realistically achievable, an effective strategy will benefit from comprehensive understanding, but will not be paralysed by planning overly comprehensive actions on many fronts at once. As a process of practical institutional change aimed primarily at mainstreaming sustainability concerns, the strategy is likely to be focused on only a few priority objectives.

A strategy for sustainable development will rarely imply initiating a completely new or stand-alone strategic planning project. Rather, a number of initiatives taken together could meet the definition and the principles. Bringing existing initiatives closer to an effective strategy for sustainable development might involve complementing them with a broad 'umbrella': a vision and set of coordinated mechanisms and processes to improve their complementarity, smooth out inconsistencies, and fill gaps when needed.

In practice, many countries have taken the approach of building on whichever strategy models have been found useful. These include development plans, poverty reduction strategies or action plans, national green plans, decentralised planning and consultation processes, or the national exercises that have proliferated over the last two decades connected to international agreements. In some countries, alternative approaches have been developed by civil society organisations. In recognition of this broad range of starting points, this guidance emphasises that *the label does not matter*—what is important is the consistent application of the underlying principles that will be discussed under sub-section 2.4.4.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

5) Explain the concept of sustainable development strategy.

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2.4.3 Components of Sustainable Development Strategy

Depending on circumstances, a sustainable development strategy may be viewed as a system comprising the following components (OECD, 2001).

- Regular multi-stakeholder forum and means for negotiation at national and decentralised levels, with links between them.
- A shared vision and set of broad strategic objectives.
- A set of mechanisms to pursue those objectives in ways that can adapt to change (notably an information system; communication capabilities; analytical processes; international engagement; and coordinated means for policy integration, budgeting, monitoring, and accountability).
- Principles and standards to be adopted by sectors and stakeholders, through legislation, voluntary action, market-based instruments, etc.
- Pilot activities to generate learning and ownership.
- A secretariat or other facility with authority for co-ordinating different mechanisms.
- A mandate for all the above from a high-level, central authority such as the prime minister's office and, to the extent possible, from citizens' and business organisations.

2.4.4 Key Principles for Strategies for Sustainable Development

There cannot be hard and fast strategies that can be uniformly applied for sustainable development in all circumstances. Different national circumstances and priorities call for varied approaches to strategic planning. But, consultations with developing countries during the dialogues and wider international experience including the UN regional consultative workshops on sustainable development have shown that there are many common features of good practice. These common features point to a set of principles underpinning effective strategies for sustainable development. These principles are as follows, which have universal relevance and may be applied to developed as well as developing countries (OECD, 2001).

- ***People-centred approach:*** An effective strategy should follow a people-centred approach, ensuring long-term beneficial impacts on the poor, the disadvantaged and the marginalized groups.
- ***Consensus on long-term vision:*** Strategic planning frameworks are more likely to be successful when they are based on a long-term vision with a clear timeframe upon which stakeholders agree. At the same time, they need to include ways of dealing with short- and medium-term necessities and change. A long-term vision needs to have the commitment of all political parties so that an incoming government will not view a particular strategy as representing only the views or policies of its predecessor.
- ***Comprehensive and integrated objectives:*** Strategies should seek to integrate, where possible, economic, social and environmental objectives. But, where integration cannot be achieved, trade-offs need to be negotiated. The entitlements and possible needs of future generations must be factored into this process.
- ***Targeted with clear budgetary priorities:*** A sustainable development strategy must be fully integrated in existing budget processes to ensure that plans have the financial resources to achieve their objectives, and do not represent mere "wish-lists". Conversely, the formulation of budgets must be informed by a clear identification of priorities. Capacity constraints and time limitations will have an

impact on the extent to which the intended outcomes are achieved. Targets need to be challenging – but realistic in relation to these constraints.

- **Based on comprehensive and reliable analysis:** Identification of priorities must be based on a comprehensive analysis of the present situation, forecasted trends and risks, and the links between local, national and global challenges. External pressures on a country such as those resulting from globalisation or the impacts of global climate change need to be factored in this analysis. Such analysis requires credible and reliable information on changing environmental, social and economic conditions, pressures and responses, and their correlations with strategy objectives and indicators. Local capacities for analysis and existing information should be fully used, and different perceptions amongst stakeholders should be reflected.
- **Incorporate monitoring, learning and continuous improvement:** Monitoring and evaluation needs to be based on clear indicators and built into strategies to steer processes, track progress, distil and capture lessons, and signal when a change of direction is necessary.
- **Country-led and nationally-owned:** Past strategies have often resulted from external pressure and development agency requirements. It is essential that countries take the lead and initiative in developing their own strategies if they are to be enduring.
- **High-level commitment of government and influential lead-institutions:** Such commitment on a long-term basis is essential if policy and institutional changes are to occur, financial resources are to be committed and for there to be clear responsibility for implementation.
- **Building on existing processes and strategies:** A strategy for sustainable development should not be thought of as a new planning process but instead build on what already exists in the country, thus enabling convergence, complementarity and coherence between different planning frameworks and policies. This requires good management to ensure co-ordination of mechanisms and processes, and to identify and resolve potential conflicts. The latter may require an independent and neutral third party to act as a facilitator. The roles, responsibilities and relationships between the different key participants in strategy processes must be clarified at the earliest.
- **Effective participation at different levels:** Broad participation helps to open up debate to new ideas and sources of information; exposes issues that need to be addressed; enables problems, needs and preferences to be expressed; identifies the capabilities required to address them; and develops a consensus on the need for action that leads to better implementation. Central government must be involved in providing leadership, shaping incentive structures and allocating financial resources, but multi-stakeholder processes are also required. These should involve decentralised authorities, the private sector and civil society, as well as marginalized groups. This requires good communication and information mechanisms with a premium placed on transparency and accountability.
- **Link national and local levels:** Strategies should be two-way iterative processes within and between national and decentralised levels. The main strategic principles and directions should be set at the central level. Here, economic, fiscal and trade policy, legislative changes, international affairs and external relations, etc., are key responsibilities. But, detailed planning, implementation and monitoring would be

undertaken at a decentralised level, with appropriate transfer of resources and authority.

- ***Develop and build on existing capacity:*** At the outset of a strategy process, it is important to assess the political, institutional, human, scientific and financial capacity of potential state, market and civil society participants. Where needed, provision should be made to develop the necessary capacity as part of the strategy process. A strategy should optimise local skills and capacity both within and outside government.
- ***Consider all requirements for effective participation in strategies:*** These requirements will depend on the scope and goals of the strategy and the likely participants, as well as on political and social circumstances. In general, these needs and requirements include the following:
 - Appropriate participatory methods for appraising needs and possibilities, dialogue, ranking solutions, forming partnerships, resolving conflicts and reaching agreement on the way ahead.
 - A proper understanding of all those with a legitimate interest in the strategy, and a considered and concrete approach to include the more vulnerable and disenfranchised among them.
 - Catalysts for participation, e.g. NGOs and local authorities to start participation and to link decisions that need to be taken centrally with those appropriate to more local level: specific activities and events around which to focus participation.
 - A step-by-step approach, i.e. start modestly, building on existing participation systems, and build up; then deepen and focus participation with each iteration of processes.
 - Adequate resources, skills and time – effective participation tends to start slowly and requires early investment; it becomes more cost-effective with time. If there are learning environments (e.g. policies, laws and institutions that encourage, support, manage and reward participation in the planning/development process, including specially-formulated groups where appropriate institutions do not exist, and which allow participants and professionals to test approaches), then these requirements will be more likely to be met.

Countries in peace with democratic systems, freedom of speech and the rule of law will, however, be in a better position to translate the above mentioned principles into practice. Many of these principles represent good development practice and may be in practice at the project level. But, putting them into practice in strategic planning and policy processes remains a challenge. Many past strategic planning processes such as National Environmental Action Plans (NEAPs) and National Conservation Strategies (NCSs) – did not have a lasting impact in terms of moving a country towards a more sustainable development path because they were not and sometimes did not aim to be integrated into a country's mainstream strategic planning systems. International commitments to eliminate poverty through sustainable development offer a major new opportunity to achieve progress in integrating all the components of sustainable development into countries' strategic planning processes.

These are the principles towards which strategies should aspire. They are all important and no order of priority is implied. They do not represent a checklist of criteria to be

met but encompass a set of desirable processes and outcomes which also allow for sectoral and local differences in their application. The globally accepted and popular approach is overall development of peoples with emphasis on sustainable development which encompasses all the above discussed approaches giving more recognition to aspects of human development.

2.4.4.1 Principles of Strategic Approach to Sustainable Development: Exemplary from a Case

Glenn M. Wiser and Daniel B. Magraw, Jr. (2005, See http://www.ciel.org/Publications/SAICM_PrinciplesStudyFinal_July05.pdf) have identified 15 principles that they believe have the most direct relevance to a Strategic Approach to International Chemicals Management (SAICM). Out of them, 14 can be considered as equally applicable to a strategic approach in any other sector as well, and are generalized as follows.

- 1) **Principle of inter-generational equity:** According to this principle, the present generation has a right to use and enjoy the resources of the Earth, but is under an obligation to take into account the long-term impacts of its activities on sustaining the resource-base and the global environment for the benefit of future generations of humankind.
- 2) **Principle of precaution:** It is a decision-making tool for taking action in response to threats of serious or irreversible damage to human health and/or the environment when full scientific information is not available.
- 3) **Principle of proportionality:** According to this, the measures taken to protect human health and the environment should be proportional to the chosen level of protection, taking into account technical and economic feasibility and other relevant factors as well as a country's chosen level of protection.
- 4) **Principle of life-cycle approach:** It is a tool for conducting a systematic, cradle-to-grave (or cradle-to-cradle) analysis to estimate the environmental consequences of alternative materials, designs, manufacturing processes, product-use-patterns, and end-of-life alternatives.
- 5) **Principle of prevention:** This principle deals with how any harm to human health and the environment can be averted, recognizing that the economic and social costs of avoiding damage and injury are nearly always less than the costs of repair, treatment, or compensation after they happen.
- 6) **Principle of substitution:** According to this, when a chemical product may cause risks to human health or the environment, it should be avoided if products or processes that are less dangerous can reasonably be used instead.
- 7) **Principle of internalization of costs (polluter-pays principle):** The use of market and/or regulatory instruments to ensure that persons who are responsible for pollution, or for production or processes that may ultimately lead to pollution, bear the full environmental and social costs of their activities, and that those costs are reflected in the market price for goods and services.
- 8) **Principle of public-participation:** It includes unrestricted public access to environmental information with only limited, explicitly defined exceptions; the right of the public to participate in environmental decision-making processes and have its input taken into account, and opportunities for redress when authorities fail to comply with their duties to provide access to information or decision-making.

- 9) **Principle of right to know:** It is a specific aspect of the public's access to environmental information; the concept that the public has the right to know information regarding the risks to human and environmental health from chemicals including chemical accidents, manufacturing, use and disposal.
- 10) **Principle of confidential business information:** According to this, information provided by a business entity cannot normally be disclosed by the government to a third party (including, sometimes, other governments or governmental departments).
- 11) **Principle of good governance:** This principle states that transparent, accountable and honest government is an important component of sustainable development and, more particularly, an essential element for the prevention and punishment of illegal traffic in hazardous wastes and restricted and banned chemicals.
- 12) **Principle of cooperation among States, including common but differentiated responsibilities:** According to this, in order to effect collective global action to achieve sustainable development, different standards, delayed compliance time-tables or less stringent treaty commitments may be appropriate for different countries at different stages of development, and that developed countries have a special obligation with respect to providing technical and financial assistance to developing countries and the countries with their economies in transition.
- 13) **Principle of partnerships:** This principle states that there should be collaborations among stakeholders such as the Governments, IGOs, industry groups, business organisations and NGOs that allow each partner to leverage its unique set of expertise, efficiencies and networks to achieve a more productive and sustainable outcome than if pursued alone.
- 14) **Principle of liability:** This principle holds a public or private entity responsible for providing compensation for an injury after it has occurred due to its strategic failure.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

6) List out the principles of strategic approach to sustainable development.

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2.4.5 Specific Roles of Individual, Organization and Government

We have discussed the approaches and strategies for achieving sustainable development. In this context we will now discuss the specific roles of agencies – individuals, organizations and government. Following are some specific ways in which each of these agencies can play their active roles in achieving sustainable development.

1) **Individual and family level:** Earth can fulfill needs of all but not the greed of any one. Our attitudes play an important role in achieving sustainable development at individual and family level, which include the following.

- Less wastage of energy.
- Less wastage of food.
- Limiting our needs.
- Alternative use of resources e.g. plastic table instead of wooden or steel table chair.
- Maximum use of solar and wind energy.
- Less wastage of water.
- Environment friendly food habits.
- Co-ordination and co-operation among families and individuals.

2) **Society level:** At this level, the following things determine crucial role of society.

- Social customs and celebrations of family functions should be environment-friendly.
- Social discipline.
- Community cleanliness – civic sense.
- Communal harmony.

3) **Industrial/corporate level:** At this level, the specific roles include the following.

- Control on excessive use of natural resources like energy, fuel, water, etc.
- Control on various types of pollution – air, water, land, noise.
- Use of alternative materials for more scarce and fund resources.
- Use of eco-friendly material, and soft technology.

