UNIT 1 SUSTAINABLE DEVELOPMENT: AN OVERVIEW

Structure

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1.1 INTRODUCTION

Sustainable development has become a buzzword in different forums, seminars, and workshops. You might have read and heard about this concept. In this unit you will know more about the concept. Sustainable development stands for meeting the needs of present generations without compromising the ability of future generations to meet their own needs. In other words, its a better quality of life for everyone now, and for the generations to come. It offers a vision of progress that integrates immediate and longer term objectives, local and global action. It regards social, economic and environmental issues as inseparable and interdependent components of human progress.

After studying this unit, you should be able to:

- Explain the meaning of sustainable development;
- Describe various components of sustainable development;
- Discuss various indicators of sustainable development; and
- Suggest measures for the promotion of sustainable development.

1.2 SUSTAINABLE DEVELOPMENT: CONCEPT AND DEFINITION

Sustainable development has become a buzzword in different forums, seminars, workshops. It is found much in environmental and economics literature these days. The concern for sustainable development is becoming increasingly louder with the rapidity of economic growth. Around the globe, throughout history, most modern human institutions have evolved in ways that are at best, oblivious, and, at worst, positively hostile to the health of environment. Economic development, till today, is based on two fallacious premises:

1) It considers needs of mankind alone and ignores the interdependent ecosystem

2) It treats the environment as a commodity.

Human being strives ceaselessly for riches as enslaved and obsessed by technological advancement and by obtaining higher GNP. This obsession has sullied the environment and is tending to ruin the carrying capacity that is, capacity

of the ecosystem to support life of Mother Earth. The land lays scarred and eroded. The waters of rivers, lakes and oceans are contaminated with industrial waste, which is nearly unfit for either industrial use or for human consumption. The air is filled with gaseous and particulate pollutants that are toxic to life. Pesticides used to promote agricultural production and public health has severely poisoned the environment. Each agent of production and consumption regards the disposal cost of waste as zero and uses the environmental sector as long as it permits human being to improve their own welfare. They do not have to pay anything to anybody. The environment is still regarded as common property, each agent acting as if the human being owns it. The reckless use continues, without any heed to the damage inflicted, and causes degraded environmental standards, unhealthy and detrimental to all.

"Our Common Future" marks the beginning of the sustainable development concept that has generated all the literatures. New books on sustainable development have been appearing with increasing rapidity since the United Nations Conference on Environment and Development popularly known as the Earth Summit held in Brazil in 1992. Divergent economic theorists like E. F. Schumacher of Britain, environmentalists like Barry Commoner and Lester R. Brown, population analysts like Paul Ehrlich, politicians like Willy Brandt of Germany and Jimmy Carter of the United States, all played significant roles in formulating ideas.

The era of modernisation has created an atmosphere of excitement of instant economic growth. In fact, all sectors of developing countries seem to be vibrating with economic buoyancy. There is expansion of trade, investment, market, and increase in Gross National product (GNP) productivity, per capita income, profit, efficiency, salary, etc, across the globe. The free trade system could more tellingly be called the free ride system. As the producers do not have to include in their product costs all the indirect costs they cause society. It includes pollution of the land, sea and air, ozone holes, disappearing topsoil, exploding health costs, allergies, global warming, destruction of species, pesticides in food, antibiotic-resistant bacteria, crime, unemployment, escalating social costs, etc. Many of the most common and most damaging products on the market would never be manufactured if they were priced at their real costs to society as a whole. The road to success in global business today is to find a way to pass on as many of your costs as possible to the public, preferably to another country's public. The most profitable companies at this time are those that are most successful at getting someone else to pay the real costs of their doing business. Present economic process maximises only the profits to the shareholders, while all the other stakeholders are left bearing the costs, such as, cleaning up the environment and dealing with unemployment.

The term, sustainable development, was coined by the Brundtl and Commission, which defines sustainable development as development that "*meets the needs of the present without compromising the ability of future generations to meet their own needs*". Sustainable development is defined as balancing the fulfilment of human needs with the protection of the natural environment so that these needs can be met not only in the present, but in the indefinite future. Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment. The field of sustainable development is conceptually divided into four general dimensions: social, economic, environmental, and

institutional. The first three dimensions address key principles of sustainability, while the final dimension addresses key institutional policy and capacity issues.

There is, now, a worldwide movement of environmentalism parallel to the more enthusiastic global movement of economic growth. Every section of people around the globe now expresses some amount of concern towards the deterioration of environmental standards. The rise in economic welfare is increasingly accompanied by a considerable decline in the quality of environment and loss of ecological stability. Some groups of environmentalist are very pessimistic while the other group of environmental scientists is very optimistic. But the fact remains that there is acid rain, global warming, the greenhouse effect, erosion and sterility of soil, degradation of land, environmental pollution and ozone layer depletion. There is widespread desertification in one hemisphere and deforestation in another hemisphere of the globe. Deeper and wider concern for environmental degradation springs from two major sources.

1) Rise in material production effluents and use of synthetic materials
2) Increased demand for environmental goods.

The first refers to the problems of environmental externality and the second, to depletion of natural resources. In addition to the increased supply of economic goods, there is also an increased demand for environmental goods. Environmental goods signify any external environmental conditions that affect human welfare. The following elements are connected with the human welfare

- Absence of all types of pollution
- Availability of clean water and air
- Quality of natural environment (outdoor recreation, etc)
- Quantity of natural environment(forest, wildlife)
- Availability of public utility systems
- Average space availability for inhabitants

In this session you read about the concept of sustainable development, now answer the questions given in *Check Your Progress 1.*

Check Your Progress 1

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

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

1) What is the need for sustainable development?

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2) What do you mean by sustainable development?

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1.3 COMPONENTS OF SUSTAINABLE DEVELOPMENT

In this section you will read about the various components of sustainable development. The three main components of sustainable development discussed here are

i) Interconnectedness of the system

ii) Sustainable development path

iii) Intergenerational approach.

i) Interconnectedness of the System

Traditionally we use numbers to show progress. Employment rose by 0.8 percent in January, or, the economy grew by 2% last year, air pollution has declined by 0.2 per cent, dowry death has increased by 1.3%, etc. However, the traditional numbers only show changes in one part of the community without showing the various links between the community's economy, society, and environment.

It is as if a community was made of three separate parts:

i) An economic part

ii) A social part

iii) An environmental part.

In this view, the parts do not overlap like the picture below (figure-1)

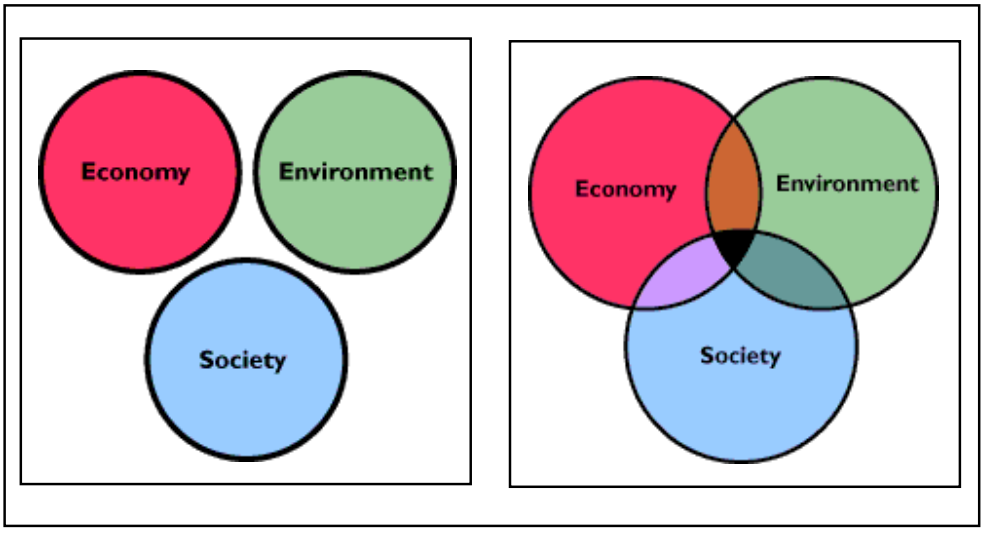

Fig. 1.1: Interconnectedness of the three systems

However, when society, economy, and environment are viewed as separate, unrelated parts of a community, the community's problems are also viewed as isolated issues. This piecemeal approach has a number of negative side effects. Sustainable development depends on the links between the economy, the environment and the society. Figure-1, above, is frequently used to show the interconnectedness of three systems. Understanding the three parts and their links is the key to understanding sustainability as sustainability is about more than just quality of life. It is about understanding the connections and achieving balance among the social, economic, and environmental pieces of a community.

Sustainable development is a dynamic concept, as a wide array of views fall under its umbrella. There may be as many definitions of sustainability and sustainable development. All the definitions have to do with:

- Living within the limits
- Understanding the interconnections among economy, society, and environment
- Equitable distribution of resources and opportunities.

Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality and social equity. Sustainable community development is the ability to make development choices which respect the relationship between the three E's, that is economy, ecology, and equity.

- **Economy -** economic activity should serve the common good, be self-renewing and build local assets and self-reliance.
- **Ecology** - humans are part of nature, nature has limits, and communities are responsible for protecting and building natural assets.
- **Equity** - the opportunity for full participation in all activities, access, benefits and decision-making of a society.

Figure 1.2 illustrates all three dimensions of sustainable development. Sustainable development cannot ignore any of the three. If we neglect the social dimension, the development process may be viable, if we disregard the environmental dimension, development process may be equitable and if we pay no heed to the environmental dimension, the development process may be bearable, but not sustainable.

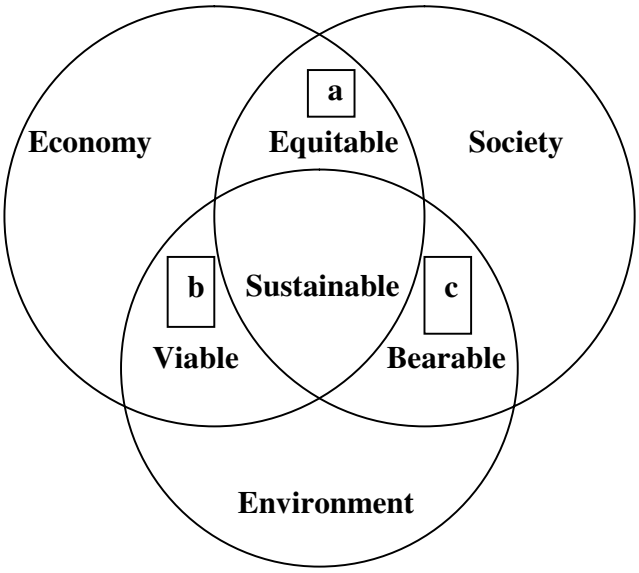

Fig.1.2: Sustainable Development

In other words, the search for equity

a) Neglects environmental aspects and the search for viability;

b) Neglects social dimension and the search for bear ability;

c) Ignores economic efficiency.

Thus, a sustainable development process is that trajectory which is a synergy of efficiency, equity and social acceptability. Sustainable development shows a compassionate concern for the posterity and for the world as a whole. It contends that social development, environmental soundness, and economic growth are not contradictory or incompatible. Healthy environment and good society are, rather, prerequisites for sustainable development. Sustainable development is based on a broader economic system which fulfils inter-generational equity criteria. Its objectives are focused on the future, not the present, quality not quantity, protection not production, conservation not consumption.

ii) The Path of Sustainable Development

Sustainability implies irreversibility in the process of development. It necessitates the maintenance of the level of wellbeing so that it improves, and, at the least, never allows a decline over time. Thus, sustainable development has three interdependent and mutually reinforcing pillars:

i) Economic development,

ii) Social development

iii) Environmental protection.

It does not focus solely on environmental issues. We should differentiate between green development and sustainable development. The proponents of green development prioritise environmental sustainability over economic and cultural considerations. But cultural diversity is as necessary for humankind as biodiversity is for nature. It is one of the roots of development understood not simply in terms of economic growth but also as a means to achieve a satisfactory social, intellectual, emotional, moral and spiritual existence. In this sense, cultural diversity is the fourth policy area of sustainable development. Developing countries are not only rich in biodiversity but also in cultural diversity. In Figure.3 illustrates the path of sustainable development. It shows that Path N is unsustainable and non-survivable. Development path E is efficient but not sustainable. But path S is sustainable. Path E looks more attractive, but Path S is not impressive in the early stage. Path E has a maximum point after which it curls down. But Path-S is slow and steady, having no maximum survival limit.

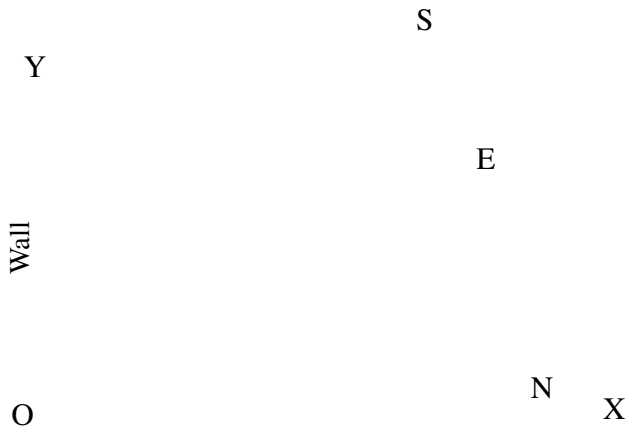

Fig.1.3: Sustainable Development Path

Source: Das (2009) Sustainable Development Path

Sustainability is related to the quality of life in a community. Whether its economic, social, and environmental systems that make up the community and it is providing a healthy, productive, meaningful life for all community, either present or in future. It involves following three questions -

i) How has your community changed, economically?

ii) How has your community changed, socially?

iii) How has your community changed, environmentally?

Thus, the field of sustainable development can be conceptually broken into three constituent parts:

i) Environmental sustainability

ii) Economic sustainability

iii) Socio-political sustainability.

Sustainable development integrates the imperatives of developmental and environmentalism. It highlights the long term doomsday scenario and puts emphasis on economic, social, and ecological integration. It has three objectives.

i) Economic efficiency

ii) Social acceptability

iii) Ecological sustainability.

Sustainability is an issue encompassing all the communities starting from small rural milieu that are fast losing the natural environment on which their livelihoods depend to large metropolitan cities where crime and poverty are decreasing the quality of life. Sustainability does not mean static equilibrium where nothing ever changes. Rather, it does it mean a utopia where nothing bad ever happens. Sustainability is not about maintaining the *status quo* or reaching perfection. It is not a community where nothing ever goes wrong. Sustainability does not mean that businesses never fail, or that people never go hungry, or that pollution never happens. The process of a sustainable development seeks to maintain and improve the economic, environmental and social characteristics of an area. The improvement helps its members so that they can continue to leading healthy, productive, enjoyable lives at present and in future. Sustainability implies that when problems arise, we look for solutions that take into account all three dimensions of the community instead of applying a quick fix in one area that causes problems in another. It is not against growth nor does it imply unlimited growth. Rather, at some point, a sustainable community stops getting larger but continues to change and improve, to develop in ways that enhance the quality of life for all its inhabitants.

iii) Intergenerational Approach

Sustainable development improves the economy without undermining the social or environmental imperatives. Sustainable development focuses on improving our lives without continually increasing the amount of energy and material goods that we consume. A sustainable community does not consume resources energy and raw materials faster than the regenerative capacity of the natural systems. We are currently living unsustainable lives.

If we are not careful how we use and dispose of resources, our children, grandchildren and great-grandchildren will have a poorer, more polluted world to live in. A sustainable community interacts with four types of capital:

i) Natural,

ii) Human,

iii) Social,

iv) Built capital.

All four types of capital need to be cared for. A sustainable community wisely manages all its capital - using and improving the social, natural and built capital in ways that allow that capital to continue to support that community in the future. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. An unsustainable situation occurs when natural capital (the sum total of nature's resources) is used up faster than it can be replenished.