4) **Government level:** Government roles include:

- Proper implementation of the policies.
- Proper planning of manpower, industries, resources and development.
- Reducing wastage.
- Strict pollution-control measures.
- Co-operation and co-ordination among various stakeholders.

2.4.6 Key Challenges to Sustainable Development Strategy in Developing Countries

Whatever be the strategy, challenges are bound to exist. However, in the context of sustainable development strategy in developing countries, the key challenges include the following (OECD, 2001).

- *Extreme poverty* still ravages the lives of one out of every five persons in the developing world. The social ills associated with poverty, including diseases, illiteracy,

family breakdown, crime, use of narcotic drugs, etc., are on the rise in many countries.

- *Political instability*, sometimes leading to violent conflicts hinders socio-economic progress in many countries and regions. Growing inequality of income both within and between countries as well as the marginalisation of ethnic and other minorities contribute to this instability.
- *Environmental deterioration* continues to increase. Natural resource-depletion (soil erosion, loss of forests, habitats, biodiversity and depletion of fish stocks), and pollution are clearly evident in most countries, placing growing strain on the quality of water, soil and air. Current patterns of production and consumption and global climate-change, among others, raise questions about the continued capacity of the Earth's natural resource-base to feed and sustain a growing and increasingly urbanised population. Recent studies have revealed that the Earth's ecosystem and non-renewable natural resources declined by over 30% over the last 30 years, while demands on them have increased by 50%. Developing countries, and notably the least developed, are expected to be the most vulnerable to the impacts of global climate-change, although their current contribution to the problem is small.
- *Rapid population growth* is expected to exacerbate these pressures, although it is people's consumption levels that matter more than their mere numbers. Over 95% of the estimated increase of 2 billion people over the next twenty years will live in the developing world.
- *HIV-AIDS and malaria* are particularly serious diseases which erode the productive capacity and social fabric of nations. In the worst affected countries, HIV has already had a profound impact on existing rates of infant, child and maternal mortality. Nearly 500 million people suffer from acute malaria a year, of whom 1 million will die.
- *Marginalisation*: Many countries are struggling under the combined weight of slow economic growth, a heavy external debt burden, corruption, violent conflicts, and food insecurity. They also suffer from actions taken in the North such as trade-protectionism and pollution causing global warming. As a result, they are increasingly marginalized from the global economy.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

7) What are the key challenges to sustainable development strategy?

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2.4.7 Criticisms of Sustainable Development

Following criticisms provide us an understanding of negative aspects or disagreements associated with sustainable development.

- **Vague and Ill-defined:** Some critics point out that sustainable development itself is vague and ill-defined. This criticism arises because much of sustainable development cannot be precisely measured. Traditional understanding of progress have focused on well-defined economic quantities such as personal income, financial returns, gross national product or the number of jobs. As long as these measures were increasing, well-being was assumed to be progressing in a favorable direction (Leibman and Anna, 1996). Sustainable development attempts to look beyond these conventional measures of progress and considers our needs for natural, social and human capital. These aspects of progress are less precise and harder to quantify, especially in economic terms. Aspects of our social, community and environmental well-being do not always lend themselves to precise or measurable definitions. Even if they cannot be precisely measured or quantified, these are still important aspects of progress for many sustainability programs (Eric Larson, 1998, See <http://www.iser.uaa.alaska.edu/Publications/Larson-sustain2.pdf>).
- **Anti-Growth:** For some people, the word “sustainable development” conjures up images of “no growth,” “maintaining the status quo”, “no change,” or “a return to primitive days”. This interpretation is especially popular for groups who take a narrow view of progress and favour only one type of capital or asset over all others. For example, in some debates over sustainable development, one side may want to sustain only our economy and manufactured capital as a way to “protect” jobs and income for future generations. On the other side of this, sometimes harsh and adversarial debate, opponents advocate sustaining only natural capital as a way to “protect” environmental health, natural resources, and the life support services for future generations. Each side in this battle tries to “protect” one form of capital or asset while ignoring other assets.

To conclude, these adversaries become preoccupied with “protecting” their personal favorite type of capital and lose sight that sustainable development includes a broad view of *all* types of assets and capital – not just one. These arguments pitting one form of capital “against” another maintain the confrontational status quo and prevent meaningful change or progress. Communities and regions that are able to constructively and respectfully discuss the need for all types of capital – manufactured capital, financial assets, natural capital, human capital and social capital are the most successful in implementing sustainable development programs and achieving their own definition or vision of progress (Ibid).

- **Way ahead:** Sustainable development proposes that each generation has the same opportunity to meet its needs. We can do this by ensuring that each generation has access to the same capital and assets as our generation. We need to provide them with natural capital, human capital, and manufactured capital so that they can provide for all types of well-being including economic, environmental and community health.

Many sustainable development programs started over the past ten years provide numerous examples that we can draw upon. We can initiate indicator programs at the community level to measure all aspects of well-being in our communities. We can measure the sustainable output of our economy in order to keep track of how we are depleting our non-renewable resources. We can assess the full costs of development projects to ensure that the social and environmental costs are consistent with our development goals. A sustainability program will be most successful if it begins at the community level and involves the people and interest-groups most interested in the progress of their communities. Successful programs are able to move beyond adversarial and confrontational relationships that have pitted the economy and environment against each

other. Communities that are able to respectfully discuss all types of capital assets and include a wide range of participants are the most successful at implementing sustainable development programmes.

2.5 LET US SUM UP

Sustainable development is a matter of concern for all – individuals, communities, societies, nations and the international community. While it became significant in the light of industrial revolution, gradually it acquired everlasting currency. The approaches and strategy to promote sustainable development will vary from context to context, and its broad contours remain the same with minor differences depending upon degree of concern at given time and place. Broadly, the principles of sustainable development strategy will have universal applicability with due regard to minor variations and exceptions vis-à-vis specific situation. Therefore, we have focused on all these aspects in this Unit.

2.6 ANSWERS TO ‘CHECK YOUR PROGRESS’ QUESTIONS

- 1) Basically, the concept of sustainable development has originated out of concern for protection of environment. It has been developed in different phases of environmentalism, which are briefly described below.
 - *First phase:* Significant action for the environmental protection has been initiated by the people of Europe at the time the Industrial Revolution in 17th century. It is in fact this Revolution which gave rise to modern environmental pollution. The emergence of great factories and consumption of immense quantities of coal and other fossil fuels gave rise to unprecedented air pollution and the large volume of industrial chemical discharges added to the growing load of untreated human waste. Environmentalism, thus, grew out of the amenity movement, which was a reaction to industrialization, the growth of cities and worsening air and water pollution.
 - *Second phase:* In this phase, the environmental movement started in the United States which can be traced to 1739, when Benjamin Franklin and other Philadelphia residents, citing “public rights,” petitioned the Pennsylvania Assembly to stop waste-dumping and remove tanneries from Philadelphia’s commercial district. In the US, it was seen that great poets and other literary scholars protested against destruction of the environment through their work. The US movement further expanded in the 1800s, out of concerns for protecting the natural resources of the West, with individuals such as John Muir and Henry David Thoreau making key philosophical contributions. Muir came to believe in nature’s inherent right, especially after spending time hiking in Yosemite Valley and studying both ecology and geology. With the initiative of common people first two National Parks – Yosemite and Yellowstone National Parks – were established in the US to save some wildlife.
 - *Third phase:* In 1960’s, an incident which turned the whole situation was spraying of DDT in the farms of America. In 1962 *Silent Spring* was published by American biologist, Rachel Carson. The book explained in detail the environmental impacts of the indiscriminate spraying of DDT in the US countryside farms, which contained large amount of chemicals causing harm to the migratory birds that usually came to have the crops. The book suggested

that DDT and other pesticides may cause cancer and that their agricultural use was a threat to wildlife as well as to the human beings. Then, in India, the Chipko movement was formed in the 1970s; influenced by Mahatma Gandhi, they set up peaceful resistance to deforestation by literally hugging trees (leading to the term “tree huggers”). Their peaceful methods of protest and slogan “ecology is permanent economy” became very influential.

- 2) In sustainable development, capital and assets are any store of value that can provide income, benefits, goods, services, or other things of value. They are typically categorized into the following *three types*.
 - i) *Manufactured and Financial Capital*: It includes all financial assets and physical capital – buildings, highways, pipelines, stock and bond investments, the permanent funds and any other form of financial or physical asset humans have created or manufactured.
 - ii) *Human and Social Capital*: People embody human capital in the form of knowledge, education, skills, training and other valuable abilities. People and communities also have stores of value that can be passed on from one generation to the next as social capital. Communities and societies are stores of social capital in the form of traditions, customs, identity, organizations, laws and institutions that are passed on to future generations.
 - iii) *Natural capital*: It includes all aspects of the natural environment that provide basis for income, services, resources or benefits – raw resources such as mines, oil, timber, fish, etc; life support services such as climate-regulation, nutrient-cycling, waste-treatment, soil formation and other ecological processes that keep us alive.

Many people may agree with the principle that current and future generations should have equitable access to capital and assets to meet their needs. However, not everyone agrees on what those needs are and what *type* of assets and capital are needed.

- 3) Following are the important approaches to sustainable development.
 - i) *Traditional Approach*: This approach to development and progress focuses on *economic* well-being as the primary measure of progress. It relies on economic measures of well-being such as personal income, numbers of jobs, financial returns on assets, or gross national product. It emphasizes that each generation should have equitable access to manufactured capital, financial assets and economic opportunities to meet their needs.
 - ii) *Social and Human Capital Approach*: Sustainable development approaches and programs expand this traditional understanding of well-being to include the social and environmental well-being of people. *Sustainable development programs under this approach typically define progress and well-being in broad terms that include measures of the health of the environment, communities, and the people living there.* Those who advocate this approach emphasize the need to sustain natural assets to preserve life support services and the need to conserve natural resources that future generations will depend on for life. They point to the finite quantity of our natural assets and argue that their depletion or degradation may lead to hardships for future generations or even the possible extinction of our species. Further, they emphasize the social well-being of communities, cultures, and individuals. To

help ensure social well-being, current and future generations should have access to the wealth offered by communities, institutions, and traditions. They argue that we should ensure that we pass on accumulated human capital to future generations.

iii) *International Approach to Sustainable Development*: People's reactions and movements to environmental concerns at different levels and in different forms have led to international recognition of the issues and concerns of sustainable development. The action of the United Nations Conference on Human Environment held in Stockholm in 1972, famously known as Stockholm Declaration, is the first such attempt where the concept of *sustainable development* had been given a wider interpretation. In Principle 21 of Stockholm Action Plan, it is mentioned that it should be obligatory for the human being to use its natural resources in that manner by which his future generation can also avail all those resources. And, individual has to play an important role for the protection of the environment. Later, in late 1970's the Brundtland Committee report stated that due to negligence of the human beings the environment has encountered so much destruction. Now, it is the time for the human beings to participate in the environment-protection actions.

4) The *basic aspects* involved in the approaches to sustainable development include the following.

- Poverty eradication and sustainable livelihoods.
- Changing unsustainable patterns of consumption and production.
- Protecting and managing the natural resource-base of economic and social development.
- Sustainable national development in a globalizing world.
- Sustainable health of people.
- Means of implementation of sustainable development.
- Strengthening governance for sustainable development at the local, national and international levels.

5) In general parlance, being strategic implies setting goals and identifying means of achieving them. This implies adopting an approach which has an underlying vision, is based on solid evidence, sets of priorities, goals and direction and sets out the main tactics for achieving them. In relation to sustainable development, 'being strategic' requires a comprehensive understanding of the concept of sustainable development and its implication. A strategic approach to sustainable development implies new ways of thinking and working so as to move:

- from developing and implementing fixed plans, ideas and solutions towards operating an adaptive system that can continuously improve governance to promote coherence between responses to different challenges.
- from a view that it is the state alone which is responsible for development towards one that sees responsibility with society as a whole.
- from centralised and controlled decision-making towards sharing results and opportunities, transparent negotiation, co-operation and concerted action.

- from a focus on outputs (e.g. projects and laws) towards a focus on outcomes (e.g. impacts of projects and legal changes).
 - from sectoral towards integrated planning.
 - from a dependence on external assistance towards domestically-driven and financed development.
 - towards a process which can accommodate monitoring, learning and improvement.
- 6) Listed below are the *important principles of sustainable development strategy*.
- People-centered approach to a strategy.
 - Consensus on long-term vision.
 - Comprehensive and integrated objective.
 - Targeted with clear budgetary priorities.
 - Based on comprehensive and reliable analysis.
 - Incorporate monitoring, learning and continuous improvement.
 - Country-led and nationally-owned.
 - High-level commitment of government and influential lead-institutions.
 - Building on existing processes and strategies.
 - Effective participation at different levels.
 - Link national and local levels.
 - Develop and build on existing capacity.
 - Consider all requirements for effective participation in strategies.
- 7) Following are the *key challenges to sustainable development strategy*.
- Extreme poverty
 - Political instability
 - Environmental deterioration
 - Rapid population growth
 - HIV-AIDS and malaria
 - Marginalisation

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UNIT 3 CHALLENGES TO SUSTAINABLE DEVELOPMENT

Structure

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Need for Commitment Towards the Solution – A Great Challenge

3.3 Let Us Sum Up

3.4 Answers to 'Check Your Progress' Questions

3.5 References

3.0 INTRODUCTION

In the preceding unit, we have discussed the approaches and strategies for sustainable development. While highlighting the different aspects of a strategy for sustainable development we have made a brief mention of the challenges such as extreme poverty, political instability, environmental deterioration, rapid population growth, HIV-AIDS and malaria, and marginalization. These are not complete and there are more challenges and problems to sustainable development which is by itself a very complex process. All these challenges and problems are related to growing population and exploitation of natural resources, growing disparities among the people and their migration leading to urbanization, deforestation, pollution, climate-change and global warming. Since the sustainable development has, thus, become a global challenge, it warrants a global solution with serious commitment for its implementation by the national government, ensuring which is a big challenge by itself. We will, therefore, discuss these challenges in detail in the context of sustainable development.