Inherently, the concept of sustainable development is intertwined with the concept of carrying capacity. In fact natural capital, social capital, and economic capital are often complementary. Carrying capacity is the size of the population that can be supported indefinitely upon the available resources and services of supporting natural, social, human, and built capital. Living within the limits of an ecosystem depends on three factors:

i) The amount of resources available in the ecosystem

ii) The size of the population, and

iii) The amount of resources each individual consumes.

Thus, there is urgent need to develop an ecosystem approach, or inter generational approach for the management of natural capital and social capital. Ultimately, an ecosystem approach tends to evolve and change from a consumptive economy to an economy oriented towards conservation, maintenance of capital stock, and recycling of materials. Impoverishment of an ecosystem means the devastation of the entire society that depends upon it. Thus, an ecosystem approach is a compassionate concern for posterity and for the planet as a whole. Dismal economic growth is not enough to bring welfare to mankind. Man is an organic being, whose total development depends, to a large extent, on the non-economic, sociological, psychological factors, and, on a meaningful sustainable balance between him and the environment (social and natural) in which he lives.

There are many contradictions and inconsistencies in the goal of sustainable development. It poses a great dilemma and a great challenge. Confronting the challenge is very costly, but not facing the challenge is really disastrous for the whole society. However, the idea of sustainable development should be less idealistic and more practical. We do not have to choose between an environmentally healthy and economically robust nation. Both are compatible. We can have both. We are intelligent enough have the ability to develop enough new technologies and can change our behaviour enough to confront all the problems facing us, and to create optimal solutions.

1.4 INDICATORS OF SUSTAINABLE DEVELOPMENT

Indicators of sustainable development are more in the nature of indices that reflect the state of overall concepts or social goals such as human development, sustainable development, the quality of life, or socioeconomic welfare. Indicators provide early warnings about non sustainable trends of economic activity and environmental deterioration. They are the 'nutshell' indicators favoured by policy makers. Sustainable development indicators proliferated in the wake of the Rio Earth Summit's call for indicators of sustainable development (United Nations 1994, Agenda 21). Let us discuss a few selected indices of sustainable development.

Important indicators of sustainable development are:

i) Gross Sustainable Development Product

ii) Environmental Kuznets Curve

iii) Social Indicators for Sustainable Development

i) Gross Sustainable Development Product

Among different aggregation methods, green accounting is a common physical or monetary averaging. It is most commonly applied. The concept of Green GDP has been modified as Gross Sustainable Development Product (GSDP), which is defined as the total value of production after giving due care to social capital and natural capital of a region over a specified period of time. It is designed to replace the Gross Development Product (GDP) as the primary indicator of the economic performance of a nation. It takes into account:

- The economic impact/costs of environmental degradation
- Impacts of changes in quality systems on national income and wealth
- Global concerns and their impacts on the economy and ecology and society
- The welfare, economic development, and quality of life of future generations
- Expenditures on pollution abatement and clean-ups
- The status of each resource and the stocks and productive capacities
- The depreciation or appreciation of natural assets
- The ecological processes and biological diversity
- The costs of economic growth, resources uses of present and future generations.

The measurement of GSDP shows that consumption levels can be maintained without depleting and depreciating the quality and quantity of services for the present and future. It indicates the solutions to the problems as well as the directions to take, such as:

- Invest in technology, R and D
- Increase productivity and end-use efficiency

- Modify social services, educational programs
- Slow down or increase economic growth
- Remediate components of major quality systems; and
- Rectify present shortcomings of income and wealth accounts.

The measurement of GSDP also gives a proper and sound signal to the public, government and industry about the rate and direction of economic growth. It identifies environmental, health, and social quality; it identifies sustainable and unsustainable levels of resource and environmental uses; it measures the success or failure of sustainable development policies and practices; and it identifies resource scarcity. The primary goal of a sustainable local community is to meets its basic resource needs in ways that can be continued in the future.

ii) Environmental Kuznets curve

Some forms of pollution appear first to worsen and later to improve as countries' incomes grow. The world's poorest and richest countries have relatively clean environments, while middle-income countries are the most polluted. As of its resemblance to the pattern of inequality and income described by Simon Kuznets (1955) this pattern of pollution and income has been labelled an 'Environmental Kuznets Curve' (EKC). Grossman and Krueger (1995) and the World Bank (1992) first popularised this idea, using a simple empirical approach. Data are regressed on ambient air and water quality in cities worldwide on a polynomial in GDP per capita and other city and country characteristics. Then, plot the fitted values of pollution levels as a function of GDP per capita, and demonstrate that many of the plots appear inverse U-shaped, first rising and then falling. The peaks of these predicted pollution-income paths vary across pollutants, but 'in most cases they come before a country reaches a per capita income of $8000' in 1985 dollars (Grossman and Kruger, 1995, p. 353). In simple terminology, the EKC shows the relationship between the environmental degradation and the per capita income. The proponents of EKC are of the opinion that in the early stages of economic growth, degradation and pollution increase. But beyond some level of per capita income, the trend reverses, so that at high-income levels, economic growth leads to environmental improvement. This implies the environmental impact indicator is an inverted U shaped function of per capita income.

In the years since these original observations were made, researchers have examined a wide variety of pollutants for evidence of the EKC pattern. It includes automotive lead emissions, deforestation, greenhouse gas emissions, toxic waste, and indoor air pollution. Some investigators have experimented with different econometric approaches, including higher-order polynomials, fixed and random effects, splines, semi- and non-parametric techniques, and different patterns of interactions and exponents. Others have studied different groups of jurisdictions and time periods as well as have added control variables. It includes measures of corruption, democratic freedoms, international trade openness, and even income inequality (bringing the subject full circle back to Kuznets's original idea). However, some generalisations across these approaches emerge. Roughly speaking, pollution involving local externalities begins improving at the lowest income levels. Faecal coli form in water and indoor household air pollution are

examples. For some of these local externalities, pollution appears to decrease steadily with economic growth and we observe no turning point at all. This is not a rejection of the EKC; pollution must have increased at some point in order to decline with income eventually, and there simply is no data from the earlier period. By contrast, pollutants involving much-dispersed externalities tend to have their turning points at the highest incomes or even no turning points at all, as pollution appears to increase steadily with income. Carbon emissions provide one such example. This, too, is not necessarily a rejection of the EKC; the turning points for these pollutants may come at levels of per capita income higher than in today's wealthiest economies.

Another general empirical result is that the turning points for individual pollutants differ across countries. This difference shows up as instability in empirical approaches that estimate one fixed turning point for any given pollutant. Countries that are the first to deal with a pollutant do so at higher income levels than following countries, perhaps because the following countries benefit from the science and engineering lessons of the early movers. Most researchers have been careful to avoid interpreting these reduced-form empirical correlations structurally, and to recognise that economic growth does not automatically cause environmental improvements. All the studies omit country characteristics correlated with income and pollution levels, the most important being environmental regulatory stringency. The EKC pattern does not provide evidence of market failures or efficient policies in rich or poor countries. Rather, there are multiple underlying mechanisms, some of which have begun to be modelled theoretically. An example of EKC of sulphur emission is given below in Figure.4.

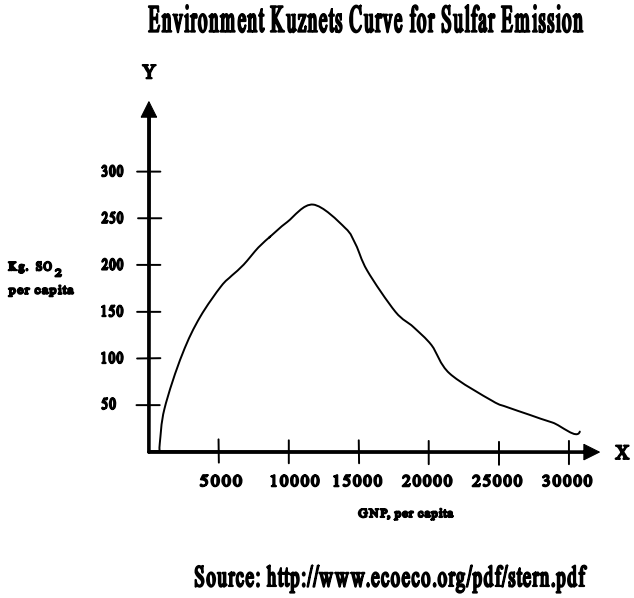

Fig. 1.4:

iii) Social Indicators of Sustainable development

The social indicators of sustainable development as framed by the United Nations Commission on Sustainable Development (CSD) in 1995 are broadly categorised as:

i) Poverty

ii) Governance

iii) Health

iv) Education

v) Demography.

i) Poverty: Poverty is considered as one of the key indicators of sustainable development. Nations with a high percentage of people living the poverty line can not sustain their level of development. The sub themes as well as the core and other indicators to be covered in the area of poverty are given in Table 1.1.

Table 1.1: Poverty Indicators for Sustainable Development

Sub Themes	Core Indicators	Other Indicators
Income Poverty	Proportion of population living below poverty line	Proportion of population below $1 a day
Income Inequality	Ratio of share in national income highest to lowest quintile	___
Sanitation	Proportion of population using an improved sanitation	___
Drinking Water	Proportion of population using an improved water sources	___
Access to Energy	Share of household without electricity or other modern energy services	Percentage of population using solid fuel for cooking
Living Conditions	Proportion of urban population living in slums	

Source: *Indicators of Sustainable Development: Guidelines and Methodologies*, United Nations, New York, 2007

ii) Governance: Governance is the second key indicator of sustainable development. Good governance is an essential element of sustainable development. The sub themes of the governance in sustainable development are corruption and crime. The indicators are given in Table 1.2.

Table 1.2: Governance Indicators for Sustainable Development

Sub Themes	Core Indicators	Other Indicators
Corruption	Percentage of population having paid bribe	___
Income Inequality	Number of international homicides per 1,00,00 population	___

Source: *Indicators of Sustainable Development: Guidelines and Methodologies*, United Nations, New York, 2007

iii) Health: The key indicators of sustainable health care are mortality, health care delivery, nutritional status and health status and risks. The core areas of these health care themes are delineated in Table 1.3.

Table 1.3: Health Indicators for Sustainable Development

Sub Themes	Core Indicators	Other Indicators
Mortality	Under Five Mortality Life Expectancy at Birth	Proportion of population below $1 a day
Health Care Delivery	Percentage of population with access to primary health care facilities Immunization against child hood diseases	Contraceptive prevalence rate
Nutritional Status	Nutritional status of children	—-
Health Status and Risks	Morbidity of major diseases such as HIV/AIDS, malaria, tuberculosis	Prevalence of tobacco use Suicide rate

Source: *Indicators of Sustainable Development: Guidelines and Methodologies*, United Nations, New York, 2007

iv) **Education:** As far as education is concerned, sustainable education includes educational levels and literacy. The core indicators of education are given in Table 1.4.

Table 1.4: Education Indicators for Sustainable Development

Sub Themes	Core Indicators	Other Indicators
Educational Level	Gross intake ratio to last grade of primary education Net enrolment rate in primary education Adult secondary (tertiary) schooling attainment level	—-
Literacy	Adult literacy rate	—-

Source: *Indicators of Sustainable Development: Guidelines and Methodologies*, United Nations, New York, 2007

v) **Demography:** The two vital demographic indicators of sustainable development are population growth and the dependency ratio. The indicators of demographic themes for sustainable development are given in Table 1.5. The high fertility rates and higher dependency ratios retard development. Therefore, sustainable development goals become difficult to attain.

Table 1.5: Demography Indicators for Sustainable Development

Sub Themes	Core Indicators	Other Indicators
Population growth rate	Total Fertility Rate	Ratio local residents to tourists in main tourist regions and destinations
Dependency ratio	Dependency ratio	—-

Source: *Indicators of Sustainable Development: Guidelines and Methodologies*, United Nations, New York, 2007

In this session you have read about the indicators of sustainable development, now answer the questions given in *Check Your Progress 2.*

Check Your Progress 2

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

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

1) What do you mean by Gross Sustainable Development Product?

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2) What is the Environmental Kuznets Curve?

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1.5 MEASURES TO PROMOTE SUSTAINABLE DEVELOPMEMNT

Sustainable development is an important development agenda of the 21st century and is one of the vital paradigm shifts in development. Countries have to take appropriate measures for the promotion of sustainable development. The United Nations has emphasised its institutional framework for sustainable development. It has mentioned for its attainment in its institutional framework for sustainable development, that good governance, sound economic policies, social democratic institutions responsible to the needs of the people and improved infrastructure is much needed. Moreover these are also the basis for sustained economic growth, poverty eradication, and employment generation.

Some suggested measures for the promotion of sustainable development follow.

1) The conservation of land, water and energy resources is fundamental for the promotion of sustainable development. Appropriate action has to be taken for the conservation of scanty resources. Conservation of resources by the present generation will provide future generation with widest range of possibilities.

2) The development of technologies and approaches which will minimise the environmental damages. Such development requires scientific knowledge and continuous investment.

3) Political and public support is critical to implement environmental targets.

4) Increasing the scope of public participation in environmental issues and, in particular, in planning processes.

5) Some countries have initiated good practices which are concomitant with the promotion of sustainable development:

   a) In Brazil, the bio-fuels programme has saved the country $100 billion in external debt-a fact that makes such fuels attractive in many countries

   b) In China, the promotion of vehicles that are more efficient.

   c) In South Africa, the implementation of carbon capture and storage technology brings benefits in terms of technology transfer.

The United Nations has strengthened and integrated the three dimensions of sustainable development policies and programmes, and to promote the full integration of sustainable development objective with social development issues.

In this session you read about measures to promote sustainable development, now answer the questions given in *Check Your Progress 3.*

Check Your Progress 3

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

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

1) What are the important measures for the promotion of Sustainable Development?

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2) Write a few good practices for sustainable development?

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1.6 LET US SUM UP

In this unit, we dealt with the definition of economic growth and characteristics of economic development. We discussed the merits and demerits of different measures of economic development. We dealt with the definition and components of sustainable development. We analysed sustainable development path, sustainable community ecosystem approach. We analysed different indicators of sustainable development: Green Economic GDP, Gross Sustainable Development Product, Genuine Progress Indicator and Global Living Planet Index. Finally, we discussed the role of indigenous knowledge in sustainable development.

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1.8 CHECK YOUR PROGRESS - POSSIBLE ANSWER

Check Your Progress 1

1) What is the need for sustainable development?

The need for sustainable development arises for two important reasons. Those are: (i) the current system of development considers development of mankind alone and ignores the interdependent ecosystem; and (ii) it treats environment as a commodity.

2) What do you mean by sustainable development?

According to the Brundtl and Commission "Sustainable development" is that which "meets the needs of the present without compromising the ability of future generations to meet their own needs." It has three components: a) Economy - economic activity should serve the common good, be self-renewing, and build local assets and self-reliance. b) Ecology - humans are part of nature, nature has limits, and communities are responsible for protecting and building natural assets. c) Equity - the opportunity for full participation in all activities, access, benefits, and decision-making of a society. It has three objectives: i. Economic efficiency, ii. Social acceptability, and iii. Ecological sustainability

Check Your Progress 2

1) What do you mean by Gross Sustainable Development Product?

The Gross Sustainable Development Product is the total value of production after giving due care to the social capital and natural capital of a region over a specified period of time.

2) What is the Environmental Kuznets Curve?

In simple terminology, the EKV shows the relationship between the environmental degradation and the per capita income. The proponents of EKV are of the opinion that in the early stages of economic growth, degradation and pollution increases, but beyond some level of per capita income, the trend reverses, so that at high income levels, economic growth leads to environmental improvement. This implies the environmental impact indicator is an inverted U shaped function of per capita income.

Check Your Progress 3

1) What are the important measures for the promotion of sustainable development?

The conservation of land, water and energy resources is fundamental to promotion of sustainable development. Appropriate action has to be taken for the conservation of scanty resources. Development of technologies, which would minimize the environmental damages, such development requires scientific knowledge and continuous investment. Increasing awareness of the public and policy makers on environmental quality and natural resources issues is critical to sustainable development.