3.1 OBJECTIVES

In this Unit, we will attempt to focus our discussion on different challenges to sustainable development. After going through this Unit, we expect you to be able to:

- Identify different challenges to sustainable development;
- Discuss the inter-linkages between different challenges of sustainable development;
- Explain the differences in nature and magnitude of the challenges in their comparative perspective in developing and developed countries; and
- Suggest the measures to address the global challenges to sustainable development.

In order to enable you to realize the above objectives suitable content is presented in the sections that follow.

3.2 CHALLENGES TO SUSTAINABLE DEVELOPMENT: AN OVERVIEW

You are aware that the concept of sustainable development is very complex and its approaches and strategies are still more complicated. Thus, in reality, ensuring sustainable development is not an easy task as it has to address challenging issues and problems. The nature and intensity of these challenges and problems may vary widely from region to region, though the major areas of concern in many regions may be common, with certain region-specific variations. In this section, we will discuss these major concerns and common challenges such as the following.

- Exploitation of natural resources.
- Growing disparities.
- Migration and displacement.
- Climate-change – global warming.

Man is considered to be the most intelligent animal (organism) on the surface of the Earth. He has thinking ability and hence he is able to make use of various types of natural endowments – considered as resources – for his benefit. These resources (e.g. air, water, minerals, soils, etc.) form basic foundation for development. The rate of exploitation of resources is directly related to the rate of growth of human population and development process. Hence, more developed societies use more resources than the underdeveloped societies. But, at the same time, the size of the population and the rate of its growth also influence the nature, quality and quantity of exploitation of resources. In addition, development in science and technology accelerates the rate of exploitation of resources. As a result of all these, exploitation of resources has increased tremendously all over the world, but with wide variations in the quality and quantity of development within and across the countries. Simultaneously, it has begun to disturb the natural environment and ecological balance, among others.

Sustainable development can be achieved only through the effective utilization, conservation and development of resources. Hence, how to control exploitation of resources for their equitable distribution among different sections of population is one of the major challenges to sustainable development. Inequitable development creates disparities of different kinds – across the different geographical regions and sections of population. For example, a settlement having large population is normally considered as urban, though the concept of urban (i.e. definition of urban) differs from one country to another. Urban areas are more developed and they have more infrastructural facilities than the surrounding rural areas. This difference between rural and urban is less in more developed countries and more in the less developed countries. Growing disparity between rural and urban areas leads to the large-scale migration of population from rural areas

to urban areas. Such situation creates problems both in rural and urban areas. Rural areas suffer from lack of labour and urban areas become over-crowded with surplus labour leading to unemployment and other problems. The problem of voluntary migration from rural to urban areas are due to the people's choice to migrate willingly to get good job or for higher education or to have better standard of living. On the other hand, sometimes people get affected by displacement – forced migration of people – due to natural calamities like flood, earthquakes, etc., or due to the developmental projects like construction of dams, highways, Special Economic Zones (SEZs) or planned cities which pose different challenges. Thanks to the development in science and technology, transportation has become comfortable and cheaper which has accelerated the rate of migration, either voluntary or forced. Migration and displacement create many physical and socio-economic problems and also cause environmental degradation.

Developmental activities not only led to different types of disparities but have also affected the natural environment. Climate-change and global warming are currently the major challenges of sustaining the development. The atmospheric balance of heat was in perfect order for the ages i.e. there was perfect balance between the amount of heat received by the Earth due to solar radiation and the amount of heat given out by it. This balance is increasingly getting disturbed due to human activities – increasing population, environmental degradation, industrialization, urbanization, pollution and so on. The amount of green-house gases has increased in last 200 years, as these gases absorb heat, i.e. outgoing radiation from the Earth. The increasing temperature of the Earth has given rise to climate-change and global warming.

All these present us the crux of the challenges to sustainable development. We discuss these challenges in greater detail in the following sections.

3.2.1 Challenges of Exploitation of Natural Resources

Nature provides various things like different types of rocks, minerals, plants, animals, soil, air (different gases), wind, water, sunshine, etc. to human beings. All these natural elements, components or things are termed as *Endowments*, i.e. natural gifts given to man and other animals by the nature.

Man has ability of logical thinking, reasoning and hence he is able to develop science and technology. He thinks about using the natural things (endowments) and their products for his benefit. While using these endowments, man converts them into the *potential resources*. It is important to note that potential resource is only an abstract idea about use of endowment. When man implements his idea into reality, i.e. he converts endowment (*potential resource*) into something useful to him. In other words, in reality we convert an endowment, through an idea into a potential resource, which when implemented becomes a *resource*. For example, marble rock is a natural endowment. Sculptor looks at the rock and thinks of using this rock to satisfy his desire of: a) creating a statue, or b) earning money. When he creates statue, he converts a rock into a resource (of *aesthetic value*). When he sells the rock or the statue, he earns money (*financial value*).

Hence, resource can be identified as a source of raw materials used by the society. But, the term resource is also used to refer to both the *material* or *non-material things*. Non-material things include human qualities like patriotism, devotion to work, honesty, etc. Countries like UK and Japan could become superpowers mainly due to the quality of their population. So, resource is anything which is useful to man. Resources can be classified as *physical* or *natural* and *cultural* or *human*.

3.2.1.1 Types and Values of Natural Resources

From the point of view of natural resources, Earth can be sub-divided into the following four sections.

- a) *Lithosphere* – Land area resources (rocks, minerals, fuel, plains, plateau, hills, mountains, soil, etc).
- b) *Hydrosphere* – Water resources (oceans, seas, rivers, lakes, springs, etc).
- c) *Atmosphere* – Air resources (wind, gases).
- d) *Biosphere* – Plant resources (variety of vegetation – flora), and animals resources (variety of animals – fauna), and microbes.

The rate of exploitation of natural resources is more in the developed society; development of human society depends upon the utilization of different types of natural resources.

Types of Natural Resources: Natural resources are broadly of two types.

- i) **Flow resources:** The flow of certain resources in the environment remains continuous and, hence, these resources are termed as flow resources, e.g. air, water, sunshine, plants, animals, etc. Flow resources are further classified into two groups.
 - *Automatically renewed resources* – e.g. Air, water, sunshine, etc. These resources are automatically renewed in the environment. Plants purify air, water is purified due to hydrological cycle. We get sunshine everyday without any obstruction.
 - *Resources renewed with efforts* – Some flow resources require human help for their growth e.g. plants grow naturally, but they require water, proper plantation, manures/fertilizers, etc., for their growth. With the support of efforts from man these flow resources are renewed rapidly. e.g. plants, animals, fish, birds, etc.
- ii) **Fund resources:** These resources are limited in supply and once extracted from the environment they cannot be replaced back at their original place nor can grow at that place, e.g. ores of different metals, coal, crude oil, natural gas, etc. Fund resources are of two types.
 - *Fund resources which are recycled:* These fund resources can be reused after recycling e.g. Bauxite is an ore of Aluminium. It is a fund resource, as once extracted from the mine it cannot be replaced back. It is purified and Aluminium is extracted from it. Aluminium products are scrapped after their use. They are melted and Aluminium is obtained from them; which is used again in the manufacturing of other products.
 - *Fund resources not recycled:* Fund resources like coal, natural gas and crude oil cannot be recycled or reused. Coal is converted into ash after burning. It is not possible to get back coal from ash. The rate of renewal of coal or crude oil in environment is many thousand times slower than the rates of their use, e.g. It may require thousands to hundreds of millions of years for the formation of coal. Hence, it is necessary to give top priority to the conservation of fund resources than the flow resources.

Short-term and Long-term Exploitation of Natural Resources and Changes in the Values of Resources: Resources are exploited carelessly for the short-term

economic benefits by the developed countries all over the world. But, *with the conservation of resources its proper use can derive greater economic benefits*, e.g. the total economic value of a rainforest in Amazon and other areas is greater if the forest is utilized over a long span of time for tourism, pharmaceuticals, native foods and other uses than if it is cut down for a one-time short-term gain in lumber that leaves the forest unusable for decades or centuries. The total value of the rainforest is enhanced even more if extremely long-term environmental benefits are included such as the value of the forest for future generations.

Values of resources: In order to appreciate the significance of values of resources in the context of sustainable development, we need to understand the different types of values of resources. Nevertheless, value of the resources cannot be measured only in terms of economic benefits. Resources are more valuable. The values of resources are as follows.

- **Ethical value or intrinsic value:** This value is the value of a resource unto itself regardless of its value to humans. Does a river has as much right to exist as you do or does an animal? If you say “Yes”, then you place a high intrinsic value on these natural resources. Intrinsic values are ‘eco-centric’ or ‘environment-oriented’.
- **Extrinsic value:** It refers to the resource’s ability to provide something to human being or human society. Such values are known as anthropocentric or related to man. Extrinsic values are more practical and they have economic and political importance.
- **Esthetic (aesthetic) value:** It is the value of a resource in making the world more beautiful, more appealing to the senses and generally more pleasant, e.g. enjoying holiday in a dense forest.
- **Emotional value:** It is the value of a resource beyond sensory enjoyment. Some people develop very strong emotional bonds to certain natural areas or certain plant or animal species. Nature is given greater psychological importance, especially in children.
- **Economic values:** These are directly involved with the products that can be bought or sold e.g. energy, food, timber, etc. Society needs to focus more on long-term economic values, which provide more income over the long-run, i.e. the value of resources for tourism, native fruits or other sustainable products is ultimately much greater than the value of their destructive uses.
- **Environmental service value:** These are the values of resources in providing intangible ‘services’ that allow humans and other forms of life to exist on Earth, e.g. plants produce oxygen and absorb carbon dioxide and hence purify air. Plant roots and soil microbes purify water. All our food relies on a variety of environmental services.

The above values can broadly be classified into two broad categories, viz. a) direct values and b) indirect values:

- **Direct values:** Direct use of natural resources, i.e. mining, deforestation and other types of harvesting. Most environmental problems arise when resources are considered only for their direct values. These are generally *short-term values*.
- **Indirect values:** These are valued in ways that do not involve direct mining or deforestation. These are: i) Esthetic value, ii) Emotional value, iii) Environmental services, iv) Ethical value. These are generally *long-term values*.

The short-term economic value of resources provides immediate financial rewards. Harvesting the short-term value often destroys: a) the long-term economic value, and ii) many or all of the indirect values. Major problem with the long-term values is that such values are subjective and very difficult to calculate. It is necessary to create awareness about the long-term values in the society to promote conservation of resources.

3.2.1.2 Conservation of Natural Resources

Resources are exploited for the benefit of man but, unfortunately, the exploitation is often done for the short-term economic profit. As we have discussed above long-term economic and other gains (such as esthetic, emotional and environmental services) are greater if the emphasis is shifted to reducing resource-use. This can also be done in the following three ways:

- a) Conservation;
- b) Restoration of what has been degraded or depleted; and
- c) Preservation.

Conservation: Conservation or input-reduction by lowering resource-use is more practical and useful for the sustainable society. Conservation slows down depletion of resources and reduces pollution by slowing the flow of matter and energy through society and saves money, e.g. burning less coal by increasing a power plant's efficiency not only saves coal but also produces less acid rain and other types of pollution.

There are *three basic ways to conserve natural resources*: i) Efficiency improvement, ii) Reuse and recycling, and iii) Substitution.

- *Efficiency improvement:* It is generally most effective and economically cheapest because many technologies and activities are wasteful and inefficient. Different resources will require different methods of input-reduction. Efficiency improvement occurs when the same task is accomplished with the fewer resources, e.g. engines used in earlier cars were not fuel-efficient. The output of car was only 6 km/litre. Due to constant improvements in the design of car engines today these engines have become fuel-efficient and have average of 12 to 15 km/litre. Japan took the lead in producing fuel-efficient cars. Now, most of the developed and developing countries have adopted this technology.

Efficiency improvement is responsible for conservation of mineral and other resources plus economic profits and environmental savings. Less resources extracted means less degradation of land. Pollution control from reduced processing and usage can also be significant. It is also responsible for reduction in green-house gases.

- *Reuse and recycling:* Reuse occurs when the same resource is used again in the same form, e.g. refilling soft drink in the glass bottle. Recycling is similar but the resource is not reused in the same form. The soft drink glass bottles, for instance, may be melted to make new bottles or other glass containers. Reuse and recycling reduce depletion of resources and pollution from resource extraction and use. It is useful in reducing solid-waste, which is very important today.
- *Substitution:* Substitution occurs when one resource is used instead of another. Substitution can also help to reduce both depletion and pollution problems. It helps in reduction of depletion because when one resource is being depleted, a more common substitute can be used at cheaper price, e.g. Aluminium is substituted

for much rarer and more expensive copper in making alloys, equipments and other things. Substitution also helps in arresting pollution problem when the extraction, processing or disposal of the substituted resources produce less or no pollution.

Nevertheless, substitution is often less desirable than efficiency improvements or reuse and recycling. Instead of reducing overall resources-depletion, substitution often simply switches depletion from one resource to another.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

1) Explain the difference between ‘potential resource’ and ‘resource’.

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2) What are the types of natural resource?

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3) Explain the relative importance of short-term and long-term exploitation of the natural resources in terms of their value vis-a-vis sustainability of development.

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4) What are the methods of protection of the environment? What are the ways in which natural resources can be conserved?

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3.2.2 Challenges of Growing Disparities

If you recall, we have discussed at length the types of developmental disparities including marginalization in Unit 8 of Course MAE-004 “Extension Education and Development”.

However, we touch upon them here in the summary perspective in the context of sustainable development.

3.2.2.1 Types, Causes and Consequences of Disparities: Indian Scenario

We are aware that population is not evenly spread on the Earth's surface. Similarly, the Earth's surface is not even or same everywhere. Some parts of the Earth is accessible while other parts are inaccessible. Various regions of the Earth represent different characteristics in terms of climatic conditions – temperature, rainfall, vegetation, soil, development, etc. Further scientific and technological developments and their applications are not uniform in different regions. As a result, we find many disparities in development of people in different areas or regions of the Earth. More prominent disparities include: i) Rural-rural disparity; ii) Rural-urban disparity, iii) Rich-poor disparity, iv) Inter-religious disparity, and v) global or international or inter-country disparities. But, the nature of causes and consequences of these disparities and extent of these disparities present us the true nature of challenges and their diversity in the context of sustainable development.

The above disparities are mainly the result of four sets of factors, viz.

- i) Natural factors / differences,
- ii) Socio-cultural conditions,
- iii) Development of science and technology and their application, and
- iv) Policy decisions.

Natural factors such as differences in agro-climatic conditions, endowment with natural resources and/or geographical location of a place with reference to its distance from a seaport or a centre of commerce, etc determine the potential for economic development of an area or a region. Some natural conditions such as climate and natural endowments are largely invariable, while others can be improved through such infrastructure as roads to overcome isolation and irrigation to overcome arid conditions, and so on. *Socio-cultural conditions/factors* such as values and traditions that either encourage or discourage social and economic mobility, innovation and entrepreneurship form a second set of factors. Different levels of *advancement in science and technology and their application* in different countries form third set of factors that caused disparities. The fourth set of factors is made up of *policy decisions*. Although rural and urban areas are by nature different, they together form one system; they are integrated in political and economic terms. Policy decisions that are positive for one part of a country or one sector of the economy can have positive and negative consequences for other parts or other sectors. Differences in political power between rural and urban areas or between regions can result in intended or unintended biases in government policies. Policy decisions to leave the allocation of resources to the market or to invest scarce resources in places with the best growth potential benefit some areas and regions over others.

Inequalities between urban and rural areas are not new. They have always existed, and may even have been more extreme in the past than they are today. However, in the past the disparities were taken for granted, because that was the way society was organized, or they remained unnoticed owing to a lack of interaction between urban and rural areas. Historians have suggested that when agricultural development made surpluses possible, towns developed because of economies of scale in the storage of the surplus and the need for its protection. Once there was a production surplus, comparative advantage led to trade in agricultural products between different locations. Transfer nodes for agricultural products turned into trading posts which became trading towns

(Economic and Social Commission for Asia and the Pacific, 2001, at <http://www.unescap.org/pdd/publications/Disparities/disparities.pdf>).

Others have pointed out that the development of towns coincided with the emergence of large-scale religion, possibly as a result of economies of scope in the provision of religion and storage in a single place. Religion and the storage of wealth could have caused armed conflicts, resulting in a larger role for the military to protect the storage and the religious places in the town (Sullivan, 1992). Whatever be the exact sequence, urban areas developed as the seats of accumulated power and wealth, supported by religion and living off the agricultural surplus. Towns could develop only if three conditions were met (ESCAP, 2001, at <http://www.unescap.org/pdd/publications/Disparities/disparities.pdf>):

- i) The agricultural surplus was large enough to support the urban population;
- ii) Differences in productivity-generated comparative advantages that off-set transport costs; and
- iii) Economies of scale in transport made large-scale trade and central market places efficient.

The towns and later the cities became home to the elite, and the urban population formed a small, but powerful and influential segment of the total population due through their links to the ruler, the religion and the military. A large majority of the population who lived in the countryside was involved in agriculture and supplied food and labour to the cities through the market towns. Urban areas (whether represented by the ruler or by traders) could acquire the agricultural surplus at a fair price from the farmers. However, more often, they would simply take it from the rural areas at any price or no price to the farmers. Because towns formed a real political-commercial-religious complex, it is likely that people in the rural areas saw it simply as their duty to supply the urban areas with food and other products from the land. Rulers could also tax the farmers for their land, their products and their income. Exploitation of the rural areas by the cities and towns is a historical fact (Ibid).

Being the centres of power, religion and wealth the traditional cities and towns were very distinct from the countryside. The urban areas were the centres of civilization; the rural areas were the places where the simple, hard-working people lived and toiled, close to nature. Urban dwellers developed a sense of superiority over the peasants in the countryside. With the elite in the urban areas and the masses in the rural areas, the distinction between urban and rural society became a cultural one. Culture dictated that people should live on the land and off the land, and that farming was the natural way of life (Ibid).

On the other hand, there was a need for urban areas with rulers, traders and priests. The ruler ensured that law and order was maintained and that the rural population could do farming. The traders were prepared to leave their urban homes to buy the agricultural surplus from the farmers to sell in far-away places. Religious leaders gave meaning to life; they prayed for the well-being of the ruler and his people so that all would prosper. Urbanites would confess that they preferred to live in the rural areas, but that this would only be possible once they were old and retired. In the meantime, it was up to the rural population to supply them with food in a mutually beneficial symbiosis (Ibid).

Most rural families were engaged in agriculture, and their income was highly influenced by climatic conditions. They maintained large networks of extended families and patron-client relationships to reduce vulnerability and the economic risk. These social safety-

nets helped the weaker members of society, but at the same time acted as a disincentive for the more entrepreneurial ones because any accumulated wealth would have to be shared with many others (Ibid).

With its larger population size, urban society is characterized by more diversified but less personal relationships. Wirth (2009) tried to formulate a meaningful and logically coherent sociological definition of urban life. He defined cities as relatively large, dense and permanent settlements of socially heterogeneous individuals. He saw differentiation and specialization as logical outcomes of the large number of people within a small area because this is the only way an area can support increased numbers. Urban life tends to be much more anonymous than rural life because urbanites have limited knowledge of the large number of people they meet. Rigid social hierarchies are difficult to maintain. Such living and working together without sentimental and emotional ties fosters a spirit of competition and mutual exploitation. So, there is a need for formal control mechanisms (regulations) to counteract irresponsibility and potential disorder. As the opportunities for social mobility increase instability and insecurity become the norm. Places of residence, places of work and character of employment, income and interests change constantly. There is specialization and innovation resulting in increase in productivity and the generation of wealth. That is why urban areas engender economic growth (Ibid).

The inherent advantages of urban settlements over rural ones are best reflected in the economies of scale and agglomeration of urban areas. The large size of the urban population creates a high demand for goods and services, and this promotes an increased supply of goods and services at lower costs of production per unit. Moreover, the availability of a wide range of different resources in a small area promotes specialization and innovation. Owing to the scattered pattern of rural settlements and the inadequate communication and transport networks, rural people are disadvantaged when it comes to organization and the articulation of needs, priorities and preferences through political processes. The fact that officials in urban areas often take decisions on behalf of the rural population about their future, and the use of their natural resources is an expression of the imbalance in political power between urban and rural areas (Ibid).

Analysing regional disparities in South-East Asia, Hill (2006) noted that an endowment with natural resources should give an area an advantage over other areas. However, the level of social and economic welfare in many resource-rich areas is actually lower because the central government appropriates a large proportion of the natural resource rents. Consumption patterns in mining enclaves tend to be highly import-intensive and major infrastructure projects tend to be awarded to more experienced companies from outside the area. As a result, even the limited local spin-offs may have little impact. Most of the resource-rich areas are distant from capital cities, which adds to the sense of deprivation (Ibid).

Hill observes that capital cities tend to be the richest part of each country. They are the seats of government, and an inevitable consequence of the concentration of political power is the accumulation of wealth. They are the places where major infrastructure projects are awarded, where business licenses must be obtained, where major foreign and domestic firms are headquartered and where foreign aid-flows enter the domestic economy. A capital region usually has a strong economy because of the absence of low-productivity agriculture and the presence of high-value manufacturing and service industries. If decision-making is centralized in the capital city, firms like to locate close to the decision-makers to maximize their capacity to lobby for tariffs, quotas and other restraints on commerce (Ibid).

Finally, Hill stresses that many policies have unintended regional effects and that these unintended effects are often more important than the official regional policy. Import-protection assists the areas where the protected factors are disproportionately located, and as a consequence it will tax other areas. Rigid national pricing policies may prevent regions from exploiting their comparative advantage. For instance, electric power should be cheaper in energy-abundant regions, but a nationally uniform pricing policy will inhibit specialization in energy-intensive activities in those regions. As a result of uniform minimum wage policy, poor regions may not be able to exploit their comparative advantage in labour-intensive activities. Production and trading regulations may influence the location of certain agricultural processing activities to the detriment of producing regions (Ibid).

Disparities between people, between urban and rural areas, between areas within countries and between countries are, thus, the result of natural differences, socio-cultural conditions and policy decisions. Because of natural, inherent differences, it is difficult, if not impossible, to remove all disparities completely. However, it is possible and necessary to remove at least all “man-made” obstacles, such as social constraints and policy decisions that stop people, areas and countries from developing their full capabilities. Balanced development can be defined as the creation of equal opportunities, a level-playing field, for all people. The level-playing field will enable people to participate in development by contributing to, benefiting from and influencing decision-making about development. Such participation will provide people with income and assets, good health, knowledge, mutual respect and recognition.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

5) Explain the causes and consequences of disparities. How can these disparities be addressed in the context of sustainable development to lead to balanced development?

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Indian Scenario of Disparities: Important Challenges: A recent World Bank Report on India (Sustaining Reform, Reducing Poverty, 2003) as also the UNDP’s Human Development Report 2003 have expressed grave concern over the widening inter-state disparities and the growing urban-rural divide in India. The World Bank Report says that development has been uneven and, as a result, poverty is getting concentrated in the slower-growing states of Uttar Pradesh, Bihar, Madhya Pradesh and Orissa. The report adds: “Accelerating growth and poverty reduction in India cannot be achieved without also accelerating growth in India’s lagging states.” (Naik, 2003, at <http://www.thehindubusinessline.in/2003/08/16/stories/2003081600070800.htm>).

Socio-economic and regional disparities: The UNDP’s Human Development Report (HDR), bemoans that India contains regions of intense poverty relieved little by overall national growth. It points out the enormous disparities across India’s States with extremely high gaps in literacy between low social classes and the rest of the population.

Female literacy, the key to so many other social indices, is as low as seven per cent in Rajasthan and nine per cent in Madhya Pradesh, among low social classes. This is despite the fact that over the past decade, there has been a significant improvement in overall literacy rate from 44 per cent to 64 per cent in Madhya Pradesh and from 39 per cent to 61 per cent in Rajasthan (Naik, 2003, Ibid).

While regional imbalances and socio-economic disparities have persisted in India over the last half a century of planned economic development, it should be a matter of particular concern to policy-makers that the same have tended to widen at an alarming rate, post-reform. With the role of the public sector diminishing, the virtual dismantling of industrial licensing and removal of locational constraints, private investments have been mostly flowing to States and regions with relatively better infrastructure and other facilities. The same is the case with the inflows of foreign direct investment (Ibid).

A CII-sponsored study by the National Council for Applied Economic Research (NCAER) released in 2000 shows how the northern states have slipped badly in respect of economic growth during the decade of the 1990s compared to their counterparts elsewhere. The study warns that the relentlessly widening economic and social disparities among States are threatening to weaken the national fabric. According to the study, the western region comprising primarily Maharashtra, Goa and Gujarat was able to step-up its annual economic growth rate from 5.7 per cent in the 1980s to 6.6 per cent in the 1990s. A similar trend is seen for the southern region. In contrast, the annual economic growth of the northern region fell from 5.6 per cent in the 1980s to 4.5 per cent in the 1990s. The annual growth rate of state domestic product increased sharply for Gujarat and Maharashtra during the 1990s to 8.6 per cent and 7.1 per cent from 3.1 per cent and 3.6 per cent respectively in 1980s. For Tamil Nadu, it rose to 4.9 per cent from 3.9 per cent, Kerala 4.5 per cent from 2.2 per cent, Karnataka 3.5 per cent from 3.3 per cent, and West Bengal 5 per cent from 2.4 per cent. On the other hand, the annual growth rate of state domestic product declined in the 1990s to 2.8 per cent from 3.3 per cent for Punjab, 2.7 per cent from 3.9 per cent for Haryana, 1.2 per cent from 2.6 per cent for Uttar Pradesh, 3.5 per cent from 4 per cent for Rajasthan, and to 3.1 per cent from 4 per cent for Delhi over the decade of the 1980s (Ibid).