2) Write a few good practices for sustainable development.

Some countries have initiated good practices which are concomitant with the promotion of sustainable development:

a) In Brazil, the bio-fuels programme has saved the country $100 billion in external debt-a fact that makes such fuels attractive in many countries.

b) In China, the promotion of vehicles that are more efficient and have similar “footprints” has the potential to address both energy security concerns and infrastructure constraints in a fast growing economy.

c) In South Africa, the implementation of carbon capture and storage technology brings benefits in terms of technology transfer.

UNIT 2 PUBLIC ADMINISTRATION AND SUSTAINABLE DEVELOPMENT

Structure

2.1 Introduction

2.2 Public Administration: Meaning, Scope and Significance

2.3 Role of Public Administration in Development of Nation States

2.4 Public Administration and Sustainable Development

2.5 Measures for Revitalization of Public Administration

2.6 Recent Global Challenges of Public Administration

2.7 Let Us Sum Up

2.8 References and Selected Readings

2.9 Check Your Progress- Possible Answer

2.1 INTRODUCTION

There is an increasing global realization that public administration can certainly help in achieving the goals of sustainable development. A number of international organizations including the UN have expressed their concern on the urgent need for public administration reforms. It is has been demonstrated at various levels world wide that goals of sustainable development can be achieved through a number of institutional innovations and reforms such as democratization and decentralization of decision making; developing legal and institutional frameworks and economic governance systems; implementing ethics and anti-corruption strategies at various levels in and out side government institutions; improving resource mobilization at various levels; introduction of better financial management systems; and tapping the potential of e-governance. In order to update and broaden the scope and the understanding of public administration roles in various sectors of government and non government institutions the UN agencies have been highlighting for greater interest targeting a variety of public administration revitalization measures undertaken world wide, to promote macroeconomic stability and economic growth, human development and achievement of the Millennium Development Goals. There is more thrust on the civil society participation in the policy and development process. More and more importance is laid in all development projects for responsiveness to citizen concerns, conflict prevention and resolution efforts, public safety and security. Some of the time tested components of management and governance like transparency and accountability, efficiency and effectiveness are also being considered components in all development projects. In this unit, an attempt has been made to describe, how to build public institutions at all levels, from local to national to global, in order to create a sustainable future.

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

- Describe concept and significance of public administration;
- Explain the scope of public administration in development projects;
- Analyse the role of public administration in meeting the goals of sustainable development;

- Discuss role of various institutions and people in achieving sustainable development.

2.2 PUBLIC ADMINISTRATION: MEANING, SCOPE AND SIGNIFICANCE

According to Handbook of Public administration, 1989 "Public administration houses the implementation of government policy and an academic discipline that studies this implementation and that prepares civil servants for this work". As a "field of inquiry with a diverse scope" its "fundamental goal... is to advance management and policies so that government can function." Some of the various definitions which have been offered for the term are: "the management of public programs"; the "translation of politics into the reality that citizens see every day"; and "the study of government decision making, the analysis of the policies themselves, the various inputs that have produced them, and the inputs necessary to produce alternative policies." Public administration is "centrally concerned with the organization of government policies and programmes as well as the behavior of officials (usually non-elected) formally responsible for their conduct".

Administration is as old as Mankind. It has existed ever since Man began to organize himself. Administration is a process common to all group effort, public or private, civil or military, large scale or small scale. The word 'Administration' is derived from the Latin word '*ad*' and '*ministrare*' which means to serve. Considered as an concrete activity, administration includes all types of Work necessary to achieve the goal in view it assumes myriad of shapes and forms in various subject matter fields; it is both skill and on art and its process is universally identical administration has been practiced from time immemorial only it form and style have been undergoing changes to suit the changing needs over the period of time.

Woodrow Wilson, who is considered the founder of the American Public Administration (the discipline), has worked on American public administration, and the big question for Wilson was how Americans could incorporate Public Administration into the Constitution which did not mention it. Also in developing Public Administration, Wilson's basic difficulty was how to reconcile the differences in notions of democracy (popular rule) and the systematic rules. To do this he says there are two spheres: "Politics" and "Administration" Politics = choices of government are made by the elected and Administration = carries out the choices by the (popular consent) free of political meddling "politics-administration dichotomy". Before entering into the science of administration Wilson felt it was needed that first there should be some account of the history of what others have done in the field, secondly there should be an ascertainment of its subject-matter, and thirdly the it should be determined the best methods to develop it and the most clarifying political conceptions to carry into it. Public administration is a segment of the wider field of Administration. Woodrow Wilson defines Public administration as "detailed and systematic application of law".

Scope of Public Administration

- Public administration is the whole government in action, it includes all operations having for their purpose the, fulfillment or enforcement of public policy.

- The science of public administration is an enquiry as to how Policies may best be carried in to operation.
- Public administration is concerned with "What"- the technical knowledge of a field which enables the administrator to perform his tasks; and the 'how- the technique of management according to which the programmes are carried to success.
- It involves, managing, directing and supervising the activities of thousands or even millions of workers so that some order and efficiency may result from their efforts.
- The core of the public administration is not the method management but the goods and services that are produced or tendered.

Significance of Public administration

The full scope of public administration would cover administrative theory and applied administration. The wellbeing of the nation (society) is increasingly dependent on the efficiency of the government (i.e.) public administration. The future of the civilized government and even the civilization rests on the competence, efficiency and efficacy of the Public administration. Every Individual in the modern society is concerned with and totally interlinked with public administration at every form of his or her life right from the cradle to the grave; nay even before his or her birth (in the form of pre-natal care of the expectant mother) to even after his or her death (proving his will and thereby taking care of his property in certain ways). Thus on account of the importance of public administration, it has been rightly described as the "Heart of Modern civilization".

Public administration deals with the organization of government policies and programs and the behaviour of officials who are responsible for this conduct. The role of a public administrator is to analyze public policies so that they come out in the right context and are eventually implemented as policies that benefit people at large. They are basically public servant and their role is seen across all government departments and agencies and they include police officers, cabinet secretaries, city managers, municipal budget analysts and census analysts. In other words, the aim of public administration is to ensure that all government bodies function normally and that there is no corruption in the handling of government activities. It further seeks to improve the effectiveness and efficiency of public services. UNDP has tried to define the role of public administration in the following words "Public administration seeks to foster relationships that are guided by respect for human rights, information sharing, and gender equality, rule of law, integrity and transparency. Our initiatives focus on building robust institutions at both national and sub-national levels, and are therefore closely integrated with UNDP's work in the area of local governance".

The UNDP focuses its support of public administration in four priority areas:

- Public administration and democratic change: UNDP promotes incremental steps towards reform, supporting the efforts of developing countries to shape public administration institutions into robust, representative, responsive and democratic institutions.
- Public administration and the MDGs: Public administration can play a key role in the equitable distribution of benefits and opportunities to all —

especially the poor, women and minorities — which is of particular significance in areas directly linked to the achievement of the MDGs.

- Public administration for state- and peace-building in post-conflict societies: UNDP seeks to increase attention to public administration and civil service management as an essential component of state-building in post-conflict societies.
- Public administration for environmental sustainability: UNDP works to strengthen public administration to better address climate change challenges, environmental sustainability and disaster risk reduction.

The role of public will need to provide the legitimate rules and organizational capacity required to promote societal transformations at all levels for a greener and more equitable economy. Many governments and public administrations still operate in an old development paradigm and do not have the capacity to mobilize the full range of stakeholders and introduce the wide spectrum of policies involved in bringing the three pillars consisting of society, economy and environment components of sustainable development together in an effective manner. In addition to the challenge of implementing cross-sectoral policies, they are struggling to translate global concerns into local action and local concerns into global actions. The mismatch between the international governance system and national and sub-national administrations leads to ineffective agreements and regimes with regards to implementation (Pinto and Puppimde Oliveira, 2008). The capacity to accelerate the transition to a greener economy rests necessarily on how public administrations can effectively incorporate the concept of sustainable development into their objectives and translate these objectives into results in practice.

2.3 ROLE OF PUBLIC ADMINISTRATION IN DEVELOPMENT OF NATION STATES

According to the Report of the Secretary General of the United Nations, in its 60th Session Item 43, Report of the Economic and Social Council, "Africa is a case in point. The dominant public policy and management issues in this region of approximately 650 million people are how to sustain ongoing governance and public administration reforms, alleviate poverty, restore normalcy to countries emerging from conflict and reconstruct institutions devastated by civil strife and, in some circumstances, by decades of dictatorial rule. Under the leadership of the African Union, and within the context of the New Partnership for Africa's Development (NEPAD), wealth creation is being pursued as a new strategy in the war on poverty".

At the present time, access to the basic necessities of life (food, potable water, housing, fuel and energy) is highly restricted in Africa. Social services and infrastructure have largely collapsed owing to a lack of resources for their upkeep. Life expectancy in the region declined from 49 years in 1999 to 46 years in 2001 owing largely to the impact of HIV/AIDS, malaria and tuberculosis.3 However, life expectancy in Africa is projected to rise to 51.3 years by the end of 2010 and to reach 69.5 years by 2045.4 Nevertheless, recent forecasts indicate that, in the absence of a substantial infusion of resources, child poverty in the world's poorest countries (a significant number of which are in Africa) will not be reduced within

the 15 years expected by the Millennium Development Goals, but in 150 years. The Human Development Index has not improved significantly from 1997 (0.463) to 2001 (0.468). Between 1975 and 1999, 22 countries suffered setbacks in the human development index. Of that number, 13 (that is, more than half) were in Africa (UN, 2005).

Similarly, with respect to the Middle East and North Africa, the dominant revitalization concerns are how to enhance the capacity of public administration systems to engineer high economic growth rates, respond to the needs of the people (particularly young persons) and ensure peace and security within and across countries. Like sub-Saharan Africa, the Middle East and North Africa is confronted with the challenges of economic growth and, to a lesser degree, of poverty alleviation. Not so long ago, the Middle East and North Africa achieved high (almost 10 per cent) gross domestic product (GDP) growth rates. Impressive economic performance enabled the region to invest in human and infrastructure development. In recent years, GDP growth rates within the region have averaged less than 2 per cent. Trade deficits and falling per capita growth continue to pose significant public policy and management challenges in the diversified (non-oil) economies.

With regard to Asia and the Pacific, the revitalization of public administration has to address enormous poverty alleviation and human development challenges. With a population of 3.4 billion, Asia and the Pacific is faced with enormous challenges in the area of human development. Of the 1.2 billion people living in extreme poverty (living on less than one United States dollar per day) worldwide, two thirds are in Asia. While the aggregate poverty ratio has fallen in recent years (rural poverty declined from 39 to 28 per cent and urban poverty fell from 24 to 20 per cent between 1990 and 2000), poverty remains a formidable challenge in the region. The solution would at first appear to lie in the design and implementation of policies geared towards economic growth. However, the tsunami tragedy of December 2004 introduced another dimension in public policy — the need for the capacity to anticipate climatic, environmental and other changes impacting on the life and well-being of the people. Therefore, in addition to economic growth and poverty alleviation concerns, public administration revitalization must of necessity include the competence to read early warning signals and institute the necessary proactive measures (UN, 2005).

The challenges facing the Commonwealth of Independent States (CIS) include how to build and strengthen the institutions capable of engaging in a variety of activities, among them, sustaining the wide-ranging governance and economic transformation that started in the 1990s; confronting the risk of State capture by organized crime; generating economic growth; creating gainful employment; improving the people's living standards; and ensuring regional peace and stability. Proximity to the European Union (EU) serves as an additional incentive to public administration reform in a number of the CIS member States. 17. Latin America and the Caribbean, with a combined population of 518.8 million, face a major challenge in poverty eradication. Of the total population, close to 221 million, or 44 per cent, live in poverty. Of the 221 million classified as poor, 19 per cent are in a state of extreme poverty. The incidence of poverty is higher in rural than in urban areas (54 per cent of rural and 30 per cent of urban households can be classified as poor). The region made substantial progress towards poverty reduction in 1997 only to backslide since then. Between 1999 and 2002, the

incidence of poverty rose from 43.8 to 44.0 per cent, while the ratio of people in extreme poverty stayed at 19.4 per cent. Over-reliance on market mechanisms contributed to jobless growth, the gradual collapse of public services and the deepening of poverty and inequality. There are, however, growing signs of a turnaround. Besides taking proactive measures at home, Governments within the region are sponsoring regional cooperation initiatives aimed at stimulating economic growth and improving people's living standards (UN, 2005).

2.4 PUBLIC ADMINISTRATION AND SUSTAINABLE DEVELOPMENT

Sustainable development can be defined as the environmental, economic and social well-being for today and tomorrow. The term 'Sustainable Development' became popular in the beginning of the 1990s, particularly after the 1992 Rio Conference (United Nations Conference on Environment and Development) and the release of the Brundtland Report. The term definitively broke the competition between environmental protection, economic and social development objectives, offering the possibility that all three could come together without a trade-off, at least in theory. However, this has not always held true in practice. Even though social and environmental awareness have increased and there are many good examples of sustainable development at the small scale, the world has become dangerously more unsustainable over the past two decades. The challenge of sustainable development cannot be underestimated. It will require a substantial transformation of the present economic development model, analogous to the transition economies underwent with the industrial revolution. According to the most frequent definition as given by the Brundtland Report, which defines sustainable development as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It has two key concepts of needs and the idea of limitations.

The ecosystems have been suitable examples of sustainable biological systems along with the biogeochemical cycles. A condition of unsustainability occurs when the natural resources are used up faster than it can be replenished. The long-term result of environmental degradation is the inability to sustain human life and such degradation on a global scale would result in the extinction of the humanity. On our planet's 20% of the population consumes 80% of the natural resources making sustainable development almost impossible.

The history of sustainable development is littered with well-intended but ill-designed or ill-executed policy initiatives. The past 20 years has witnessed a number of institutional innovations at the local, national and global levels to facilitate the integration of the three pillars of sustainable development and better align global, national and local actions. Developing countries have an opportunity to introduce these policies, managerial and technological innovations in the early stages of economic development and to avoid the costs associated with some of the unsustainable paths taken by today's developed countries. This write up tries to examine some of these innovations and to discuss options to scale them up to produce wide-reaching governance and economic change. A broader policy dialogue on public administration reforms is needed if we are to steer a course towards a new 'industrial' revolution towards sustainability. The role of public administration discusses the political, managerial and social challenges of

translating the concept of sustainable development into action. It reviews the two-century-old debate surrounding the existence of limits to growth and the different economic development paradigms rooted in this debate.

Industrial revolution had resulted in an exponential increase in the human consumption of resources and an increase in health, wealth and population. The combination of population increase in the developing world and unsustainable consumption levels in the developed world poses a challenge to sustainability. Other human impacts like air pollution, the pollutants like nitrous oxide, sulphur oxides, particulate matter, carbon dioxide etc accumulate in the atmosphere lead to the global warming and climate change. The impacts of global warming have resulted in the unsustainable conditions for the humans as well as ecosystems. The rising sea level, increasing temperature, variable precipitation and drought conditions, increasing weather extremes like cyclones, heat and cold waves are all impacting the sustainability. The corals are bleaching due to ocean warming and ocean acidification due to increasing levels of dissolved carbon dioxide. Increasing urbanization pollutes clean water supplies hence making it unfit for use. The changes in the land use change pattern by the humans are resulting in the loss of biodiversity due to habitat loss and fragmentation. Land use change is fundamental to the operations of the biosphere because alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have a marked effect on the global water, carbon and nitrogen biogeochemical cycle and this can impact negatively on both natural and human systems. The environmental costs of food production are topsoil depletion, erosion and desertification, overgrazing, salinization, sodification, water logging, high levels of fossil fuel use, reliance on inorganic fertilizers and synthetic organic pesticides, reductions in genetic diversity by the excessive use of monocultures, water resource depletion, pollution of water bodies by run-off and ground water contamination. In the second half of the 20th century world population doubled, food production tripled, energy use quadrupled, and overall economic activity quintupled. Unsustainable economic growth has been compared to the malignant growth of a cancer because it eats away the Earth's ecosystem services which are its life-support system. All of these environmental problems associated with industrial agricultural and agribusiness are now being addressed through such movements as sustainable development and organic farming and more sustainable business practices.