Census 2001 revealed disturbing disparities in the demographic indicators such as population growth rates, literacy levels and sex ratio. For instance, Bihar, with a dismal record of human development indicators, recorded a much higher rate of population growth at 28.3 per cent during the decade of the 1990s against 23.3 per cent during the previous decade. Similarly, Uttar Pradesh, the most populous state in the country, also recorded a higher population growth of 28.3 per cent against 23.38 per cent during 1981-91. Rajasthan also recorded a high rate of population growth at 28.33 per cent during 1990s. Some of the other States in the north and east also recorded much higher population growth rates. But, these are much smaller states both in terms of area and population and hence their overall impact is not so significant. Against this, Kerala recorded the lowest decadal population growth of 9.42 per cent, followed by Tamil Nadu (11.9 per cent), Andhra Pradesh (13.86 per cent), Goa (14.89 per cent) and Karnataka (17.25 per cent). As for literacy, Kerala continued its lead with 90.92 per cent, followed by Mizoram (88.49 per cent), Lakshadweep (87.52 per cent), and Goa (82.32 per cent). Maharashtra also recorded a fairly high literacy rate of 77.27 per cent. In contrast, Bihar recorded the lowest literacy rate of 47.53 per cent; the female literacy level in the State was much lower at 33.57 per cent. Incidentally, Bihar also happens to be the only state in the country to have a literacy level below 50 per cent. Other States that figure at the bottom level of literacy are Jharkhand (54.13 per cent), J&K (54.46 per cent), Arunachal Pradesh (54.74 per cent), U.P. (57.36 per cent),

Orissa (63.61 per cent), Meghalaya (61.31 per cent), and Andhra Pradesh (61.11 per cent) (Ibid). Even in 2011 Census, these disparities continued, of course, with some variations in the respective figures and positions.

In general, the southern States, which have been outperforming the northern and eastern regions in respect of economic growth and per capita income, have continued with a better record in respect of population control, literacy and sex ratio (Ibid).

An equally disturbing facet of growing socio-economic disparities is the growing rural-urban divide that is brought out by the National Sample Survey Organisation's (NSSO) household consumer expenditure surveys for recent years. According to the data compiled by the NSSO, the average monthly per capita expenditure (MPCE) by rural households during 2000-01 (July-June) was Rs.494.90, which was just a little over 54 per cent of the corresponding figure of Rs. 914.57 for a typical person in urban India. What is striking about the MPCE data is that the gap between the average per capita expenditure for urban and rural areas has widened by over 8 percentage points between 1987-88 and 2000-01. Considering that 1987-88 was a drought year, when rural incomes would have anyway been depressed, the increase in disparity levels between the two periods appears all the more worrisome. The urban-rural gap is much more pronounced for non-food *vis-à-vis* food items. An average urban resident's monthly expenditure of Rs.139.73 on food items during 1987-88 was higher than the corresponding non-food spending of Rs.110.18. But, in 2000-01, the position had reversed, with average non-food expenditure (Rs.514.01) exceeding that of food expenditure (Rs 400.57). No such progress or diversification of the commodity basket has been observed for rural India. The other major pointer to the sizeable difference in living standards is the fact that about 93 per cent of the rural population during 2000-01 had a MPCE of less than Rs.915, the average figure for urban India. Thus, the so-called rural rich enjoying consumption standards comparable to the average urban Indian constituted hardly five per cent of the rural population (Ibid).

The increase in rural poverty during the 1990s is not surprising considering the gross neglect of agriculture during this period. Because of the big drop in the annual growth rate of public investment in agriculture during the decade as also the substantial decline in the growth of banks' lending to the sector, the agricultural growth rate witnessed a substantial deceleration over this period (Ibid). Further, though the share of agriculture in our country's GDP has witnessed a substantial decline, the proportion of population dependent on this sector in the total population has not shown any significant drop. Not surprisingly, the people dependent on agriculture are getting increasingly impoverished. It is, thus, evident that reduction of rural poverty is closely linked with agricultural growth. The moderate pick-up in the growth of the economy during the decade of the 1990s was largely driven by manufacturing and services sectors, the activities that are concentrated in urban areas (Ibid).

As the World Bank Report observes, for growth to improve in lagging states, implementation of reforms is essential to reduce fiscal imbalances and improve the composition of public expenditure and investment-climate. Of particular importance for poverty reduction and increasing rural incomes are policies aimed at increasing agricultural productivity and rural employment (Ibid).

Taking a leaf out of the recent Asian experience, suitable modifications are needed in the development strategies of laggard states. The major thrust will have to be on the development of human capital through education, health and nutrition apart from increased flow of funds to agriculture and rural infrastructure. To ensure this, the role of state-intervention would be crucial in the medium-term. Subsequently, the market will start playing its role (Ibid).

3.2.2.2 Challenges of Migration and Displacement: Types and Consequences

According to International Organization for Migration, “no universally accepted definition for migrant exists. The term migrant was usually understood to cover all cases where the decision to migrate was taken freely by the individual concerned for reasons of “personal convenience” and without intervention of an external compelling factor; it therefore applied to persons, and family members, moving to another country or region to better their material or social conditions and improve the prospect for themselves or their family. The United Nations defines migrant as an individual who has resided in a foreign country for more than one year irrespective of the causes, voluntary or involuntary, and the means, regular or irregular, used to migrate. Under such a definition, those travelling for shorter periods as tourists and businesspersons would not be considered migrants. However, common usage includes certain kinds of short-term migrants such as seasonal farm-workers who travel for short periods to work in planting or harvesting farm products (http://en.wikipedia.org/wiki/Human_migration).

Migration (human) is the movement of people from one place in the world to another for the purpose of taking up permanent or semi-permanent residence, usually across a political boundary. An example of “semi-permanent residence” would be the seasonal movements of migrant farm laborers. People can either choose to move (voluntary migration) or be forced to move (involuntary migration). Migrations have occurred throughout human history, beginning with the movements of the first human groups from their origins in East Africa to their current locations in the world. Migration occurs at a variety of scales: intercontinental (between continents), intra-continental (between countries on a given continent), and interregional (within countries). One of the most significant migration patterns has been rural to urban migration – the movement of people from the countryside to cities in search of opportunities (National Geographic Society, 2005, See <http://www.nationalgeographic.com/xpeditions/lessons/09/g68/migrationguidestudent.pdf>).

Types and Consequences of Migration: The types and consequences of migration highlighted below will provide broad understanding of the challenges associated with sustainable development linked to migration.

- A) Types of migration:** The following terms will give clarity about the types of migration or migrants.
- **Internal migration:** It refers to the movement of people to a new home within a state, country or continent.
 - **External migration:** This is the movement of people to a new home in a different state, country or continent.
 - **Emigration:** Leaving one country to move to another.
 - **Immigration:** Moving into a new country.
 - **Population transfer:** When a government forces a large group of people out of a region, usually based on ethnicity or religion this is called population transfer. This is also known as an *involuntary* or *forced migration*.
 - **Impelled migration:** This is also called “reluctant” or “imposed” migration. Individuals are not forced out of their country, but they leave because of unfavorable situations such as warfare, political problems or religious persecution.

- **Step-migration:** A series of shorter, less extreme migrations from a person's place of origin to final destination such as moving from a farm, to a village, to a town, and finally to a city is called step-migration.
 - **Chain-migration:** It refers to a series of migrations within a family or defined group of people. A chain migration often begins with one family member who sends money to bring other family members to the new location. Chain-migration results in migration fields — the clustering of people from a specific region into certain neighborhoods or small towns in another area or region.
 - **Return-migration:** This is voluntary movements of immigrants back to their place of origin. This is also known as *circular migration*.
 - **Seasonal migration:** The process of moving for a period of time in response to labor or climatic conditions (e.g. farm workers following crop harvests or working in cities off-season) (National Geographic Society, 2005, Ibid).
- B) Consequences of migration:** There are different types of consequences associated with migration which impact the sustainable development of people.
- a) Economic consequences:** The economic consequences of migration may be positive or negative depending upon the circumstances of migration.
- i) Positive consequences:** These include the following.
- The remittance (payments) sent by migrants to their homes help in the growth of economy of the region.
 - This money is mainly used by the family for purchasing food, repayment of debts, medical treatment, marriages, children's education, purchasing agricultural inputs, construction of houses, etc.
 - Many poor villages of Bihar and Uttar Pradesh depend on this money for their survival.
 - Similarly, remittances from the international Indian migrants are one of the major sources of foreign exchange in India. In 2002, India received US\$ 11 billion as remittances from these people.
 - States such as Punjab, Kerala and Tamil Nadu receive very large amount of money from their international emigrants.
 - Migration of people from Uttar Pradesh and Bihar to the rural areas of Punjab, Haryana, has resulted in the success of green revolution and agricultural development in Punjab and Haryana.
- ii) Negative consequences:** These are as follows.
- Unregulated migration to the metropolitan cities of India has caused overcrowding.
 - Development of slums in industrially developed states such as Maharashtra, Gujarat, and Delhi is the result of unregulated migration.
 - The under-development gets even worse due to out-migration of skilled people.
- b) Demographic consequences:** There are positive and negative demographic consequences due to migration.

- i) *Positive consequences:* These include the following.
- Redistribution of the population within a country.
 - Balanced distribution of people according to resources.
 - Rural-urban migration which is one of the important factors contributing to the population growth of cities.
- ii) *Negative consequences:* These include:
- Imbalances in sex composition due to selective male or female migration.
 - Unfavourable sex ratio in large cities as compared to rural areas due to high male immigration.
 - Shortage of skilled people in rural areas because most of skilled and semiskilled people migrate to urban areas.
- c) *Social consequences:* These include the following.
- i) *Positive consequences:*
- Migrants act as agents of social change. The new ideas related to new technologies, family planning, girl's education, etc, get spread from urban to rural areas through them.
 - Migration also leads to inter-mixing of people from diverse cultures and results in the evolution of composite culture.
 - The mind-set of people changes. They start thinking broadly and their narrow views change.
- ii) *Negative consequences:*
- In urban areas, it also causes anonymity, which creates social vacuum and sense of dejection among the migrant individuals.
 - Continued feeling of dejection may motivate people to fall in the trap of anti-social activities like crime and drug-abuse.
 - Migration affects the women more. In the rural areas, male selective out-migration leaving their wives behind puts extra physical as well mental pressure on the women which increases their vulnerability.
- d) *Environmental consequences:* These include the following.
- Overcrowding of people due to rural-urban migration has put pressure on the existing social and physical infrastructure in the urban areas. This ultimately leads to unplanned growth of urban settlements and formation of slums-shanty colonies.
 - Apart from this, due to over-exploitation of natural resources, cities are facing the acute problem of depletion of ground water, air pollution, disposal of sewage and management of solid-wastes, among others.

Check Your Progress

- Notes:** a) Space given below the question is for writing your answer.
- b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”
- 6) Explain the inter-relationship between migration and sustainable development.

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3.2.3 Challenges of Urbanization

Urbanization, simply defined, is the shift from a rural to an urban society, which involves an increase in the number of people in urban areas during a particular year. Urbanization is the outcome of social, economic and political developments that lead to urban concentration and growth of large cities, changes in land use and transformation from rural to metropolitan pattern of organization and governance (Kwasi Nsiah Gyabaah, See http://www.Populationenvironmentresearch.org/papers/Nsiah-Gyaabah_contribution.pdf).

Urbanization is not only accompanied by industrialization but also interlinked with modernization; and these three sometimes work in conjunction. The process of urbanization in developed countries has been very slow but steady and it has been accompanied by agricultural and industrial revolution, higher per capita income and high standard of living, whereas in developing countries the rate of urbanization is very fast and it is not accompanied by industrialization but rapid growth of service sector in the economies (Helen Macbeth and Paul Collinson, 2002). In the counties of third world, urbanization has not been accompanied by modernization and industrialization, i.e. a case of ‘pseudo-urbanization’ or ‘over-urbanization’. In most of the developing countries, the modern process of urbanization is a recent phenomenon and it is still unfolding.

Urbanization is considered to be an inevitable part of economic development. Urbanization has been viewed as an important factor in the areas of economic transformation, orchestrating the breakdown of the feudal order and taking societies to higher levels of social formation. Urbanization is intrinsically connected and irrevocably enlaced with the development process, as an essential strand in the contemporary economic system.

Although urbanization is the driving force for modernization, economic growth and development, there is increasing concern about the effects of expanding cities, principally on human health, livelihoods and the environment. The implications of rapid urbanization and demographic trends for employment, food security, water supply, shelter and sanitation, especially the disposal of wastes (solid and liquid) that the cities produce are staggering (UNCED, 1992). The question that arises is whether the current trend in urban growth is sustainable considering the accompanying urban challenges such as unemployment, slum development, poverty and environmental degradation, especially in the developing countries (Kwasi Nsiah Gyabaah, See http://www.populationenvironmentresearch.org/papers/Nsiah-Gyaabah_contribution.pdf).

3.2.3.1 Effects of Urbanisation

Urbanization brings with it several consequences – both adverse and beneficial. They have impact on social and environmental areas.