In this session you have read about public administration: concept and significance, role of public administration in development of nation states and public administration and sustainable development. Now answer the questions given in *Check Your Progress-1*.

Check Your Progress 1

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

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

1) What is the meaning and significance of public administration?

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2) What is the relation between public administration and sustainable development?

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2.5 MEASURES FOR REVITALIZATION OF PUBLIC ADMINISTRATION

The complex and dramatic challenges facing the world place a heavy burden on public administration. The signs on the horizon also point to increasing awareness on the part of Governments and their civil society partners that the world of public administration is on the threshold of change and that assistance is needed in making the right choices. The countries that responded to the questionnaire confirmed this observation and provided concrete evidence of measures instituted to reform and revitalize their public administration systems during the past 10 years. The measures adopted by many countries in recent years to reform and strengthen public administration systems differ from those instituted in the 1980s and the early 1990s. First, in contrast to the revitalization agendas of the 1980s, which were formulated at the insistence of external financial and donor institutions, recent reforms are more likely to be "home-grown" and directed at specific problems and challenges. Second, rather than focusing narrowly on cost-cutting issues and seeing public administration revitalization from a doctrinaire, supply-side economics angle, recent revitalization measures have multiple objectives and rely on a variety of pragmatic change management strategies. Above all, contemporary revitalization measures differ from earlier ones in terms of the emphasis given not only to the application of "business" and "customer satisfaction" techniques — a carry-over from the early days of New Public Management — but also to the entrenchment of fundamental public service values and ethics.

The challenges highlighted in the preceding paragraphs have in one way or another informed the actions taken to revitalize public administration systems in the past 10 years. While the responses to the questionnaire administered by the Secretariat pointed to the differences in the Member States' priorities, they also highlighted issues of common concern. Fine-tuning and consolidating New Public Management reforms and applying information and communication technologies to internal management and external service-delivery processes are among the dominant concerns in well-established public administration systems. By contrast, in the former command economies of Central and Eastern Europe, the western Balkans and the Commonwealth of Independent States, and in many of the emerging market economies of Asia, Latin America and, to some extent, the Middle East and Africa, the raison d'être of public administration revitalization was to prepare public administration systems for the challenges of democratic governance and for the implementation of market reforms. In countries emerging from conflict, revitalization was expected to be an integral part of the State

reconstruction process, and a means of stemming the decay of State and civil society institutions.

Within the European Union (and among the Organization for Economic Cooperation and Development (OECD) member countries), public administration revitalization is at once a straightforward and complex exercise. For the older members of the European Union, whose administrative systems are founded on more or less similar and deep-rooted values, revitalization simply entails reorienting internal processes towards external demands, rather than subjecting the systems to radical, roots-and-branch restructuring. In recent years, however, the longer standing members of the Union have had to grapple with complex public policy challenges, not the least of which is the reconciliation of citizen expectations with fiscal and budget constraints. The recent "No" vote in France and the Netherlands is putatively a rebuff to the draft constitution of the European Union, but the verdict actually highlights a deepening concern on how to resolve the crisis of the welfare state. That crisis has far-reaching implications for public administration revitalization in the EU as a whole. For the new members, entry into the Union marks a major turning point at which difficult public choices have to be made, and substantial adjustments in institutions, management practices, and processes become absolutely essential. Since the EU is a community of values, the new entrants would, in forging ahead with their public administration revitalization plans, need to bring recruitment, promotion and service-delivery standards up to the EU level and ensure that public officials subscribe to a common code of professional ethics (Glemarec and Oliveira, 2012).

2.5.1 Emerging Revitalization Measures and Trends

According to Glemarec and Oliveira (2012) there are strong indications of commitment to the revitalization of public institutions worldwide. The recent eagerness to embrace change goes against the trend that started in the 1980s when public service reform was, in many countries, a part of cost-cutting economic restructuring programmes, implemented at the urging of international financial and donor institutions, and widely perceived as an "external imposition". In much of today's world, and as Governments acknowledge the necessity to reassess the workings of public administration and to orient public institutions towards citizen concerns, revitalization is viewed not as a bitter pill to be reluctantly swallowed, but as a natural and prudent response to escalating challenges. The major challenge is how to make a transition from commitment to action. This requires forging strong coalitions for change.

Not withstanding differences within and across regions, the rationale frequently cited for embarking on revitalization efforts includes the following:

a) Promoting ethics, transparency and accountability;

b) Enhancing public service efficiency and effectiveness, especially in the delivery of public services (however, interest in performance and productivity management and in value-for-money auditing has been particularly observed in developed economies, emerging markets and economies in transition);

c) Ensuring the responsiveness of public administration to citizen needs and legitimate demands (through the adoption of citizen charters, dissemination of service pledges, and implementation of quality service initiatives);

d) Promoting human development (and achieving the Millennium Development Goals);

e) Promoting economic growth and macroeconomic stability (by acquiring and applying the capacity to implement programmes geared towards promoting investor confidence and creating an environment conducive to private sector participation in development).

Other reasons cited for revitalizing administrative systems, though less frequently than the preceding ones, are as follows:

a) Preventing and resolving conflict, and development of emergency preparedness and community policing (for countries faced with threats to security or emerging from conflict);

b) Applying information and communication technologies to improve internal management processes and external service delivery systems, and promoting civil service automation (this is especially the case in well-established and rapidly changing administrative systems);

c) Repositioning the public service for the challenges of democratization and economic liberalization (Africa, Central, Eastern and South eastern Europe and the Commonwealth of Independent States);

d) Promoting popular participation in local governance and implementing decentralization programmes (an aspect of democratic reform);

e) Creating an environment conducive to private sector growth and development;

f) Coupling pay and employment reforms with the reassignment of posts and miscellaneous redundancy management programmes.

Among the issues on which there is a convergence of views are those relating to the integrity, efficiency, effectiveness and responsiveness of public institutions, as well as to the significance of the role played by those institutions in promoting economic growth, macroeconomic stability and human development. Without reading too much unanimity into the responses from the Member States, it is possible to add that the measures and strategies frequently applied by countries in achieving their revitalization objectives include the enactment of new laws and regulations (cited by 73.7 per cent of the respondents), personnel and human resources management and training (68.4 per cent), organizational restructuring (65.8 per cent), the adoption of anti-corruption measures (55.3 per cent) and the deployment of information and communication technology capacities to provide quality service (55.3 per cent). At the same time, privatization and enhancement of the law-making capacities of the legislature were among options not frequently cited (36.8 and 39.5 per cent respectively). A few of the responses indicated the challenges encountered in outsourcing essential services, particularly the challenges of accountability and quality control (Glemarec and Oliveira, 2012).

For countries emerging from dictatorial rule, particular emphasis has been given to the enactment of career-oriented civil service laws; the creation or strengthening of institutions responsible for public service management; the review of recruitment practices to ensure that they conform to the highest standards of integrity, competence and professionalism; entrenchment of the values of political

impartiality and non-partisanship; adoption of measures to insulate the "career service" from political influences; and the organization of programmes to provide training and upgrade skills. Reports of experiences in "engaged governance" in some countries further testify to the importance accorded by recent revitalization programmes to issues of concern to the people. In addition to promoting the adoption of participatory development planning and budgeting approaches, the programmes have led to the establishment of one-stop service-delivery centres in national public administration systems. Variously termed "citizen centres", "service assistance to citizens", or "people first", these quality service initiatives have one common objective — to place public administration at the service of the people and, by so doing, to alleviate poverty and promote development.

One item that consistently appears on revitalization agendas in all regions of the world is public integrity. It is a revitalization challenge that transcends geographic, economic, socio-political and cultural boundaries, and it serves as a linchpin in contemporary revitalization efforts. The growing interest in public integrity (also referred to as "ethics and values", "ethics and accountability", "transparency", etc.) should not come as a surprise. Aside from its role in consolidating the gains of fiscal, macroeconomic, management, institutional and other "technocratic" reforms, the focus on integrity proves critical in reviving and reasserting traditional public administration values and ethos, particularly those that had, in a number of countries, succumbed to systematic politicization or had been subverted by the tendencies of New Public Management towards "corporatization" and the downgrading of rules.

Over and above the measures reported by the respondents, the actions taken to date attest to the importance accorded to public integrity worldwide. Particularly in the last five years, when reports of ethical violations have undermined citizen trust in public and business organizations, Governments in different parts of the world have mounted multipronged assaults on grand and petty corruption. Among the measures adopted are the enactment of strict anti-corruption laws; the establishment of anti-corruption, assets declaration and allied watch-dog bodies; the restructuring of judicial and law enforcement agencies; and the enhancement of the agencies' investigative, data-gathering and information-sharing capacities. Freedom-of information laws were enacted in a few countries, and in many others civil society organizations and the media were enlisted as allies in the fight against corruption. Over time, a broad measure of consensus was reached on the outline and contents of global and regional anti-corruption conventions — examples of which are the United Nations Convention Against Corruption;9 the United Nations Convention against Transnational Organized Crime;10 the Inter-American Convention Against Corruption adopted by the Organization of American States on 29 March 1996; the Convention on Combating Bribery of Foreign Officials in International Business Transactions, adopted by the Organization for Economic Cooperation and Development on 21 November 1997; and the African Union Convention on Preventing and Combating Corruption, adopted by the Heads of State and Government of the African Union on 11 July 2003.

The measures adopted within and across countries to entrench the principles of merit, professionalism, accountability, "customer care" and citizen responsiveness complement efforts at mainstreaming high ethical standards in public administration systems. From the western Balkans, through Central and Eastern

Europe, the Commonwealth of Independent States, to Latin America, the Middle East, Asia and the Pacific, and Africa, a great deal of effort has gone into the enactment of laws and the formulation of codes aimed at delineating the "career service" from offices falling within the political patronage net. Examples include the miscellaneous civil service laws enacted in countries preparing to join the EU, the Charter for the Public Service in Africa adopted in Windhoek, Namibia, by the Third Pan-African Conference of the Ministers of Civil Service in February 2001 and the Ibero-American Charter of Public Service adopted in Santa Cruz de la Sierra, Bolivia, by the fifth Ibero-American Conference of Ministers for Public Administration and State Reform on 27 June 2003. The "customer care" and the supporting productivity measurement and performance management initiatives launched in various countries should, if vigorously pursued, give concrete expression to the quest for professionally competent, ethically sound and citizen-responsive public administration systems, and strengthen the capacity of public institutions to meet development challenges. The challenge, however, is how to ensure enforcement of those measures (Glemarec and Oliveira, 2012).

2.6 RECENT GLOBAL CHALLENGES OF PUBLIC ADMINISTRATION

There is a global consensus that urbanization and economic development are complementary to each other. Global urban population being only three per cent in 1800, 13 per cent in 1900 and 30 per cent in 1950 has crossed 50 per cent mark in the year 2007 (UN, 2007). This journey of urbanization has witnessed a rapid pace of industrialization and expansion of business, industry and trade covering a sequence from Europe to America, Japan, NICS (Newly Industrialized Countries), ASEAN (Association of South East Asian Nations), China and South Asia. This dispersal of economic activities associated with competitive edge confirms that cities and towns are specifically known for their economic function and have economies of scale and economies of settlements (Michael Cohen, 1990). It is noted that urban economies account for 55 per cent GDP in low income countries, 73 per cent in middle income countries and 85 per cent in higher income countries (World Bank, 1999, Elements for a New Strategy on Urban Development and Municipal Issues, Washington, D.C., World Bank). Therefore, cities and towns being engines of economic growth acquire crucial role to achieve national policy objectives of a welfare state. Accordingly national policies across the board are giving emphasis on urban development and associated delivery of services and infrastructure to a cross section of households (Pandey, 2012).

In order to address the issues arising due to the process of urbanization and other related unsustainable economic issues, increasing gap between rich and the poor, unsustainable harvesting of natural resources at different levels and increasing social maladies led to grow pubic concern at national and international levels. As a result, in 1992 the world leaders met at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro, the largest gathering of heads of states or governments to have ever been organized until then, promising to chart a development path that is equitable, environmentally just and economically rewarding. They recognized, under the call for 'sustainable development' that a different kind of development was needed, one which would simultaneously achieve the economic, social and environmental objectives of

human development. Twenty years after UNCED, the Rio + 20 Summit again met to re affirm past commitments, but, even more importantly, accelerate their implementation by focusing on the greening of the economy, promoting social equity and improving environmental governance. A fundamental and often overlooked pre-requisite to achieve sustainable development is the role and capacity of public institutions. Practice has shown that public institutions faced a number of challenges to translate political will and policy change into action. Therefore, to deliver a new development paradigm, we need to strengthen the 'visible hand' of public institutions worldwide to supplement the so-called invisible hand of markets. In view of these initiatives by the UNCED, there started more discussions and actions on the role and newer dynamics of public institutions all across the world particularly after liberalization and globalization of economy all across.

The social and economic fibre of global societies have undergone tremendous change due to the process of urbanization, modernization, increased awareness and public participation in development and decision making. The processes of globalization and political and economic change have introduced socio-economic changes taking place worldwide. The challenges confronting public administration systems as the developed and the developing countries have implemented different types of innovative and capacity-strengthening initiatives at different levels. All these have also multiplied and introduced new challenges into the realm of public administration worldwide. The world has also witnessed the accelerated development of information and communication technologies, the emergence of trading blocs and economic unions. The rural to urban mass migrations accompanied by the increasing pressure on urban resources and the increasing number of urban poor and unemployed youths have posed serious rich and poor divide in developing countries particularly India are some of the new challenges before the government and the public administration. The other types of new emerging challenges include growing intercultural interactions economic liberalization, expanding opportunities for the movement of goods and capital, climatic and environmental changes with catastrophic consequences. Some of the more recent ones include the marketing of new drugs and genetically modified food products and the discovery of mysterious diseases that recognize no political or geographical boundaries have compounded the ever increasing challenges for public administration.

Many developing and under developed countries are still struggling with the new realities of globalization and liberalization and are yet to introduce few desired and required reforms in governance and economic policy. While the developed nations have already moved much ahead in terms of certain reforms in the functioning of the government and administration, but many developing countries are yet to begin their reforms in order to meet the new challenges due to liberalization and globalization of world trade, production and economy. Some of the events, which have far reaching consequences world wide like the events of 11 September 2001, which has placed security firmly on the public policy agenda in a number of issues and countries. Now, there is more realization that security needs to be broadly defined to include human concerns, particularly concerns for the socio-economic welfare of the people.

It is also important to understand here that how quickly the developing countries, particularly the least developed ones, improve their economy, and emerge from

poverty and achieve improved living standards depends partly on the support of the international community but also on the effectiveness of national public administration systems in implementing the poverty reduction components of the Millennium Development Goals. Those concerns explain the attention given in recent years to measures aimed at enhancing the policymaking capacity and the service-delivery capacities of public administration systems worldwide. The objectives and strategies of public administration revitalization are as varied as the challenges encountered at different times and places. This is to be expected. In a world characterized by diversity of culture and by disparities in socio-economic and political conditions, public administration revitalization cannot be projected in a monochromatic format, but rather in a way that vividly brings out the various hues and circumstances distinguishing one environment from another (UN, 2005).

In this session you have read about means for revitalizing of public administration, recent global challenges and public administration. Now answer the questions given in *Check Your Progress-2.*

Check Your Progress 2

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

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

1) What are some of the measures for revitalizing public administration?

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2) Discuss some of the recent global challenges with regard to public administration?

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2.7 LET US SUM UP

Public Administration can certainly help in achieving the goals of sustainable development. Sustainable Development can take place in a more efficient manner if public administration officials are honest and willing to take risks to perform better. For this there is an urgent need for public administration reforms. It is has been demonstrated at various levels worldwide that goals of sustainable development can be achieved through a number of institutional innovations and reforms such as democratization and decentralization of decision making; developing legal and institutional frameworks and economic governance systems;

implementing ethics and anti-corruption strategies at various levels in and outside government institutions; improving resource mobilization at various levels; introduction of better financial management systems; and tapping the potential of e-governance. Ultimately, an efficient government is an instrument of change, a change which will secure and preserve resources for the future generations.