Benefits of urbanization: The benefits of urbanization include the following (http://alumni-conference.eu/wp-content/uploads/2011/08/4_c_Kurz-%C3%9Cberblick-Urbanization.pdf).

- *Efficiency:* Cities are extremely efficient. Less effort is needed to supply basic amenities such as fresh water and electricity. Research and recycling programs are possible only in cities. In most cities flats are in vogue today. Many people can be accommodated within a small land area.
- *Convenience:* Access to education, health, social services and cultural activities is readily available to people in cities than in villages. Life in cities is much more advanced, sophisticated and comfortable compared to the life in villages. Cities have advanced communication and transport networks.
- *Concentration of resources:* Since major human settlements were established near natural resources from ancient times, lot of resources are available in and around cities. Lot of facilities to exploit these resources also exist mainly in cities.
- *Educational facilities:* Schools, colleges and universities are established in cities to develop human resources. A variety of educational courses and fields are available offering students a wide choice for their future careers.
- *Social integration:* People of many castes and religions live and work together in cities, which creates better understanding and harmony and helps break down social and cultural barriers.
- *Improvements in economy:* High-tech industries earn valuable foreign exchange and lot of money for a country in the stock markets.

Adverse effects of urbanization: In spite of benefits of urbanization, there is increasing competition for facilities due to the high standard of living in urban areas, which has triggered several negative effects (http://alumni-conference.eu/wp-content/uploads/2011/08/4_c_Kurz-%C3%9Cberblick-Urbanization.pdf).

- i) **Slums:** Many people including farmers who move to cities in search of a better life end up as casual laborers as they lack adequate education or skills. This leads to one of the worst problems of urbanization – the growth of slums. These urban areas are heavily populated with substandard housing and very poor living conditions. As a result several problems such as the following arise.
- *Poor living conditions:* Crowding and lack of sanitation are main problems. This contributes to outbreak of diseases. Utilities such as water, electricity and sewage disposal are also scarce or poor.
 - *Unemployment:* Since the number of people competing for jobs is more than jobs available, unemployment is an inevitable problem.
 - *Crime:* Slum conditions make maintenance of law and order difficult. Patrolling of slums is not a priority of law enforcing officers. Unemployment and poverty force people into anti-social activities. Slums become a breeding ground for criminal activities.

ii) **Environmental impacts of urbanization:** Major environmental impacts of urbanization include the following.

- **Rise in temperature:** Due to factors such as paving over formerly vegetated land, increasing number of residences and high-rise apartments and industries, temperature increases drastically.
- **Air pollution:** Factories and automobiles are symbols of urbanization. To a large extent, air pollution occurs due to harmful emissions of gases and smoke from factories and vehicles. Current research shows high amount of suspended particulate matter in air, particularly in cities, which contributes to allergies and respiratory problems thereby becoming a huge health hazard.
- **Water issues:** When urbanization takes place, water cycle changes as cities have more precipitation than surrounding areas. Due to dumping of sewage from factories and residential buildings into water bodies, water pollution occurs which can lead to outbreaks of epidemics.
- **Destruction of habitats:** To make an area urbanized, a lot of forested areas are destroyed. Usually, these areas would have been habitats to many birds and animals.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under "Answers to 'Check Your Progress' Questions."

7) What are the environmental effects of urbanization?

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3.2.4 Challenges of Deforestation

Deforestation is the full or large-scale removal of a forest or area of trees, in order to use cleared land for human development, or to use the trees as fuel or timber (<http://www.what-is-global-warming.com/what-is-deforestation.php>). The main factors that contribute to deforestation are farms and cattle pasture. In many countries of the developing world, population is growing, and as the population grows people need more and more room to expand. So, many forests are cleared out, and on once forested areas now are mostly farms and savannas.

Deforestation has reached an alarming rate in many countries around the world, but three areas most hit by deforestation are: Amazon rainforest, Africa and Indonesia. These three areas are already in critical zone. Deforestation is really one of the biggest environmental evils that happen on this planet, and if the current trend continues with somewhere around 16 million hectares of forests disappearing each year, our planet will head into a real environmental disaster in the years to come (<http://ecological-problems.blogspot.in/2009/06/deforestation-definition-and-meaning.html>).

3.2.4.1 Causes of Deforestation

Deforestation can be attributed to various causes. The obvious one is logging. However, the reasons extend a lot further than that. The forests are cultivated, cleared and burned every year for international ranchers and local farmers. Every year certain factors such as the following influence the amount of forest area (<http://library.thinkquest.org/C0127068/deforestation.html>).

- fires
- logging
- farming
- population expansion
- growth of cities
- roads and highways
- politics
- shifting cultivators

In a number of third world countries, the population is involved in various primary activities, one of these being logging. The native people in an area are put under tremendous pressure to make a living to support their families, and get jobs as loggers, often illegally so. Most of these people are often uneducated and know nothing other than logging practices. In many countries, the logging trade is the biggest foreign money-earner and therefore governments try to exploit the forests for all they can take and more. Another cause is fires. In Kenya, the Amazon and various other countries there are large plantations of exotic plants in the places where there used to be indigenous forests. The exotic trees often are not suited to the environment and shed a lot of leaves. This makes the area a huge fire hazard. If a fire starts, the dry leaves act like fire-lighters and cause huge amounts of damage to the local area (Ibid).

Human settlement is another big problem in many areas. People who have left the city to live in the rural areas claim pieces of land as their own and slash and burn the surroundings, using wood for fuel and also selling it on roadsides, etc. Some people who have been displaced by large ranchers or plantations have to move further into the indigenous forests because they do not know how to live off the exotic plants. By doing this they remove trees from yet more of the forest. Construction of roads and highways in wooded areas is another challenge. In the Amazon they proposed to build a 960 km highway called the BR-163 from Cuiabá in the middle of South America to Santarém in the top right corner of Brazil. The BR-163 will allow giant grain producers in the Mato Grosso region to export their crops to Europe via Santarém far more quickly and cheaply. It is estimated that 49,000 km² of forest will be destroyed during this construction. This is not the only worry though. When the road is built there will be a wave of squatters and farmers, etc., vying for land on the superhighway. This could be the single most devastating assault on the Amazon ever (Ibid).

The growth of the world population is also a problem because more ground has to be cleared in order to feed the ever-growing populations. As the population grows there is a need for food. People take the initiative and buy large pieces of land that they cultivate with single crops. They have to cut down trees and bushes, etc. When they harvest their crop they leave the ground open to erosion (Ibid).

3.2.4.2 Effects of Deforestation on the Environment

The main reason for concern is the old tropical rainforests that are disappearing really fast. These ancient forests absorb large quantities of carbon dioxide (CO₂) which not only regulates climate but also helps in slowing the global warming impact. Rainforests and other forests are important because of their role in climate regulation. They are also the areas of extremely rich biodiversity with lots of unique plants and animals that need forests to survive (<http://ecological-problems.blogspot.in/2009/06/deforestation-definition-and-meaning.html>).

The more the forests disappear the less the carbon emissions they sink. But, what is even worse is frequent use of slash and burn techniques. By using slash and burn techniques we are constantly releasing huge CO₂ emissions into the atmosphere. Industry and cars are not alone the leading causes of global warming; one major factor is also deforestation. One study showed that in just 24 hours time deforestation will release as much CO₂ into the atmosphere as 8 million people flying from London to New York do. Thus, deforestation also has its significant impact on climate change (Ibid).

Trees draw water up through their roots and release it into the atmosphere (transpiration). In the Amazon, half of the water is contained in the trees. If the trees are removed, the region cannot hold as much water and will become drier. In areas where deforestation occurs the community as a whole suffers. If there are no trees, the land becomes far more unstable than before. The roots from the trees no longer exist and therefore it leaves the forest floor open to erosion and mudslides, etc. (<http://library.thinkquest.org/C0127068/deforestation.html>).

The land also becomes sandy and dry as the sun can now penetrate deep into the deforested area, where the tree-cover blocked out the damaging rays before. When this occurs, plants living near the cut down tree also die and wither in the sun. It is believed that with every tree felled another 40 are destroyed in the process. The local animals are affected just as much as the people. Their natural habitats are destroyed and species, possibly unknown to man, become extinct because they have nowhere to live. When the bulldozers knock the trees down, they are all caught in the destruction. The animals either end up in the cities or are killed or they starve to death in their new surroundings (Ibid).

Native people living in the forest areas are pushed out of their homes and have to encroach on more of the forest. They cannot go anywhere else because they only know how to survive on the plants in the forest. In this way more forest is destroyed and the cycle will probably continue until all forests are destroyed (Ibid).

Further, deforestation is by no means a restricted problem, as erosion and many other associated problems follow it. It can play havoc with not only the local community but also the entire country it occurs in. Deforestation is caused not by ignorant people; hence, it is unfair to blame only the nomads, shifting cultivators and farmers for destroying the countryside. Deforestation is a contributing factor to the *green-house effect*. The trees are large CO₂ stores, and when the trees are burnt they release this gas. This leads to an increase in the CO₂ levels in the air. Carbon dioxide is thus the major contributor to the *green-house effect* leading to more serious challenge of climate change, the consequences of which will go beyond the control of human beings endangering sustainable development at all levels and in all forms.

Check Your Progress

- Notes:** a) Space given below the question is for writing your answer.
- b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”
- 8) What are the causes of deforestation? How does deforestation affect the environment?

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3.2.5 Challenges of Climate-change

Climate-change refers to the variation in the Earth’s global climate or in regional climates over time. It describes changes in the state of the atmosphere over time-scales ranging from decades to millions of years. Climate change has been defined by many in many ways. While some define it as an off-shoot of Earth’s natural processes, others define it as a result of human activities. Striking a balance between these two varying perspectives, climate-change is defined as “a change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”. Truly, the present changes in the Earth’s climate cannot be explained by the natural processes alone as they explain Earth’s previous warm periods. There is a broad scientific consensus that most of the warming in the recent decades can be attributed to human activities. If humanity is, in large part, responsible for this change, then whatever choices we make today, will have a significant bearing on the climate of the future. This makes climate change a formidable concern (Research Unit, Rajya Sabha Secretariat, 2008, at http://rajyasabha.nic.in/rsnew/publication_electronic/climate_change_2008.pdf).

3.2.5.1 Green-House Gases and Global-Warming

The Earth’s climate is dynamic and always changing through a natural cycle. It took billions of years for the Earth’s climate to become conducive for the evolution of mankind. The solar energy passing through the atmosphere is absorbed by the Earth’s surface and a significant part of it is reflected back into the atmosphere. However, the atmosphere of the Earth contains small quantities of carbon dioxide, methane and nitrous oxide, collectively called greenhouse gases (GHGs) which act as a partial blanket that trap some of the outgoing infra red radiation and reflect it back to Earth thus keeping the surface warmer than it would otherwise be. In the absence of this greenhouse effect (trapping by GHGs) the Earth’s mean temperature would be 30°C lower than it is (Gautam Dutt and Fabiina Gaioli, 2007, p.4239), which would mean that the Earth would be an ice covered place. Thus, most of the present life forms on the Earth depend on the natural green-house effect for their existence. However, increase in the emission of these GHGs due to human activities causes the enhanced green-house effect. Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004 (IPCC, 2007, p.5). Apart from the three natural GHGs (carbon dioxide, methane and nitrous oxide), the increased emission also includes several “man-made” gases including chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

Increase in the concentration of these GHGs tends to increase the surface temperatures. This *rise in the average temperature of the Earth is called global warming*, which is likely to lead to unprecedented climate changes on a global scale threatening the ecosystems of the entire world (Research Unit, Rajya Sabha Secretariat, 2008, Ibid).

Today, there is evidence that we are overloading the carrying-capacity of the Earth's atmosphere. Stocks of green-house gases that trap heat in the Earth's atmosphere are accumulating at an unprecedented rate. Today, increasing number of scientists believe that we have already crossed into a new weather regime marked by extremes of all kinds (Ross Gelbspan, 2007). It is predicted that in the course of the 21st Century, average global temperature could increase by more than 5°C. Behind this prediction, there is an overwhelming fact that we are playing havoc with our environment, upsetting the ecological interdependence. In effect, our generation is compelling future generations to inherit an unsustainable ecological debt, which will jeopardize the future development and prosperity (Ibid).

3.2.5.2 Impacts of Climate-Change on Sustainable Development

Though climate-change poses a variety of challenges, important of them include: agriculture and food security; water stress and water insecurity; rising sea levels; and biodiversity and human health; which have immense relevance from the perspective of developing countries in general and India in particular (Research Unit, Rajya Sabha Secretariat, 2008, Ibid).

Agriculture and Food Security: Climate-change is projected to have significant impacts on conditions affecting agriculture, including temperature, precipitation and glacial run-off. It affects agriculture in more ways than one. It can affect crop-yield as well as the types of crops that can be grown in certain areas, by impacting agricultural inputs such as water for irrigation, amounts of solar radiation that affect plant growth, as well as the prevalence of pests.

Rise in temperatures caused by increasing green-house gases is likely to affect crops differently from region to region. For example, moderate warming (increase of 1 to 3°C in mean temperature) is expected to benefit crop-yields in temperate regions, while in lower latitudes especially seasonally dry tropics, even moderate temperature increases (1 to 2°C) are likely to have negative impacts for major cereal crops. Warming of more than 3°C is expected to have negative effect on production in all regions (IPCC, 2007, p.3). The Third Assessment Report of the Intergovernmental Panel on Climate-Change (IPCC, 2001) concluded that climate change would hit the poorest countries severely in terms of reducing the agricultural products. The Report claimed that crop-yield would be reduced in most tropical and sub-tropical regions due to decreased water availability, and new or changed insect/pest incidence. In South Asia, losses of many regional staples such as rice, millet and maize could top 10 per cent by 2030 (Ibid).

As a result of climate-change the amount of arable land in high-latitude region is likely to increase by reduction of the amount of frozen lands. At the same time arable land along the coast lines are bound to be reduced as a result of rising sea level. Erosion, submergence of shorelines, salinity of the water-table due to the increased sea levels, could mainly affect agriculture through inundation of low-lying lands. In a recent study, the International Commission for Snow and Ice (ICSE) reported that Himalayan glaciers that are the principal dry-season water sources of Asia's biggest rivers – Ganges, Indus, Brahmaputra, Yangtze, Mekong, Salween and Yellow – are shrinking quicker than anywhere else, and that if current trends continue they could disappear altogether by 2035 (Khoday, 2007). If the predictions are true then the magnitude of the impact can be gauged from the sheer numbers of people it will affect; approximately 2.4 billion

people live in the drainage basin of the Himalayan Rivers. The above predictions certainly pose a serious threat to agriculture which impacts human lives in many ways. One of the foremost impacts is food security.

Agriculture is important for food security in two ways: it provides the food and also the primary source of livelihood for 38.7 percent of the world's total workforce. In Asia and the Pacific, this share accounts for approximately 50 per cent and in sub-Saharan Africa, nearly two-thirds (63 per cent) of the working population still make their living from agriculture (ILO, 2007, p.12). If agricultural production in the low-income developing countries of Asia and Africa is adversely affected by climate change, the livelihoods of large numbers of the rural poor will be put at risk and their vulnerability to food insecurity will be manifold.

Water Stress and Water Insecurity: Lack of access to water is a perturbing issue, particularly in developing countries. At present a whopping 1.1 billion people around the world lack access to water and 2.6 billion people are without sanitation. Climate-change is expected to exacerbate current stresses on water resources. By 2020, between 75 and 250 million more people are projected to be exposed to increased water stress due to climate-change.

Spreading water-scarcity is contributing to food insecurity and heightened competitions for water both within and between countries. As the world population expands and the consumption of water spirals upwards, water problems are bound to intensify. By 2025, 40 per cent of the world's population, more than 3 billion in all, may be living in countries experiencing water stress or chronic water scarcity.

Increase in temperature due to climate-change has been widespread over the globe. Warming has resulted in decline in mountain glaciers and snow cover in both hemispheres and this is projected to accelerate throughout the 21st century. This will in turn lead to reducing water availability, hydropower potential, and would change the seasonal flow of rivers in regions supplied by melt- water from major mountain ranges (e.g. Hindu-Kush, Himalaya, Andes) where more than one-sixth of the world population currently lives. By 2050s freshwater availability in Central, South, East and South-East Asia, particularly in large river basins, is projected to decrease. A warmer climate will accelerate the hydrologic cycle, altering rainfall, magnitude and timing of run-off. Available research suggests a significant future increase in heavy rainfall events in many regions, while in some regions the mean rainfall is projected to decrease. The frequency of severe floods in large river basins has increased during the 20th century and it is likely that up to 20 per cent of the world population will live in areas where river flood potential could increase by the 2080s.

Increasing floods poses challenges to society, physical infrastructure and water quality. Rising temperatures will further affect the physical, chemical and biological properties of fresh water lakes and rivers, with predominantly adverse impacts on many individual fresh water species, community composition and water quality. In coastal areas, sea level rise will exacerbate water resource constraints due to increased salinisation of groundwater supplies.

Rise in Sea Levels: Nearly 70 % of Earth's surface comprises of water in the form of seas and oceans. Sea level rise under warming is inevitable. Sea level rise is both due to thermal expansion as well as melting of ice sheets. Thermal expansion would continue for many centuries even after GHG concentrations have stabilized causing an eventual sea level rise much larger than projected for the 21st century. If warming in excess of 1.9 to 4.6°C above pre-industrial level be sustained over many centuries then the final rise in sea level due to melting polar ice could be several meters, because it will be in

addition to that of rise of sea level due to thermal expansion. The present scenario clearly indicates that the sea level will definitely rise (IPCC, 2007).

Satellite observations available since the early 1990s show that since 1993, sea level has been rising at a rate of around 3 mm per year, significantly higher than the average during the previous half-century. IPCC predicts that sea levels could rise rapidly with accelerated ice-sheet disintegration. Global temperature increase of 3–4°C could result in 330 million people being permanently or temporarily displaced through flooding. Warming seas will also fuel more intense tropical storms. With over 344 million people currently exposed to tropical cyclones, more intensive storms could have devastating consequences for a large group of countries. The 1 billion people currently living in urban slums on fragile hillsides or flood-prone river banks face acute vulnerabilities. People living in the Ganges Delta and lower Manhattan share the flood-risks associated with rising sea levels.

Ecosystems and Bio-diversity: Climate-change has the potential to cause immense biodiversity loss, affecting both individual species and their ecosystems that support economic growth and human well-being. It is difficult to predict the overall result of climate-changes on animal and plant kingdom. Devastating effects on the native habitats of many animals and plants due to global warming is likely to drive a considerable number of today's known animal and plant species to extinction. Mass extinctions of the Earth's flora and fauna have occurred before also, but those were driven by natural factors. However, the projected extinctions of flora and fauna in the future will be human-driven i.e. due to adverse impact of human activities. The growth of human populations around the world, along with attendant pollution and loss of habitat, has set the stage for mass extinctions and large-scale alterations in the flora and fauna.

According to International World Wildlife Fund (WWF) and National Wildlife Federation in the United States species from the tropics to the poles are at risk. Many species may be unable to move to new areas quickly enough to survive changes that rising temperatures will bring to their historic habitats. WWF asserted that one-fifth of the world's most vulnerable natural areas may be facing a "catastrophic" loss of species. Another survey in 2004 of 5,743 amphibian species indicated that one in every three species was in danger of extinction due to global warming (Bruce E. Johansen, 2006). Studies predict that global warming will also lead to extinction of insects in the tropical zone by the end of the century while insects in the temperate zones and the poles could experience a dramatic increase in numbers. It will also have catastrophic impact on the marine ecosystems. They will be affected not only by an increase in sea-temperature and changes in ocean circulation but also by ocean acidification, as the concentration of dissolved carbon dioxide (carbonic acid) rises. This is expected to negatively affect shell-forming organisms, corals and their dependent ecosystems. Accelerated warming of the atmosphere will also alter the flora and fauna around the world.

Climate-Change and Health: Climate-change poses a host of threats to the survival of mankind. The debilitating impact of climate change has broadened the sphere of discourse much beyond the traditional concern like environment or development. The far-reaching consequences of climate-change has forced policy-makers and planners to look at every possible aspect of human survival. Arguably, it has catastrophic effects on human health. Each year, about 800,000 people die from causes attributable to air pollution, 1.8 million from diarrhoea resulting from lack of access to clean water supply, sanitation, and poor hygiene, 3.5 million from malnutrition and approximately 60,000 in natural disasters (World Health Organization, 2008). A warmer and more variable climate would result in higher levels of certain air pollutants, increased transmission of diseases through unclean water and through contaminated food.

Climate-change has direct impact on human health. For example, the warmer the climate the likelihood of its impact on human health becomes worse; available studies suggest that there will be an increase in health problems. It is anticipated that there will be an increase in the number of deaths due to greater frequency and severity of heat-waves and other extreme weather events. Climate-change and the resulting higher global temperatures are causing increasing frequency of floods and droughts leading to the risk of disease infections. By 2090s climate change may bring a doubling in the frequency of extreme drought events. Many more million people are projected to be flooded every year due to sea-level rise by the 2080s. Lack of freshwater during droughts and contamination of freshwater supplies during floods compromise hygiene, thus increasing rates of diarrhoeal disease. Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in hydrological cycle. Flooding also creates opportunities for breeding of disease-carrying insects such as mosquitoes. Areas affected by frequent floods and drought conditions also witness large-scale migration of populations to relatively stable regions leading to over-crowding and unhygienic conditions resulting in transmission of diseases like Japanese encephalitis and malaria.

Climate-change is a major factor in the spread of infectious diseases. Diseases usually confined to one specific geographic region spread to other areas. The World Health Organization (WHO) in their studies have indicated that due to rising temperatures, malaria cases are now being reported for the first time from countries like Nepal and Bhutan. It has also been predicted that an additional 220-400 million people could be exposed to malaria – a disease that claims around 1 million lives annually. Dengue fever is already in evidence at higher levels of elevation in Latin America and parts of East Asia. Climate-change could further expand the reach of the disease. Studies suggest that climate-change may swell the population at risk of malaria in Africa by 90 million by 2030, and the global population at risk of dengue by 2 billion by 2080s.

Rising temperatures and changing patterns of rainfall are projected to decrease crop-yields in many developing countries, stressing food supplies. This will ultimately translate into wider prevalence of malnutrition / under-nutrition. In some African countries, yields from rain-fed agriculture could be reduced by up to 50 per cent by 2020. Emission of the Green-House Gases have been responsible for the depletion of ozone layer, which protects the Earth from the harmful direct rays of the sun. Depletion of stratospheric ozone results in higher exposure to the ultra violet rays of the sun, leading to an increase in the incidents of skin cancer. It could also lead to an increase in the number of people suffering from eye-diseases such as cataract. It is also thought to cause suppression of the immune system. The projections by WHO and IPCC suggest that the negative effects of climate-change on health are greater. In addition, the negative effects are concentrated on poor populations that already have compromised health prospects, thus widening the inequality-gap between the most and the least privileged. The balance of positive and negative health impacts will vary from one location to another, and will alter over time as temperatures continue to rise.

Check Your Progress

Notes: a) Space given below the question is for writing your answer.

b) Check your answer with the one given at the end of this unit under “Answers to ‘Check Your Progress’ Questions.”

9) Define climate-change.

10) What are the green-house gases (GHGs)? Explain the relationship between these gases, climate-change, global warming and sustainable development.

11) What the major impacts of climate-change on sustainable development?

3.2.6 Measures to Address the Above Challenges by Developed and Developing Countries: Need for Commitment Towards the Solution – A Great Challenge

As we have discussed above, climate-change is one of the complex problems facing mankind today. The overriding complexity of the problem is attributed to its deeper global ramifications on a vast range of issues impacting the very survival of life on Earth. Understanding such a complex issue with vast and varied dimensions and implications assumes greater significance for all stake-holders, especially for our policy-makers at both national and international/global levels. Irrespective of differing perceptions regarding the magnitude and consequences of climate-change, it is no secret that risks emanating from climate-change are indeed profound, which call for urgent mitigation efforts. There is now strong evidence that climate-change is a reality. Today, it has been scientifically established that significant global warming is occurring. Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. There is no denying the fact that the problem exists and it is assuming alarming proportions, each passing day. Therefore, there is an imperative need to take urgent and strong measures in the interest of calibrating an appropriate response to meet the emerging challenges of climate-change.

Climate-change is not an isolated issue. It has several aspects/dimensions and inter-linkages, namely, science and technology, economy and trade, diplomacy and politics – that make it not just another issue in this complicated world of proliferating issues, but the mother of all issues. Climate-change, however, is different from other problems facing humanity and it compels us to think differently, but towards the common cause, at many levels. It obliges us to think about what it means to live as part of an ecologically interdependent human community. In the face of many diversities that characterize human society, climate-change provides a potent reminder of one thing that we share in common – the planet Earth. All nations and all people share the same atmosphere. And, we only

have one. Addressing the climate chaos by all the countries both individually and collectively will be critical to the human well-being and prosperity of the present as well as the future generations.

Nevertheless, significant and more challenging dimension of climate-change pertains to the varying commitments of the developed and developing countries. The challenge to limit and cut emissions and to adapt to climate-changes is upon all of us, depending on the common but differentiated responsibilities of countries to take action. The United Nations Framework Convention on Climate-Change (adopted at the Rio Earth Summit in May 1992) aimed at achieving stabilization of green-house gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate-change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. As a first step, the Convention called upon the developed countries to restrict their green-house gas emissions to 1990 levels by 2000. In reality, emissions from these countries, as a whole, have increased since 1990. Between 1990 and 2005, green-house gas emissions continued to rise in 26 out of a total of 40 developed countries. Correspondingly, in 11 countries with their economies in transition, the emissions fell by 39 per cent during the nineties due to sharp decline in the levels of their economic activities.

It is apparent that quantified emission reduction commitments from the developed countries can only achieve real cuts in green-house gas emissions. In 1997, parties to the UNFCCC adopted the Kyoto Protocol to strengthen the commitment of the developed countries towards carbon emissions-reduction. Kyoto Protocol is viewed as one of the significant measures in the reduction of carbon emissions of the developed countries, yet the USA – the world's largest emitter of green-house gases, has not ratified it, raising serious doubts in the effectiveness of this protocol. Under Kyoto protocol, even though there is an obligation on the part of the developed countries to commit themselves to a second round of quantified emission-reductions for the next decade (the present commitments expire in 2012), they have maintained a deafening silence over this issue. Rather, their intention seems to escape from the quantitative emission-reduction commitments that are obligatory for the developed countries under the Kyoto protocol and to introduce, at the same time, new commitments for the developing countries in particular, the so called emerging economies such as China, India, Brazil and South Africa.