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2.9 CHECK YOUR PROGRESS - POSSIBLE ANSWERS

Check Your Progress 1

1) What is the meaning and significance of public administration?

Public administration is the whole government in action; it includes all operations having for their purpose the fulfillment or enforcement of public policy. The wellbeing of the nation (society) is increasingly dependent on the efficiency of the Government (i.e.) Public administration. The future of the Civilized Government and even the Civilization rests on the competence, efficiency and efficacy of the Public administration.

2) What is the relation between public administration and sustainable development?

The role of public administration discusses the political, managerial and social challenges of translating the concept of sustainable development into action. Public administration can implement ethics and anti-corruption strategies at various levels in and outside government institutions; improving resource mobilization at various levels; introduction of better financial management systems etc.

Check Your Progress 2

1) What are some of the measures for revitalizing public administration?

Some of the measures for revitalizing public administration are:

a) Promoting ethics, transparency and accountability;

b) Enhancing public service efficiency and effectiveness, especially in the delivery of public services

c) Ensuring the responsiveness of public administration to citizen needs and legitimate demands

2) Discuss some of the recent global challenges with regard to public administration?

Some of the recent global challenges include growing intercultural interactions, economic liberalization, expanding opportunities for the movement of goods and capital, climatic and environmental changes with catastrophic consequences. The marketing of new drugs and genetically modified food products and the discovery of mysterious diseases that recognize no political or geographical boundaries have compounded the ever increasing challenges for public administration.

UNIT 3 NATURAL RESOURCE MANAGEMENT AND ENVIRONMENT

Structure

3.1 Introduction

3.2 The Meaning and Types of Natural Resources

3.3 Biodiversity: Our Strength

3.4 Exploitation of Natural Resources

3.5 Threats to Biodiversity

3.6 Conservation of Biodiversity

3.7 Management of Natural Resources

3.8 Let Us Sum Up

3.9 References and Suggested Readings

3.10 Check Your Progress - Possible Answers

3.1 INTRODUCTION

The need to preserve natural resources for future generations is one of the most critical issues on the national and the global agenda is the need to preserve. It also meets present day requirements. Today, the entire world has awakened to the need for sustainable development by maintaining judicious use of the natural resources and adopting developmental models and policies assuring proper environmental protection. It is well known that humans across the globe are not only polluting nature and destroying it thorough an aggressive expansion of urbanisation *vis-à-vis* consumerism. Rightly it was pointed out by Mahatma Gandhi, that *there is enough in nature for human need but not for human greed*. Some 11,000 years ago, agriculture started in the lap of nature. In the beginning, it was a beautiful synergy between human technique and rhythmic nature, gradually this relationship became less friendly and finally it became tarnished. In the aftermath of the Second World War, unabated mechanisation as well as increasing use chemicals have transformed our agriculture into a huge source of pollution of the environment.

After studying this unit, you should be able to:

- Explain the role of natural resources in the lives of human beings
- Discuss the impact of development activities on the natural resource base
- Describe the impact of development on the natural resource management strategies
- Explain the role of various government bodies in the management of natural resources
- Differentiate the factors responsible for the depletion and over exploitation of natural resources
- Identify the various threats in the management of natural resources.

3.2 THE MEANING AND TYPES OF NATURAL RESOURCES

Nature has been defined as the omnipresent expanse, definite and indefinite, created and evolving, having all the biotic, abiotic and social dimensions, evolving within, and around life forms and life process.

The following definition may be used for understanding the natural resources:

"*The sum total of all physical, chemical, biological and social factors which construct the surroundings of man is referred to as environment and each element of these surroundings constitutes a resource on which man thrives in order to develop a better life*". Any part of our natural environment, such as land, water, air minerals, forest, rangeland, wild life, fish, micro organisms, or even human population – that man can utilise to promote the welfare, may be regarded as a natural resource.

There are two types of natural resources:

i) Exhaustible

ii) Inexhaustible.

Exhaustible resources are limited in nature and liable to be degraded in quantity and quality by human activities. The examples are forests, soil, water and fossil fuels, etc. Inexhaustible natural resources are unlimited in nature, and they are not likely to be exhausted by human activities, like solar radiation, air, and precipitation.

Environment: The environment is everything which surrounds an organism and influences its life in many ways. It includes physical and biological components. The physical components of the environment are soil, water, air, light and temperature. These are termed abiotic components. The plants and animals are collectively referred to as biotic components. All these components of the environment work together, interact and modify the effects of one another.

Water: About 70-73 per cent of the earth is covered by water. Water is available in the form of oceans, seas, rivers, lakes, ponds, pools, polar ice caps, and water vapour, and this forms the hydrosphere. The main component of the hydrosphere is water. Water exists in all the three forms, i.e., solid (snow), liquid (water), and gas (water vapour).

Air: This is an inexhaustible natural resource and essential for the survival of all the living organisms on earth. In the atmosphere, about 95 per cent of the air is present up to a height of 20 km above the earth's surface. The remaining 5 per cent of air is present up to a height of about 280 km. Air is a mixture of different gases; nitrogen and oxygen are the major components. Thus, the total volume of air present in the atmosphere consists of 78 per cent nitrogen, 21 per cent oxygen, while the remaining 1 per cent is made up of other gases, such as argon, neon, helium, krypton, xenon, and radon.

Soil: The word, soil, is derived from a Latin word, *solum,* meaning ground. It is a stratified mixture of inorganic and organic materials, both of which are products of decomposition.

Minerals: The Earth's crust is rich in inorganic materials which include ores that are used on a large scale to yield metals such as iron, aluminium, copper, tin, nickel, silver, gold, and platinum. These minerals are useful in industrial and technological growth. Some of the metals are used as catalysts, e.g., vanadium, tungsten, and molybdenum. Some of the non metallic materials (minerals) are vital to industrial growth such as sand, fluxes, clay, salt, sulphur, phosphorus, diamonds, gems, coal, and by products of petroleum (petrol, kerosene, lubricants).

Flora and fauna: Flora refers to plant species and fauna refers to animal species. The term biota includes both plants, as well as the domesticated and wild species of animals. Our country has a rich diversity of flora and fauna. There are over 45,000 plant species and 81,251 animal species. This represents about 7 per cent of world's flora and 6.5 per cent of world's fauna.

3.3 BIODIVERSITY: OUR STRENGTH

Biodiversity is the variation of life forms within a given ecosystem, biome, or, on the entire Earth. Biodiversity is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct biological species, which is the product of nearly 3.5 billion years of evolution.

Biological diversity or biodiversity can have many interpretations, and it is most commonly used to replace the more clearly defined and long established terms, species diversity, and species richness. Biologists most often define biodiversity as the "totality of genes, species, and ecosystems of a region". An advantage of this definition is that it seems to describe most circumstances and present a unified view of the traditional three levels at which biological variety has been identified

- Genetic diversity
- Species diversity
- Ecosystem diversity.

One of the most pressing issues on the national and global agenda is the need to conserve biodiversity for future generations while trying to understand and document the indigenous knowledge of resource management practices. So far, this challenge has been partially addressed by the national and global agencies, which have restricted themselves to conservation of biodiversity as outlined by the World Commission on Environment and Development (1987), which led to calls for sustainable development. As a result, the model of development was foisted upon the so called Third World for the last fifty years. A strong argument has been made that development dictated from outside rather anchored in the knowledge base of the target population is, in principle, modernisation disguised, and not fully concerned with local needs. This is evidenced by the continuing marginalization of already marginalised populations in Latin America and elsewhere at a global level, and similarly, marginalisation of the tribal, pastoralists and marginal farmers in far flung and remote areas, especially in the mountains in India. Only recently, it has been realised by scholars and researchers that indigenous knowledge systems should constitute the core of development models in the Third World. Because indigenous knowledge has permitted its holders to exist in harmony with nature, allowing them to use it in a sustainable manner, it is seen as especially pivotal in discussions of sustainable resource use.

In agricultural systems, a diversity of crops and varieties is needed to combat the risks farmers face from pests, diseases, and variations in climate. Crop biodiversity also underpins the breadth of dietary needs and services that consumers demand as societies become wealthier. For some time, scientific experts have been concerned about declining diversity of crop genetic resources on farms. Many argue that the very processes that engendered the remarkable advances in agricultural productivity during the 20th century, such as the Green Revolution, also eroded the valuable stocks of genetic resources long maintained by farmers. Sampling these resources and housing them in gene banks, while fundamental, is only a partial solution. *Ex situ* conservation stops the evolutionary clock and raises proprietary concerns as genetic material is transferred out of the hands of its historical custodians for safeguarding. Economists often view the loss of diversity as an unavoidable, unintended consequence of technical change and specialisation—a negative externality of progress. In the longer term, managing crop genetic diversity through a combination of strategies and approaches (in gene banks, breeding programs and on farms) is essential for sustained social and economic development. The overall categories of floral and faunal biodiversity available to us are as under:

Flora

Item	**No. of species**
Bacteria	830
Algae	2500
Fungi	23000
Lichens	1600
Bryophyte	2700
Pteridophyta	1022
Gymnosperms	64
Angiosperms	17000
Total	**48736**

Fauna

Item	**No. of species**
Fishes	2546
Amphibians	204
Reptiles	428
Birds	1228
Mammals	372
Total	**1,26,188**

Protozans-2577, Porifera-519, Enidaria-237, Ctenophora-10, Platyhelminthis-1622, Ctenophora-10, Platyheminthis-1622, Nematoda-2350, Rotifern-310, Mollusca-5042, Anthrapoda-57525, Protocordata-116, Echinodermata-705, Annelida-1093.

In this section you studied meaning and types of natural resources. Now, you should be able to answer some questions relating to this section given in C*heck Your Progress*-1.

Check Your Progress 1

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

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

1) What do you mean by Natural Resources Management (NRM)?

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2) Write in brief what do you understand by environment?

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3) What do you understand by biodiversity?

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3.4 EXPLOITATION OF NATURAL RESOURCES

Number of activities relating to development including construction activities of all kinds, forest based industries, hydel and irrigation projects, mining, oil drilling, pollution, resource extraction and road and transportation put enormous pressure on natural resource base. There are some human induced activities, which relates to agriculture, fishery, expansion of forest villages, grazing/increased domestic animals habitat, habitat depletion and exchange due to horticulture, monoculture forestry have led to different kinds of encroachment on natural resources.

Collections made by scientific/ educational institution

- Exploitation by local authorities as revenue resource
- Fuel wood collection

- Food gathering
- Food hunting
- Smuggling of timber/ forest produce
- Trophies/ specimen collection of medicinal plants and orchids and
- Unregulated trade / market forces.

Human induced disasters causing stress on natural resources

- Floods
- Major oil spills/ leakage
- Wildlife depredation
- Epidemic
- Forest fires due to humming and
- Intentional forest fire.

Threats to NRM- wrong and faulty approaches

- Diseases
- Fire as management tool
- Genetic uniformity
- Hybridisation
- Inadequate water and food for wildlife
- Increased competition
- Introduction of exotic species
- Lack of patronage of local / native species
- Low population/ restricted range (protectionism).

Management of human resources

- Change in people's life style
- Conflicting / increasing demands
- Dilution of traditional values
- Erosion of indigenous knowledge
- Generation gap
- Human harassment
- Ignorance / lack of awareness
- Inadequate trained human resource
- Inappropriate land use
- Lack of effective management
- Negative attitude
- Tourism development.

Political and policy issues

- Civil unrest / political movement

- Change in use/ tenure/ legal status
- Insurgency or armed conflict
- Intercommunity conflict
- Intervention failure
- Lack of clear policy implementation
- Lack of interdepartmental coordination
- Lack of intervention
- Military activities
- People's pressure.

3.5 THREATS TO BIODIVERSITY

The categories of threats that follow have been recognised by the International Union for Conservation Nature (IUCN).

Endangered

This category includes *taxa* whose number have been reduced to a critical level, and those whose habitats have been so drastically reduced that they are seemed to be in immediate danger of extinction, as for example *Ncpenthes khasiana, Rhinanthera imschootiana, Vanda cerulean.*

Vulnerable

Taxa is likely to move into the endangered category in the near future, if the casual factors continue operating due to over exploitation, extensive destruction of habitats or other environmental disturbances. Some of the examples are *Discora deltoidea and taxus wallichiana.*

Rare

This includes *taxa* with a small world population that are not at present endangered or vulnerable but are at risk. These *taxa* are usually localised within restricted geographical areas, or habitats, or are thinly scattered over a more extensive range, the examples are *Farictia macrantha and Rauvolfia serpentina.*

Threatened

The term threatened is used in conservation for species which are in one of the three categories: endangered, vulnerable and rare. India's biodiversity is one of the most significant in the world. As many as 45,000 species of wild plants, and over 77,000 if wild animals have been recorded, which comprise about 6.5 percent of the world's known wildlife. In the last few decades, India has lost at least half of its forests, polluted over 70 per cent of its water bodies, built on, or, cultivated much of its grasslands, and degraded most of its coast.

3.6 CONSERVATION OF BIODIVERSITY

Why Conservation?

The Indian region is a treasure house of wild genetic resources. Wild species and relatives of crop plants contain valuable genes that are of immense genetic value

in crop improvement programmes. The important wild related species and types in various crop groups, prevailing under different phytogeographic zones in the country needs particular attention in the agro-biodiversity management system for sustainable use, to help maintain food, nutritional, and agricultural economic security. The main objectives of biodiversity conservation are

- The conservation of biological diversity
- The sustainable use of components of biodiversity.

India's efforts at Biodiversity Conservation

Dr. M.S. Swaminathan (1983) suggested the following conservation measures

- Cultivated varieties in current use
- Obsolete cultivars
- Primitive cultivars or land races
- Wild species and weedy species closely related to cultivated varieties
- Wild species of potential values to man
- Special genetic stock developed by man
- Fair and equitable sharing of benefits arising from the utilization of genetic resources.

In-situ Conservation

- This includes conservation of plant and animals in their native ecosystems, or even in a man-made ecosystem, where they naturally occur.
- It applies only to wild fauna and flora.
- It aims at preservation of land races with wild relatives in which genetic similarities exists.

Ex-situ Conservation

- This is done through the establishment of gene banks.
- It is the chief mode for preservation of genetic resources.
- Generally, seeds or *invitro* maintained plants cells, tissue, and organs are preserved under appropriate conditions.

The drawbacks of *ex-situ* conservation are

- Loss of viability over passage of time and susceptibility to insect or pathogen attack
- Inability to maintain distinct clones except for inbreed and apomicts species
- Non applicability to vegetative propagated crop.

3.7 MANAGEMENT OF NATURAL RESOURCES

There is an urgent need to think deeply about the destruction of natural resources. With the exponential increase in human population and increased technological advancement, the natural resources get relentlessly exploited. There is a need for optimisation of its usage. This is possible only when we adopt the concepts of management and conservation of natural resources. Management and conservation mean scientific utilisation of resources while maintaining their

sustained yield and quality. India produces only half of the national requirement of petroleum products and it imports the rest from other countries. Natural gas is the most popular petroleum product and its consumption during last two decades has increased tenfold. If we need to save fossil fuels from total exhaustion, we should encourage the usage of non conventional resources of energy, such as solar energy, wind energy, biomass energy, etc. Biogas is a natural gas. It is produced from animal, water and weeds and other plants. India comes first in developing and using biogas technology. It is a cheap, non- polluting and labour saving fuel. Biogas can be used for cooking and lighting, and in vehicles.

According to the world conservation strategy on natural resource management (NRM), it is the management of human use of the biosphere, lithosphere, and hydrosphere so that it may yield the greatest sustainable benefit to the present generation while maintaining its potential to meet the needs and aspiration, not the greed, of future generation. With the current rate of development, population growth, and migration, communities are increasingly unable to meet their sustained needs, growing demand for fuel wood and other forest products, pollution due to industrialization, and a market for rare animal species and medicinal plants have all threatened the biological diversity; and thereby have hampered sustainable human development. Further, the race for development and cultivation of improved varieties in larger areas has threatened the biodiversity to a considerable extent. The complex dynamics of resource management system can be well understood by the flowchart (figure 1) and various issues and dimensions involved in resource management are represented in figure 2.

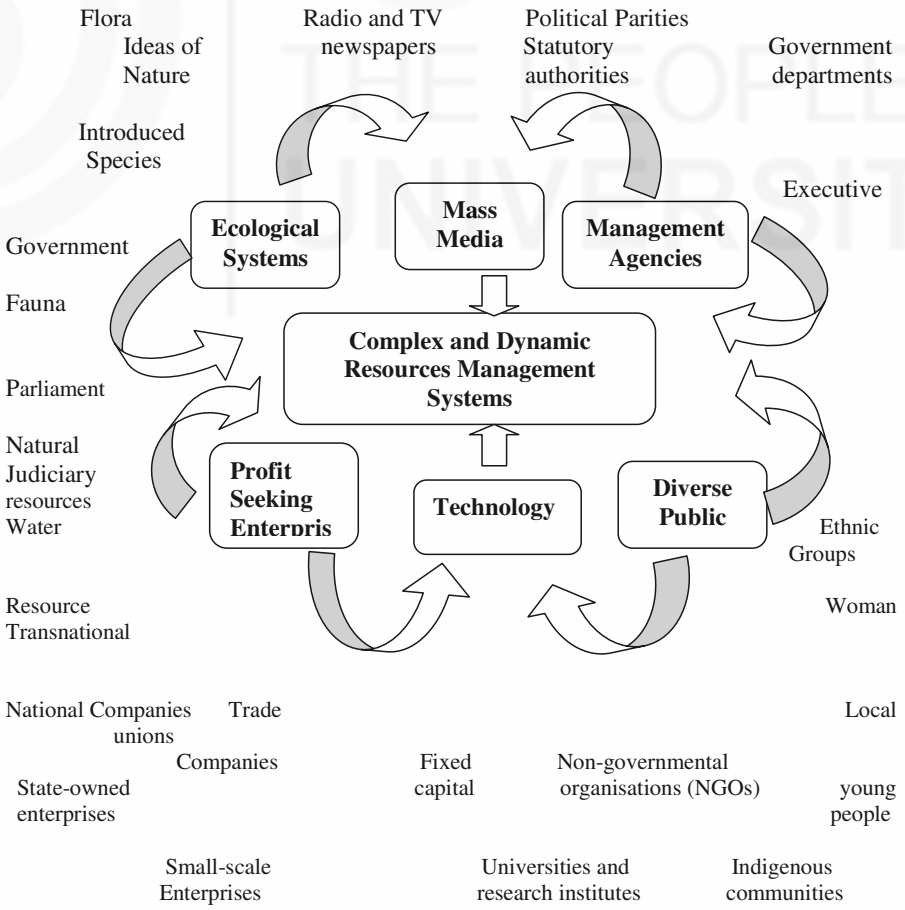

Fig.4.1: Complex and Dynamic Resources Management Systems

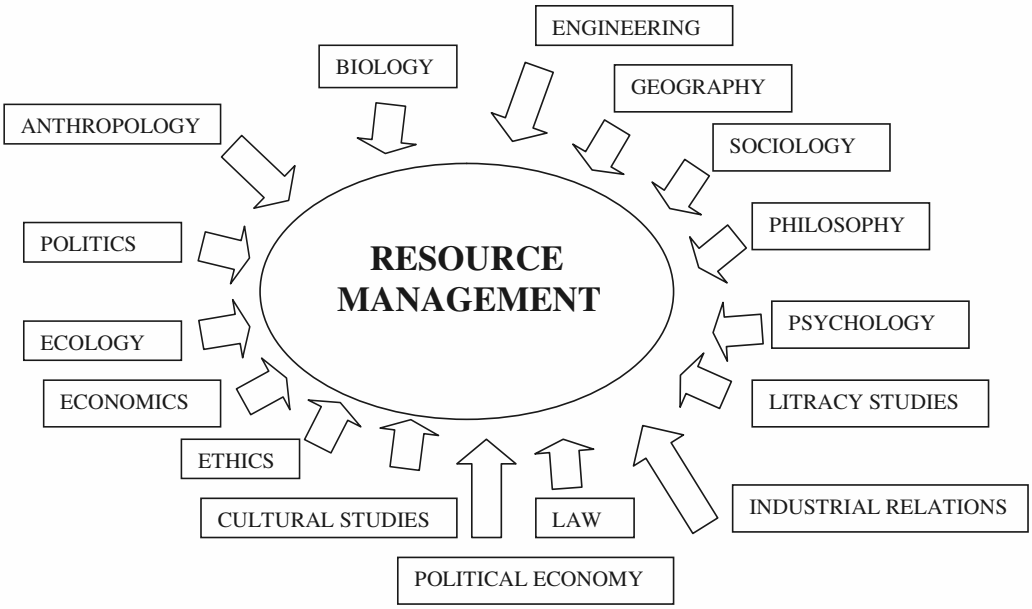

Fig.4.2: Various issues/dimensions involved in resource management

3.7.1 Meaning and Need for Resource Management

The main driving forces of resource consumption are population and economic growth, and the pattern of development, broadly defined to include technological level, economic structure, and the patterns of production and consumption. The projected 50 per cent growth in the global population over the next fifty years will put a significant pressure on the environment. If, over the next fifty years, the population of the developing countries achieves levels of material wealth similar to today's levels in industrialised countries, world consumption of resources would increase by a factor ranging from two to five. Without dramatic technological improvements or changes in the patterns of consumption, growth in resource use and environmental impacts due to increased population and economic growth in developing countries are likely to outweigh technological efficiency gains in industrialised countries.

Human wealth is based on the use and consumption of natural resources, including materials, energy and land. Continued increase in resource use and the related environmental impacts can have a multitude of negative effects leading to ecological crises and security threats. The sustainable use and management of natural resources have, therefore, come into focus and has been the subject of many policy discussions over more than a decade, beginning with the summit in Rio de Janeiro in 1992.

Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period in human history, largely to meet rapidly growing demands for food, fresh water, timber, fibre and fuel. This has resulted in substantial gains in human wellbeing and economic development. But these gains have been achieved at growing costs in the form of the degradation of many ecosystems (Millennium Ecosystem Assessment, 2005). What is driving our material and energy use to the extent that it is becoming a global environmental problem and a threat to future generations? There is no simple answer to this question, because a number of interdependent socioeconomic and environmental factors are at play. Nevertheless, there are three basic factors which determine

the growth of resource consumption, and the resulting environmental impacts of human production and consumption patterns.

3.7.2 Dynamics of Resource Management

Public policy in India has, for long, appreciated that access to shared or common natural resources (NR) is crucial to local livelihood strategies. Many of the rural poor depend directly on shared NR, yet they often live in ecologically marginal areas and have limited and insecure rights to NR. A recurrent question in the rural development debate has been: how are poverty and access to NR linked and what are the policy implications of these linkages? A principal conclusion has been that decentralised NR management regimes will enhance both sustainability and equitable access to NR by the poor. Policy has focused principally on institutional frameworks conferring rights, responsibilities and roles in decentralised NR management (DNRM). In India, two formal institutional systems have been identified as having the legitimacy and potential to enhance rural livelihoods: partnership models. In the last decade there have been significant moves towards formal NR management partnerships between the public administration and local user groups. The two most institutionally evolved examples, for which Guidelines have been promulgated, are Joint Forest Management (JFM) and Watershed Management (WM). A Constitutional Amendment passed in 1993 aimed to strengthen local government, collectively called *Panchayati* Raj Institutions, at District, Block and Village levels. Some of the seats at these levels are reserved for marginal and vulnerable community members, and for women. Village level *Panchayats* have become responsible for preparing plans for the management of NR within their boundaries. The support for decentralisation is based less on any proven success than on ideological convictions related to the importance of local involvement and self determination in the development process. There is, however, a growing realism about the strong centralising forces within the polity and bureaucracy that inhibit meaningful transfer of access and control over NR. Equally, earlier optimism regarding collective action has been tempered by failed participatory common resources are not considered worth collective action.

The decentralisation agenda has however led to changes in the institutional arrangements for managing shared NR. Through partnership models, and indirectly through *Panchayati* Raj, communities have been given some autonomy in deciding priorities for NR management, funds to develop NR assets and guidelines to promote community mobilisation. These decentralisation initiatives represent major achievements in challenging the previous dominance of line department control over all aspects of NR management. The objective of sustainable, equitable and efficient DNRM is, however, far from being realised as our examination of the source of political demand for decentralisation and the content of the programmes and projects themselves revealed.

3.7.3 Management of Forests

The world forest is derived from the Latin word *foris* meaning outside, the reference being to a village boundary, or fence and it must have included all uncultivated and uninhabited land. Today, a forest is any land managed for the diverse purpose of forestry, whether covered with trees, shrubs, climbers, etc., or not. The Indian word, jungle, has been adopted in the English language to describe a collection of trees, shrubs, climbers, etc., that are not grown in a regular manner,

as contrasted with a forest, which is any vegetation under systematic management. Technically, a forest is defined below.

a) Generally, a forest is an area set aside for the production of timber and other forest produce, or maintained under woody vegetation for certain indirect benefits which it provides, e.g., climatic or protective.

b) From an ecological point of view, a forest is a plant community predominantly of trees and other woody vegetation, usually with a closed canopy.

c) From a legal point of view, it is an area of land proclaimed to be a forest under a forest law.

Forestry is the theory and practice of all that constitutes the creation, conservation, and scientific management of forests, and the utilization of their resources to provide for the continued production of the required goods and services. Forests are a very striking feature of the land surface. They vary greatly in composition and density, and stand in marked contrast with meadows and pastures. The scenic effect of forests changes with the seasons like the patterns in a kaleidoscope. Certain forests are evergreen, like the Deodar forests of Kashmir, while others are deciduous, becoming leafless either before the advent of winter when vegetative activity almost ceases, such as the oak forests of the Himalayas, or else just before the onset of intense dry summer, to reduce transpiration to the minimum, like the Teak forests of Central India. The falling leaves in some species become bright orange or golden yellow. In others, the young foliage is pink. Such autumnal and verbal tinges are in vivid contrast with the general green or straw-coloured background, and are extremely pleasing. Unlike animals, plants do not have the power of locomotion. They also cannot construct shelters or generate heat to withstand the adverse effects of the environment of which they are captives. Therefore, to survive they wear the evidence of this fact in the form of structural adaptations, such as leaflessness in summer to minimize transpiration, thorns to ward off browsers, poisonous sap, etc.

The forests of a country are a natural asset of immense value. Unlike its minerals resources, including fossil fuels, which in course of time either get exhausted or their utilisation will become uneconomic due to increased costs for obtaining and processing them, the forests, if of adequate extent, ideally dispersed, scientifically managed and judiciously utilised can be kept perpetually productive and useful, conferring many benefits, direct and indirect, on the people. Thus, forests are a renewable resource. Directly, forests meet the needs of small timber, fuel, bamboos and a variety of other products, including fodders which are indispensable requirements of the people living in close proximity of the forests. They also provide the facility of grazing for their livestock, and yield a variety of products of commercial and industrial value such as structural timber, charcoal, and raw materials for making paper, newsprint, rayon, panel products, *bidi* leaves, gums, resin, dyes, tans, and a number of other economic products including medicinal drugs. Forests also provide employment to a large population engaged in their protection, tending, harvesting and regeneration as also in ancillary occupations processing forest raw material and marketing them. These are productive functions of the forests.

i) Management of State Forests

No forest should be permitted to be worked without the government having approved the management plan, which should be in a prescribed format and in keeping with the national forest policy. In order to meet the growing needs for essential goods and services which the forests provides, it is necessary to enhance the forest cover and productivity of the forests through the application of scientific and technical inputs. Production forestry programmes while aiming at enhancing the forest cover in the country and meeting national needs should also be oriented to narrowing, by the turn of the century, the increasing gap between demand and supply of fuel wood. No such programme, however, should entail clear felling of adequately stocked natural forests.

Rights and concessions: the rights and concessions, including grazing, should always remain related to the carrying capacity of forests. The capacity itself should be optimized by increased investment, silvicultural research and development of the area. Stall feeding of cattle should be encouraged. The requirements of the community which cannot meet by the rights and concessions so determined should be met by development of social forestry outside the reserved forests.

The holders of customary rights and concessions forest areas should be motivated to identify themselves with the protection and development of forests from which they derive benefits. The rights and concessions from forests should primarily be for the *bonafide* use of the communities living within, and around forest areas specially the tribal communities.

Division of forest lands for non forest purposes: forest land or land with tree cover should not be treated merely as a resource readily available to be utilised for various projects and programmes, rather, as a national asset which requires proper safeguards for providing sustained benefits to the entire community.

Wildlife conservation: forest management should take special care of the needs of wildlife conservation, and forest management plans should include prescriptions for this purpose. It is specially essential to provide 'corridors' linking the protected areas in order to maintain genetic continuity between artificially repeated sub sections of migrant wildlife.

Tribal people and forests: there exists a symbiotic relationship between the tribal people and the forests, which means that both depend on each other for their survival and existence. Therefore, the primary task of all agencies responsible for forest management, including the forces development corporations should be to associate the tribal people closely in the protection, regeneration and development of forests as well as to provide gainful employment to the people living in and around the forests.

Shifting cultivation: Shifting cultivation is affecting the environment and productivity of the land adversely. Alternative avenues of income, harmonized with the right land use practices, should be devised to discourage shifting cultivation.

Forest based industries: as far as possible a forest based industry should raise the raw material needed for meeting its raw material requirements. Forest based industries must, not only provide employment to the local people on priority, but involve them fully in raising trees and raw material.

Forest extension: forest conservation programmes cannot succeed without the willing support and cooperation of the people, a direct interest in forests, their development and conservation, and awareness of the value of trees, wildlife, and nature in general.

Forestry education: forestry should be recognized both as a scientific discipline as well as a profession. Agriculture universities and institutions dedicated to the development of forestry education should formulate curricula and courses for imparting academic and professional excellence, keeping in view the manpower needs of the country.

Forestry research: with the increasing recognition of the importance of forests for environmental health, energy, and employment, emphasis must be laid on scientific forestry research necessitating adequate strengthening of the research base, as well as new priorities for action.

ii) Promote More Public and Private Forests

The issue of sustainability has twin challenges of environmental degradation and rural impoverishment. In many developing countries including India, conservation for sustaining natural resources sometimes become very fundamentalist and results against the people. But natural resource management must have to be done in a productive manner which benefits the local community. About one-third of the Indian population lives below poverty line and most of them live in rural area and dependent on the forests and other natural resources. Managing the natural resources effectively with the involvement of local community can play a great role in reducing poverty and environmental degradation. Promoting public and private forestry is both environmentally and socioeconomically desirable, given the multiple roles that forests can play in the provision of food, livelihood and the maintenance of the natural resource base. The concept of sustainability implies ideas about forest stewardship and quality of life. Forest stewardship means the active investment of time, money, knowledge, and other resources into the management of forest for the benefits to the public and future generations. Forest based industries have a great role to play. They should fund the local people to plant trees and manage them and meet the requirement of the industry from those community or private forests in a sustainable way. The National Forest Policy of 1988 also declared that forest based industries shall increasingly meet their requirements from private lands and forests. This will decrease the pressure on the natural forests and wildlife. Proper land exchanges between public and private as well as government sectors can also support conservation of critical natural resources. Recognizing the private property rights held by indigenous communities and compensating them for continuing to conserve their private or community owned forest resources can lead to effective and efficient sustainable management and conservation of forest resources. Community using the surrounding natural resources traditionally acquires good practical knowledge and skill of judging the condition of those resources. These people with great indigenous knowledge can manage community forests by getting economical and institutional help from government in an efficient way.