Under the Climate Convention, the developing countries also have a set of commitments. The Convention states that "the extent to which developing country-parties will effectively implement their commitments under the Convention will depend on the effective implementation of the developed country-parties of their commitments under the Convention related to financial resources and transfer of technology. This has to take into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country-parties. The Convention recognizes greater responsibility on the part of the developed countries towards the largest share of historical and current share of emissions of GHGs as also their greater capacity than the developing countries to meet the costs of the global response to climate-change challenge. As the present trend shows, the developed countries instead of meeting their own obligations, they are endeavouring to pass the buck to the developing countries. But for the developing countries, sacrificing economic growth at the altars of emissions reduction is certainly not a priority. They are keen to cope with current and future conditions through economic growth and development. Unless this issue is mutually

3.3 LET US SUM UP

Since sustainable development is very complex process it poses serious challenges to the Governments, the people, the policy-makers and the implementers at different levels – local, state, national and international. These challenges and problems basically revolve around the nature, quality and extent of exploitation of natural resources and concomitant disparities among the people and regions, migration of people, displacement of people, urbanization, deforestation, pollution and the climate-change finally resulting in global warming which is threatening the sustainable development of the globe. In view of these, in this Unit, we have highlighted different facets of the above challenges and the possible solution to the menace of climate-change including the challenges in implementation of the solution to climate-change – global warming.

3.4 ANSWERS TO ‘CHECK YOUR PROGRESS’ QUESTIONS

- 1) Difference between ‘potential resource’ and ‘resource’: All these natural things such as rocks, minerals, plants, animals, soil, air (different gases), wind, water, sunshine, etc. provided by nature to human beings are termed as *Endowments*, i.e. natural gifts or the potential resources given to man. He thinks about using the natural things (endowments) and their products for his benefit. While using these endowments, man uses his ideas to convert them into the *potential resources*. When man implements his idea about the potential resource into reality, i.e. he converts endowment (i.e. *potential resource*) into something useful to him, the potential resource becomes a *resource*, which gets some value associated with it. For example, marble rock is a natural endowment (potential resource). Sculptor looks at the rock and thinks of using this rock to satisfy his desire of: a) creating a statue, or b) earning money. When he creates statue, he converts a rock into a resource (of aesthetic value). When he sells the rock or the statue, he earns money (financial value). Hence, *resource* can be identified as a source of raw materials used by the society. But, the term resource is also used to refer to the material or non-material things. So, *resource is anything which is useful to man*.
- 2) Types of natural resource: Natural resources are broadly of two types.
 - i) *Flow resources*: The flow of certain resources in the environment remains continuous and hence these resources are termed as flow resources, e.g. air, water, sunshine, plants, animals, etc. Flow resources are classified into two groups, viz. a) *Automatically renewed resources*, e.g. Air, water, sunshine etc. b) *Resources renewed with efforts*: Some flow resources require human help for their growth e.g. plants, animals, fish, birds, etc.
 - ii) *Fund-resources*: These resources are limited in supply and once extracted from the environment they cannot be replaced back at their original place, e.g. ores of different metals, coal, crude oil, natural gas, etc. Fund resources are of two types, viz. a) *Fund resources which are recycled*: These can be reused after recycling e.g. Bauxite is an ore of Aluminium. It is purified and Aluminium is extracted from it, which is used in the manufacturing of other products. b) *Fund resources not recycled*: Fund resources like coal, natural gas and crude oil cannot be recycled or reused. Coal is converted into ash after burning. It is not possible to get back coal from ash.

- 3) *Long-term exploitation of natural resources and sustainable development:* Resources are exploited carelessly for the short-term economic benefits by the developed countries all over the world. But, with the conservation of resources its proper use can derive greater economic benefits, e.g. the total economic value of a rainforest in Amazon and other areas is greater if the forest is utilized over a long span of time for tourism, pharmaceuticals, native foods and other uses than if it is cut down for a one-time short-term gain in lumber that leaves the forest unusable for decades or centuries. The total value of the rainforest is enhanced even more if extremely long-term environmental benefits are included such as the value of the forest for future generations.
- 4) *Methods of protection of environment:* Resources are exploited for the benefit of man but the exploitation is often done for the short-term economic profit. However, long-term economic and other gains (such as esthetic, emotional and environmental services) are greater if the emphasis is shifted to reducing resource-use. This can also be done in the following three ways: a) Conservation, b) Restoration of what has been degraded, and c) Preservation.

Conservation methods: It reduces use of resources and thus slows down depletion of resources and reduces pollution by slowing the flow of matter and energy through society and saves money e.g. Burning less coal by increasing a power plants efficiency not only saves coal but produces less acid rain and other types of pollution. There are three basic ways to conserve natural resources: i) Efficiency improvement, ii) Reuse/recycling, and iii) Substitution.

- 5) *Causes and consequences of disparities and sustainable development:* The Earth's surface is not even or same everywhere. Some parts of the Earth is accessible while other parts are inaccessible. Various regions of the Earth represent different characteristics in terms of climatic conditions – temperature, rainfall, vegetation, soil, development, etc. In view of these, population also is not evenly spread on the Earth's surface. Further scientific and technological developments and their applications are not uniform in different regions. As a result of all these, we find many disparities in development of people in different areas or regions of the Earth. More prominent disparities include: i) Rural-rural disparity; ii) Rural-urban disparity, iii) Rich-poor disparity, iv) Inter-religious disparity, and v) global or international or inter-country disparities.

We need to look into important factor that cause these disparities: a) Natural factors/conditions such as differences in agro-climatic conditions, endowment with natural resources or geographical location of a place with reference to its distance from a seaport or a centre of commerce determine the potential for economic development of an area or a region. Some natural conditions such as climate and natural endowments are largely invariable, while others can be improved through such infrastructure as roads to overcome isolation and irrigation to overcome arid conditions, and so on. b) Socio-cultural conditions/factors such as values and traditions that either encourage or discourage social and economic mobility, innovation and entrepreneurship, form a second set of factors. c) Different level of advancement in science and technology and their application in different countries forms third set of factors that caused disparities. d) The fourth set of factors is made up of policy decisions. Although rural and urban areas are by nature different, they together form one system; they are integrated in political and economic terms. Policy decisions that are positive for one part of a country or one sector of the economy can have positive and negative consequences for other parts or other

sectors. Differences in political power between rural and urban areas or between regions can result in intended or unintended biases in government policies. Policy decisions to leave the allocation of resources to the market or to invest scarce resources in places with the best growth potential benefit some areas and regions over others.

Sustainable and balanced development: Because of the complexity of the causes mentioned above, it is very difficult, if not impossible, to remove all disparities completely. However, it is possible and necessary to remove at least all “man-made” obstacles such as social constraints and policy decisions that stop people, areas and countries from developing their full capabilities for promoting their sustainable development to be followed by balanced development. Balanced development can be defined as the creation of equal opportunities, a level-playing field, for all people. The level-playing field will enable people to participate in development by contributing to, benefiting from and influencing decision-making about development. Such participation will provide people with income and assets, good health, knowledge, mutual respect and recognition.

- 6) Migrations have occurred throughout human history, beginning with the movements of the first human groups from their origins in East Africa to their current locations in the world. Migration occurs at a variety of scales: inter-continental (between continents), intra-continental (between countries on a given continent), and interregional (within countries). In many countries, one of the most significant migration patterns has been rural to urban migration – the movement of people from the countryside to cities in search of opportunities. People resort to migration when sustainability of their development is at risk or some times they may be forced to move involuntarily for various reasons. While there are positive and negative consequences associated with migration, negative consequences may affect their sustainable development significantly. These negative consequences may be economic, demographic, social, political, environmental, etc. These include over-crowding and slums in cities, deprivation of rural areas with out-migration of skilled and semiskilled people, selective male or female migration, unfavourable sex ratio in large cities as compared to rural areas due to high male immigration, anonymity, social vacuum and sense of dejection among individual-migrants in cities, and increase in anti-social activities like crime and drug-abuse, vulnerability of women, over-exploitation of natural resources, land, water and air pollution, increase in pressure on the existing social and physical infrastructure resulting in unplanned growth of urban settlements, and disposal of sewage and management of solid-wastes. All these have their effects on sustainable development of the people in the areas concerned.
- 7) Major environmental impacts of urbanization include the following.
 - *Rise in temperature:* Due to factors such as paving over formerly vegetated land, increasing number of residences and high-rise apartments and industries, temperature increases drastically.
 - *Air pollution:* Due to harmful emissions of gases and smoke from increasing number of factories and vehicles in urban areas air pollution is increasing. Current research shows high amount of suspended particulate matter in air, particularly in cities, which contributes to allergies and respiratory problems thereby becoming a huge health hazard.
 - *Water issues:* Water-cycle changes as cities have more precipitation than

surrounding areas. Due to dumping of sewage from factories in water bodies, water pollution occurs which can lead to outbreaks of epidemics.

- *Destruction of habitats:* To make an area urbanized, a lot of forested areas are destroyed. Usually, these areas would have been habitats to many birds and animals.
 - *Slums:* Settlement of poor people in congested areas lead to land, water and air pollution making these areas potential health hazards to other areas as well.
- 8) Major factors of deforestation include the following: i) Fires, ii) logging, iii) farming, iv) population expansion, v) growth of cities, vi) roads and highways, vii) politics, and viii) shifting cultivation.

Deforestation affects the environment in different ways. The main reasons for concern are old tropical rainforests that are disappearing very fast. These ancient forests absorb large quantities of carbon dioxide (CO₂) which not only regulates climate but also helps in slowing the global warming impact. The more the forests disappear the less the carbon emissions they sink. But, what is even worse is frequent use of slash and burn techniques which are constantly releasing huge CO₂ emissions into the atmosphere and is not absorbed adequately due to deforestation. Deforestation also has its impact on climate- change. If the trees are removed, the region cannot hold as much water and will become drier. If there are no trees, the land becomes far more unstable than before. The roots from the trees no longer exist and therefore it leaves the forest floor open to erosion and mudslides, etc. The local animals are affected just as much as the people. Their natural habitats are destroyed and species, possibly unknown to man, become extinct because they have nowhere to live. When the bulldozers knock the trees down, they are all caught in the destruction. The animals either end up in the cities or are killed or they starve to death in their new surroundings. Native people living in the forest areas are pushed out of their homes and have to encroach on more of the forest. They cannot go anywhere else because they only know how to survive on the plants in the forest. In this way more forest is destroyed and the cycle will probably continue until all forests are destroyed. The trees are large CO₂ stores, and when the trees are burnt they release this gas. This leads to an increase in the CO₂ levels in the air. Deforestation is a contributing factor to the *green- house effect*.

- 9) Climate-change refers to the variation in the Earth's global climate or in regional climates over time. It describes changes in the state of the atmosphere over time-scales ranging from decades to millions of years. Climate-change has been defined by many in different ways. While some define it as an offshoot of Earth's natural processes, others define it as a result of human activities. Striking a balance between these two varying perspectives, climate-change is defined as "a change which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere which is in addition to natural climate variability observed over comparable time-periods".
- 10) The atmosphere of the Earth contains small quantities of carbon dioxide, methane and nitrous oxide, collectively called *green-house gases* (GHGs) which act as a partial blanket that trap some of the outgoing infrared radiation and reflect it back to Earth thus keeping the surface warmer than it would otherwise be. In the absence of this *green-house effect* (trapping by GHGs) the Earth's mean temperature would be 30°C lower than it is, which would mean that the Earth would be an ice-

covered place. Thus, most of the present life forms on the Earth depend on the natural green-house effect for their existence. However, increase in the emission of these GHGs due to human activities causes the enhanced green-house effect. Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. Apart from the three natural GHGs (carbon dioxide, methane and nitrous oxide), the increased emission also includes several “man-made” gases including chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). Increase in the concentration of these GHGs tends to increase the surface temperatures. This rise in the average temperature of the Earth is called global warming, which is likely to lead to unprecedented climate-changes on a global scale threatening the ecosystems of the entire world.

Today, there is evidence that we are overloading the carrying-capacity of the Earth's atmosphere in terms of higher concentration of GHGs. Stocks of GHGs that trap heat in the Earth's atmosphere are accumulating at an unprecedented rate. Today, increasing number of scientists believe that we have already crossed into a new weather regime marked by extremes of all kinds. It is predicted that in the course of the 21st Century, average global temperature could increase by more than 5°C. Behind this prediction, there is an overwhelming fact that we are playing havoc with our environment, upsetting the ecological interdependence. In effect, our generation is compelling future generations to inherit an unsustainable ecological debt, which will jeopardize the future development and prosperity. It is, thus, the greatest challenge to sustainable development.

- 11) There are many impacts of climate-change on sustainable development. The most important of them include the following.
- Agriculture and crops failure leading to food insecurity.
 - Water-stress leading to water insecurity.
 - Rise in sea levels leading to increasing submersion of soil.
 - Damage to ecosystems and bio-diversity.
 - Climate-change and health hazards.

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