Active involvement of Village *Panchayats* (forest councils) is very crucial to implement the community forestry. Some states in India has legal framework to manage forests by community rather than forest department. Uttarakhand has a

long history of local peoples' participation in forest management. The *Van Panchayats* have been managing the forests surrounding the villages for a long time in the region though the forest area managed under *Van Panchayat* is relatively very low. Given more funding and power to the *Van Panchayats* would encourage the local people in forest management.

3.7.4 Promote Non-conventional and Renewable Energy Sources

Growing energy needs and environmental protection are two major challenges today. Energy production by burning conventional fossil fuels is responsible for the global warming and significant levels of air pollution. But access to sustainable energy services is necessary for economic growth. Increasing the renewable energy capital is the only solution to cope with these challenges and achieving sustainable development as it reduces the dependency on fossil fuel resources and provides opportunities for mitigating greenhouse gases. Technological improvement of renewable energy resources has been carried out for last decades and a number of renewable energy resources have been discovered.

i) Hydro energy

Hydro energy is one of the oldest sources of energy. Today over 80% of all electricity produced by renewable sources is produced by large hydroelectric dams. But there have been some devastating negative impacts of large hydro projects on the environment. Hydro turbines in hydro projects produce electricity by converting hydraulic potential energy of water into the mechanical kinetic energy of the turbine runner, which in turn is converted into electrical energy by the generator. In a *run-of-the-river system*, the force of the water current applies the needed pressure to rotate the turbine, while in a *storage system*, water is accumulated in reservoirs created by dams and then released with huge potential energy. Small hydro projects are very popular due to its advantage to be installed in small area and lower installation cost. Depending upon the capacity of the project, Small Hydro Project can be classified as- (*a).* micro (up to 100 KW), *b.* mini (up to 2000 KW) and *c.* small (up to 25000 KW) hydro power project.

ii) Solar energy

The Solar Photo Voltaic (SPV) technology converts the solar radiation directly into electricity without producing any noise or pollution. Remote and isolated areas can easily get power using photo voltaic plate whether it is a top mountain or an island in the middle of an ocean. Solar Thermal Device on the other hand captures and transfers the heat energy of solar radiation which can be used for thermal applications and generating mechanical or electrical energy. The United Nation's "Global Trends in Sustainable Energy Investment 2010" report said that the solar sector attracted investments worth 24 billion dollars in 2009. In the four years from end-2004 to end-2008, solar photovoltaic (PV) capacity increased six fold to more than 16?giga watts (GW) and solar heating capacity doubled to 145 gigawatts-thermal (Gwth).

iii) Wind energy

Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy of wind is converted into mechanical energy and rotates the blades of wind tower and the connected generator, thereby producing electricity. The wind speed plays an important role for energy generation which varies with latitude, land-sea disposition, altitude and season.

iv) Bio energy

Biomass is an important source of energy with potential to generate power. Plants use the solar energy to convert atmospheric CO_2 to sugars during photosynthesis and when the plant materials are combusted, energy is released as the sugars are converted back to CO_2. This energy can be harnessed using bio-energy technologies viz., biogas, gasifier, biomass combustion, co- generation etc. India has huge potential in biomass energy due to large quantity of biomass available in the form of husk, straw from agriculture field, wild bushes and large quantities of cattle dung.

Energy can also be generated from solid wastes. The heat produced by burning the wastes heats a water boiler which produces steam that powers a turbine to produce electricity. Some of the basic technologies for treatment of municipal solid wastes are incineration, pelletisation, pyrolysis, sanitary landfill and bio-methanation. Household and industrial waste is sent to a combined heat-and-power (CHP) incineration plant. Waste segregation is an important prerequisite of waste to energy system. In bio-digesters, the decomposing food generates methane (CH_4) gas that can be used to generate electricity and fuel. It is estimated that through adoption of waste to energy technologies more than 1000 MW of equivalent power can be generated from urban and industrial wastes in India.

Ethanol is another source of bio energy. It is produced from alcohol (obtained from different crops such as sugar canes and other grains). The technology for manufacture of ethanol (dehydrated/anhydrous alcohol) involves special processing of alcohol. There are three commercial routes for the manufacture of dehydrated ethanol from alcohol. These are *a.* Azeotropic Distillation Technology, *b*. Molecular Sieve Technology and *c*. Membrane Technology.

3.7.5 Management of Soil Resources

Rapid deterioration of soil health and degradation of soil environment as a consequence of persistent nutrient depletion and operating process of erosion, salinisation, acidification, and desertification have been of concern to soil scientists in recent years, as these are posing a threat to the potentiality of our soil resources to support the increasing food demands in the future.

Soil Degradation

- Physical: soil erosion, water logging, desertification, compaction, crusting, overgrazing
- Chemical: nutrient runoff, acidification, salinisation, alkalinisation, loss of organic matter, nutrient imbalance, nutrient depletion, accumulation of toxicants.
- Biological: monoculture, pesticides and herbicides, disposal of industrial waste, toxic containing sewage water, genetic manipulation

Approaches towards soil conservation

- The primary purpose of soil conservation is to prevent soil erosion and heal the damage where it has not advanced too far to respond to curative methods.
- The land should wear a vegetative cover throughout the year.
- Engineering and agronomic practices should be applied conjointly.

Reclamation of eroded lands

- Ravines should be provided with sufficient and suitable vegetative cover.
- Instead of agriculture, these lands should be reclaimed for forestry, pasture, or horticulture.
- Their deficiency in nutrients and moisture for plants growth should be improved.
- Further misuse of such land should be prevented, over transplanting by man, and fenced cattle trails. for example.
- Vegetative cover provided, should be protected against reckless destruction by local population.

Measures for controlling soil erosion deposition hazard

- Plantation at wind breaks and shelterbelts
- Sand dune stabilisation
- Stubble mulching
- Wind string cropping
- Primary and secondary tillage
- Conserving soil moisture.

3.7.6 The Management of Water Resources

Ground water has been exploited in India quite substantially in the past few decades for irrigation. However, unlike surface water resources, there has been a conspicuous lack of scientific assessment of groundwater resources. Availability of this important natural resource has been taken for granted; utilisation of ground water has not been commensurate with the available potential in a state, e.g., about 86 per cent in Gujarat and 3 per cent in Assam, indicating considerable regional imbalance. India has 4 per cent of the world's water resources. The present water demand of India's agriculture is nearly 83 per cent of the total water use in the country and shall not change appreciable by the end of the century. The Ministry of Environment (1992) had made projections for water demand of various utility sectors for 2000 and 2025 AD.

Use of most of this allocated water for agriculture is confined to 33 per cent irrigated area and the remaining 67 per cent is still dependent on monsoon rains. The disproportionate use of water in certain pockets results in wastage. Excessive use of water makes the field more vulnerable to soil erosion. Irrigation, thus, can be identified as the most important single activity responsible for agriculture induced environmental stress, although other activities such as deforestation for expanding agriculture, production oriented agronomic practices, use of fertilizers, and plants protection chemicals have their individual contribution.

Approaches towards water conservation

Management at surface water resources such as

- canal water
- run-off water
- *khadins*

- *nadis,* Tanks
- Gully
- plugging
- water harvesting dams
- water spreading
- percolation tank

Management of ground water resources

The ground water resources in arid region have four major problems

- 65 per cent area has saline ground water with total soluble salt content over 3200 ppm
- Deep static water level
- Poor yield from wells
- Due to over exploitation, static water level is declining, soluble salt content have increased, and the yield is reduced.

The following methods are available for artificially recharging aquifers

- Water spreading
- Recharging through pits
- Wells ands shafts
- Pumping to induce recharge from surface water bodies.

Extension approaches for NRM

- Creation of natural resources like forests, water bodies etc.
- Conservation of resources in an ecology niche.
- Regeneration of natural resources by organizing self-propelling processes.
- Preservation through social fencing.
- Recycling of waste water by products.
- Rejuvenation of degraded or age old resource base.
- Protection of target species.
- Pollution control through policy formulation.
- Elimination of negative factors operating in the eco-systems.
- Social fencing for protection, preservation.
- Integration of biotic, abiotic and social factors.
- Rationalisation in the use of dwindling resources.
- ITK and ITW: appropriate use and application.
- Watershed management to generate livelihood and conserve natural resources.
- Monitoring : Benefit monitoring evaluation (BME)
- Auditing is required to get accounts of depletion, and to suggest interventions
- People's participation: this is the most important and critical way to accomplish any objective in NRM.

In this section you studied about the role of forests and various aspects of conservation. Now, you should be able to answer some questions relating to this section given in C*heck Your Progress*-2.

Check Your Progress 2

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

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

1) What are the important roles of forests in our society?

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2) Write five major extension approaches which are very much needed for NRM.

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3) What are the right approaches to soil conservation?

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4) How can you manage surface water resources?

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3.8 LET US SUM UP

In this unit we dealt with various concepts and issues relating to the Natural Resource Management and Environment. We also discussed how these challenges have been partially addressed by global and national agencies. We explained how the exploitation of natural resources causes threats to the biodiversity, and various conservation issues and initiatives taken at global and national levels. The sustainable development approach, based on the complex dynamics of resource management, is the desired goal and objective of all national and international bodies. We also discussed how the decentralization agenda has led to changes in the institutional arrangements for managing shared natural resources including the sustainable management of the forests, soil resources and water resources.

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3.10 CHECK YOUR PROGRESS – POSSIBLE ANSWERS

Check Your Progress 1

1) What do you mean by Natural Resources Management (NRM)?

The following definition may be used for natural resources: "the sum total of all physical, chemical, biological and social factors which construct the surroundings of man is referred to as environment and each element of these surroundings constitutes a resource on which man thrives in order to develop a better life". Any part of our natural environment, such as land, water, air minerals, forest, rangeland, wild life, fish, micro organisms, or even human population – that man can utilize to promote the welfare, may be regarded as a natural resource.

2) Write in brief, what do you understand by environment?

The environment is everything which surrounds an organism and influences its life in many ways. It includes physical and biological components. The physical components of the environment are soil, water, air, light, and temperature. These are termed as abiotic components. The plants and animals are collectively referred to as biotic components. All these components of the environment work together, interact, and modify the effect of one another.

3) What do you understand by biodiversity?

Biodiversity is the variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems. Biological diversity or biodiversity can have many interpretations and it is most commonly used to replace the more clearly defined and long established terms, species diversity and species richness. Biologists most often define biodiversity as the "totality of genes, species, and ecosystems of a region".

Check Your Progress 2

1) What are the important roles of forest in our society?

A forest is considered as an ecological kingdom, where many animals and the ecosystem live in perfect balance. The green cover produces enough oxygen, and, as well, carbon dioxide, for photosynthesis. The wild animals and other beings get enough protection from the solar heat, temperature, and the leaf cover formed on the earth gives cooling effect to the earth. The rivers and lakes in the forests give enough food and shelter for the animals and also the water for drinking for sustaining life. While the dense forests atmosphere acts as enormous sink for green house gases.

2) Write five major extension approaches which are very much needed for NRM.

1) Creation of natural resources like forests, water bodies, etc.
2) Conservation of resources in an ecology niche.

3) Regeneration of natural resources by organizing self-propelling processes.

4) Preservation through social fencing.

5) Recycling waste water by products and social fencing for protection, preservation.

3) What are the right approaches to soil conservation?

The right approaches towards soil conservation are:

1) The primary purpose of soil conservation is to prevent soil erosion and heal the damage where it has not advanced too far to respond to curative methods.

2) The land should wear a vegetative cover throughout the year.

3) Engineering and agronomic practices should be applied conjointly.

4) How can you manage surface water resources?

Surface water resources can be managed in different ways: canal water, run-off water, *khadins*, nadis, tanks, gully, plugging, water harvesting dams, water spreading, percolation tanks, etc.

UNIT 4 ENVIRONMENT MANAGEMENT SYSTEM

Structure

4.1 Introduction

4.2 The Concept of Environmental Management System

4.3 Management System: An Overview

4.4 Basic Elements of Environmental Management System (EMS)

4.5 Environment Management Systems in Municipalities

4.6 Let Us Sum Up

4.7 References and Selected Readings

4.8 Check Your Progress –Possible Answers

4.1 INTRODUCTION

Environmental Management System (EMS) refers to the management of an organisation's environmental programmes in a comprehensive, systematic, planned and documented manner. It includes the organisational structure, planning and resources for developing, implementing and maintaining policy for environmental protection. The International Organisation for Standardisation (ISO) has defined environmental management system as that "*part of the overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy* (ISO, 1996). It provides a systematic way to ensure environmental issues are managed consistently and systematically throughout an organisation. For cities and local authorities, an EMS can assist in comprehensively addressing environmental issues, while achieving increased credibility with key stakeholders, including regulatory agencies and citizens. Effectively applied, an EMS can help integrate environmental considerations with overall operations. It sets out environmental policies, objectives and targets with pre-determined indicators that provide measurable goals, and a means of determining if the performance level has been reached.

An EMS is an excellent mechanism for both understanding and promoting positive change within a city or local authority. It enables private companies, central and state agencies, and other organisations to establish and assesses the effectiveness of, procedures to set environmental policy and objectives, achieve compliance, and demonstrate such compliance to others. This is because EMS focuses attention upon a number of critical organisational factors, including productive processes and technologies, management styles and systems, worker education and participation, internal communications, and relations with regulatory agencies, other governments, and neighbouring communities. The process of establishing an EMS requires "buy-in" from different levels of management and from employees. The successful implementation of an EMS creates positive change, environmental awareness and continuous improvement.

EMS applied to local authorities provides a systematic approach to develop policies, practices and procedures that are able to respond to the social, economic and environmental challenges ahead. In order to accomplish their goals for implementing an EMS efficiently, accurately and effectively, organisations need tools to assist them. In particular, experts and city managers recognise and highlight a lack of education and training tools specifically designed to enable local authorities assess the benefits, design and implement an EMS that meets their specific needs. Organisations in particular local authorities of cities and towns need a sound understanding of the environmental effects and impacts of the lifestyles, behaviours and values of its citizens. Need to understand that the environment has strategic implications which must be addressed by all stakeholders - at the global and local levels. Need for decision-making tools and decision support systems that enable implementation of EMSs. After reading this unit, you will be able to:

- Describe the key environmental issues concerning urbanization and in particular the opportunities for better environmental management of cities and urban areas.
- Explain to decision-makers the need for co-operation
- Develop easy to use environmental management tools that can be used to implement coordinated environmental policies and programmes involving all concerned stakeholders.

4.2 THE CONCEPT OF ENVIRONMENTAL MANAGEMENT SYSTEM

4.2.1 What Is an Environmental Management System?

The International Organisation for Standardisation (ISO) defines environmental management systems as "*that part of the overall management system which includes organisational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining the environmental policy*."

In other words, an EMS focuses on environmental management practices, rather than the activities themselves. The EMS provides the structure by which the specific activities can be carried out efficiently and in a manner consistent with key organisational goals, but does not specify levels of performance (just for instance the EMS will ensure that proper procedures are in place and that operator training exists, but won't specify methods or frequency of sampling). The EMS allows an organisation the flexibility to adapt the system to its needs and priorities, rather than forcing a "one size fits all" mentality. Implementation of an EMS is a voluntary approach to improving environmental performance. Over the years, many public and private sector organisations have implemented EMSs, and their numbers grow daily. These organisations report a number of important EMS benefits.

4.2.2 Why to Introduce an Environmental Management System?

The environment has become an important factor in the decision-making process of companies around the world. Environmental issues are becoming more

complex and interconnected. Traditional ways of addressing environmental issues - in a reactive, ad-hoc, end-of-pipe manner - are proving to be highly inefficient. As competition increases within the expanding global market, environmental laws and regulations are setting new standards for business in every region of the world. But good environmental performance is not just a legal or moral obligation. It also makes good business sense. Reducing pollution means increasing efficiency and wasting fewer resources. Improved health and safety conditions result in a more productive workforce. Supplying goods and services that respect the environment helps to expand markets and improve sales.

In short, companies become more competitive when they practice good environmental management system.

On the other hand, the risks posed by mismanaging environmental issues are complex and varied. They include the obvious, such as damage to the environment with negative consequences for the overall standard of living. They can also include damage to a company's reputation and a resulting loss of confidence among customers, neighbours and shareholders, the loss of market share, and, of course, legal liabilities. Such risks cannot be dealt with on an ad-hoc basis. As with any financial or commercial risk, only a well-founded and properly implemented management approach can provide a measure of confidence that good performance is not an accident and that poor performance can be identified and rectified. By properly implementing an appropriate environmental management system (EMS), any company, large or small, can ensure that they effectively manage environmental risks while identifying and exploiting the myriad opportunities proper environmental management can bring. Such a systematic approach to environmental management is at the very heart of the ISO 14001 standard. This checklist is intended to allow managers of industrial facilities to review existing operations and management approaches against this standard to determine how well they measure up to what is soon to be considered as "state-of-the-art" in effective approaches to environmental management.

An Environmental Management System (EMS) performs the following functions:

- Serves as a tool to improve environmental performance
- Provides a systematic way of managing an organisation's environmental affairs
- Is the aspect of the organisation's overall management structure that addresses immediate and long-term impacts of its products, services and processes on the environment
- Gives order and consistency for organisations to address environmental concerns through the allocation of resources, assignment of responsibility and ongoing evaluation of practices, procedures and processes
- Focuses on continual improvement of the system

4.2.3 What is ISO 14000?

ISO 14000 is a family of standards intended to support environmental protection and prevent pollution in balance with socioeconomic needs. The international standard does not establish absolute requirements for environmental performance beyond commitment to compliance with applicable legislation and regulations and to continual improvement. Thus, two organisations carrying out similar activities but having different environmental performance may both comply with

ISO 14000 requirements. ISO 14000 encompasses 16 standards that address organisational issues and products. ISO 14001 is the EMS specification document outlining the requirements that an organization must meet for its EMS to be registered or certified to the standard. It is a tool to measure the effectiveness of environmental management programmes. ISO 14001 is being used by private corporations to enhance their competitiveness in both foreign and domestic markets. Federal and other public agencies are evaluating the potential of ISO 14001 or alternative EMSs to improve performance, and some agencies have already launched pilot projects.

4.2.4 Characteristics of EMSs and ISO 14001

Many federal and state agencies as well as private companies find ISO 14001 to be a flexible, its baseline approach that can be adapted to organisations of all sizes and types, and to a variety of cultures, processes, and businesses. The fundamental principles of ISO 14001 promote a programme of continual improvement to achieve objectives and targets set by the organisation itself. The objectives and targets derive from an assessment of significant environmental aspects and commitments made in the organisation's policy. The Code of Environmental Principles (CENT), another type of environmental management system, is also important in this regard. The CENT specifically addresses compliance, assurance, and pollution prevention, a distinguishing difference from ISO 14001.

4.2.5 Incorporating EMS into Corporate Business Practices

As an EMS is integrated into an organisation's business decision-making processes, it can improve programme management and enhance environmental performance. Some speakers' organisations found that the EMS improved overall productivity. As an EMS is incorporated into central management systems and organisational strategies, there is less need for external oversight as core business operations take ownership of environmental responsibility. The full cost of implementing an EMS includes the salary and time costs of in-house staff devoted to the project, as well as costs of any certification program. Total costs will vary, depending on the quality of the organization's existing environmental management/protection systems. Several speakers concluded that an EMS, once implemented, should result in cost savings over time. One speaker from a large corporation stated that, with the implementation of a corporate wide management system, his organisation's long-term vision includes facility self-governance, incorporating self-auditing of their compliance with environmental regulations. Several speakers addressed the benefit of dealing with environmental, safety, and health issues together as part of business planning and operational risk assessment. They agreed that integrating these issues into the same management concepts makes good business sense.

4.3 MANAGEMENT SYSTEM: AN OVERVIEW

4.3.1 Basics about Management

The management process involves performance of certain fundamental functions. One useful classification of managerial functions has been given by Luther Gulick, who abbreviating them using the word POSDCORB - Planning, Organising, Staffing, Directing, Coordinating, Reporting and Budgeting. There is no

commonly held opinion about the managerial functions proposed by different experts. By combining many of those views, this unit discusses the managerial functions under the headings

i) Planning

ii) Organising

iii) Staffing

iv) Directing

v) Coordinating

vi) Controlling

vii) Budgeting

viii) Delegation

ix) Leading

4.3.2 Management Process

Management is a distinct process consisting of various functions of management to determine and accomplish stated objectives by the use of human and other resources. As a process, management consists of three aspects:

i) Management is a social process – Since people are central in the process of development, human factor is most important among the other factors. As managers of developmental programmes are concerned with developing relationship among people. It is the duty of manager to make interaction between people for attaining developmental goals.

ii) Management is an integrating process – Manager undertakes the job of bringing together human, physical and financial resources so as to achieve organisational purpose. As it is an important function to bring harmony between various resources and integrate them to attain the developmental goals.

iii) Management is a continuous process – It's a never ending process and concerned with constantly identifying the development problems and solving them by taking adequate steps.

4.3.3 Objectives of Management

The main objectives of management are:

i) Getting maximum results with minimum efforts – Management is basically concerned with thinking and utilising human, material and financial resources in such a manner that would result in best combination to secure maximum outputs with minimum efforts and resources.

ii) Increasing the efficiency of factors of production – Through proper utilisation of various factors of production, their efficiency can be increased to a great extent which can be obtained by reducing spoilage, wastages and breakage of all kinds, this in turn leads to saving of time, effort and money.

iii) Maximum prosperity – Management ensures smooth and coordinated development and helps in providing maximum benefits to the people.

iv) **Human betterment and social justice** – Through increased productivity and development, management ensures better standards of living for the society. It provides justice through its uniform policies.

4.3.4 Importance of Management

i) **It helps in achieving group goals** – It arranges, organise and integrate the resources in effective manner to achieve developmental goals. It directs group efforts towards achievement of pre-determined goals. By defining objectives of development clearly, there would be no wastage of time, money and effort.

ii) **Optimum utilisation of resources** – Management utilises all the physical and human resources productively in the process of development. Management provides maximum utilisation of scarce resources by selecting its best possible alternate use.

iii) **Reduces costs** – It gets maximum results through minimum inputs by proper planning of physical, human and financial resources in such a manner which results in best combination to reduce costs.

iv) **Establishes sound organisation** – It establishes effective authority and responsibility relationship that is who is accountable to whom, who can give instructions to whom, who are superiors and who are subordinates. Management fills up various positions with right persons, having right skills, training and qualification.

v) **Establishes equilibrium** – It adapts organisation to changing demand of people / changing needs of society.

vi) **Essentials for prosperity of society** – Efficient management leads to better economical production which helps in turn to increase the welfare of people. Good management makes a difficult developmental task easier by avoiding wastage of scarce resources.

4.4 BASIC ELEMENTS OF ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

4.4.1 What Are the Key Elements of an EMS?

The key elements of any environmental management system are:

- **Environmental policy** - Develop a statement of the organisation's commitment to the environment. Use this policy as a framework for planning and action.
- **Environmental aspects** - Identify environmental attributes of products, activities, and services. Determine those that could have significant impacts on the environment.
- **Legal and other requirements** - Identify and ensure access to relevant laws and regulations, as well as other requirements to which the organisation adheres to.
- **Objectives and targets** - Establish environmental goals for the organisation, in line with the policy, environmental impacts, the views of interested parties, and other factors.

- **Environmental management programme** - Plan actions necessary to achieve objectives and targets.
- **Structure and responsibility** - Establish roles and responsibilities for environmental management and provide appropriate resources.
- **Training, awareness, and competence** - Ensure that the employees are trained and capable of carrying out their environmental responsibilities.
- **Communication** - Establish processes for internal and external communications on environmental management issues.
- **EMS documentation** - Maintain information on EMS and related documents.
- **Document control** - Ensure effective management of procedures and other system documents.
- **Operational control** - Identify, plan, and manage the operations and activities in line with the policy, objectives, and targets.
- **Emergency preparedness and response** - Identify potential emergencies and develop procedures for preventing and responding to them.
- **Monitoring and measurement** - Monitor key activities and track performance. Conduct periodic assessments of compliance with legal requirements.
- **Non conformance and corrective and preventive action** - Identify and correct problems and prevent their recurrence.
- **Records** - Maintain and manage records of EMS performance.
- **EMS audit** - Periodically verify that the EMS is operating as intended.
- **Management review** - Periodically review the EMS with an eye to continual improvement.

4.4.2 Elements of ISO 14001

ISO/DIS 14001 is one of a series of emerging international environmental management standards, which aims at promoting continual improvement in company environmental performance through the adoption and implementation of an environmental management system. The (draft) standard specifies the core elements of an EMS, but contains only those elements that may be objectively audited for certification or self-declaration purposes. A companion guidance standard, ISO/DIS 14004 includes examples, descriptions and options that aid in the implementation of an EMS and in integrating the EMS into overall management practices. It is not intended for use by certification/registration bodies. ISO/DIS 14001 defines an overall environmental management system, closely modelled on the ISO 9000 quality systems standard, and covers the following key elements:

i) **Establishment of an appropriate environmental policy** that is documented and communicated to employees and made available to the public, and which includes a commitment to continual improvement and pollution prevention, regulatory compliance and a framework for setting objectives.

ii) **A planning phase** that covers the identification of the environmental aspects of the organization's activities, identification and access to legal requirements, establishment and documentation of objectives and targets consistent with the policy, and establishment of a program for achieving said targets and objectives (including the designation of responsible individuals, necessary means and timeframes).

iii) **Implementation and operation of the EMS** including the definition, documentation and communication of roles and responsibilities, provision of appropriate training, assurance of adequate internal and external communication, written management system documentation as well as appropriate document control procedures, documented procedures for operational controls, and documented and communicated emergency response procedures.

iv) **Checking and corrective action procedures** including procedures for regular monitoring and measurement of key characteristics of the operations and activities, procedures for dealing with situations of non-conformity, specific record maintenance procedures and procedures for auditing the performance of the EMS.

v) **Periodic management reviews of the overall EMS** to ensure its suitability, adequacy and effectiveness in light of changing circumstances. The EMS provides a structured process for the achievement of continual improvement, the rate and extent of which is determined by the organization in light of economic and other circumstances. Although some improvement in environmental performance can be expected due to the adoption of a systematic approach, it should be understood that the EMS is a tool which enables the organization to achieve and systematically control the level of environmental performance that it sets itself. The establishment of an EMS will not, in itself, necessarily result in an immediate reduction of adverse environmental impact. Indeed, care needs to be taken that the mere establishment of an EMS does not lull the organization into a false sense of security. But effectively used, an EMS should enable an organization to improve its environmental performance and avoid or reduce adverse environmental impacts over time.

An organisation has the freedom and flexibility to define the boundaries of its system and may choose to implement an EMS throughout the entire organization, or within specific operating units or activities of the organisation. If it is implemented for a specific operating unit or activity, policies and procedures developed by other parts of the organization can be used to meet the requirements of an environmental management system, provided that they are applicable to the specific operating unit or activity that will be subject to the environmental management system. The level of detail and complexity of the environmental management system, the extent of documentation and resources dedicated to it will be dependent on the size of the organization and the nature of its activities. This may be the case in particular for small and medium-sized enterprises.

Integration of environmental matters with the overall management system can contribute to the effective implementation of the environmental management system, as well as to the efficiency and clarity of roles. In many aspects, the ISO

14001 standard shares common management system principles with the ISO 9000 series of quality system standards. In the beginning of the ISO 14001 standard, it states that "organisations may elect to use an existing management system consistent with the ISO 9000 series as a basis for its environmental management system. It should be understood, however, that the application of various elements of the management system may differ due to different purposes and different interested parties. While quality management systems deal with customer needs, environmental management systems address the needs of a broad range of interested parties and the evolving needs of society for environmental protection."

4.5 ENVIRONMENTAL MANAGEMENT SYSTEMS IN MUNICIPALITIES

Since its publication in 1996, the manufacturing industry has embraced the concept of Environmental Management Systems. However the ISO standard was not designed specifically for implementation in manufacturing, or even just for-profit businesses; it specifically uses the word "organization" to imply any group of individuals that come together for a specific purpose under a specific administrative structure. The benefits of the EMS approach – which will also be discussed in this section – have led to its application in other locations, such as local governments, with similar success. Several pilot studies have been commissioned at the International, Federal and State levels to demonstrate this, and the evidence is clear that municipalities can realise benefits at least equal to those achieved by business. Much like businesses, municipal governments have a complex system of organizational management and are subject to large number of regulatory requirements. However, unlike many businesses, municipalities typically have a very wide scope of activities that encompass power generation, water and wastewater treatment, solid waste collection and disposal, maintenance of the local infrastructure, and enforcement of numerous federal, state and local codes. Further, many of these operations interact directly with the environment and have a high potential for significant impact if a problem occurs. For these reasons, an EMS may in fact be more useful for protecting the environment in a municipal setting than in a business setting.

i) Municipal EMS Pilot Project

The Pennsylvania Department of Environmental Protection (DEP), in conjunction with Five Winds International, conducted a Municipal EMS Pilot Project with seven Pennsylvania municipalities from 2001 – 2003. The materials used by those municipalities form the core of this guidebook, having been refined based on their experiences and recommendations.

ii) Municipalities Participating in the PA EMS Pilot Project

- Brockway Borough – Wastewater Treatment Facility
- Crawford County – Crawford County Correctional Facility
- City Of Erie – Erie-Western Pennsylvania Port Authority
- Hampden Township – Wastewater Treatment Facility
- Lawrence County – Long-Term Care Facility

- City of Philadelphia – Solid Waste Collection Operations and NW Transfer Station
- Venango County – Two Mile Run County Park

Examples from these case studies are included throughout this section to illustrate the benefits of implementing an EMS as have been realized by Pennsylvania municipalities. Additionally, success factors for implementation identified by pilot municipality participants are described.

iii) Benefits of a Municipal EMS

Multiple studies have been performed to examine the benefits of the EMS approach, several of which are referenced in 4.4.1. The evidence indicates that the systems approach to managing environmental issues that is fundamental to an EMS causes a deep, cultural shift in how the organisation addresses these issues. Every employee must incorporate environmental considerations into their daily job functions. Thus the documented benefits of implementing an EMS range from improved compliance with environmental regulations and often a reduction in fines to increased management efficiency, and even a reduction in waste production and energy consumption. The systematic EMS approach to the daily management of energy and environmental objectives leads to benefits that can only be created by an integrated effort across the entire organisation, and are typically difficult to foresee prior to the implementation of the EMS.

A particularly useful element of an EMS is the incorporation of stakeholder requirements and external communications. Because municipalities are pubic entities designed to serve local communities, the increased transparency and ability to respond to the needs of the community typically improves relationships between the municipality and its various stakeholders. The increased management and operational efficiency gained with an EMS also improves the ability of the municipality to provide its services to the community inexpensively and with greater effectiveness. The Pennsylvania EMS Pilot Project Participants anticipate realizing many of the benefits common to EMS implementation; however it is still relatively early to predict whether long-term benefits, such as improved relationships with regulators and regulatory compliance, will be achieved. Despite this, numerous benefits have been noted by Pilot Project Participants, including:

- Capturing Institutional Knowledge;
- Streamlining Operations.

iv) Primary EMS Benefits for Municipalities

- Positive effect on environmental performance and compliance
- Improved EHS/ emergency response training, awareness, involvement and competency
- Increased management and operational efficiency
- Improved relationships with regulators and the community
- Reduced waste production and energy consumption
- Process for inclusion of multiple stakeholder requirements
- Increased transparency and ability to respond to community requests for information

- Demonstration of management control over highly complex and varied activities
- Regulatory Fine and Cost Avoidance
- Improved Emergency Response Procedures and
- Increased Awareness and Participation.

Each of these benefits is discussed below in three broad heads:

a) Capturing Institutional Knowledge

All municipalities involved in the Pilot Project strongly agreed that the most significant, initial benefit they recognised from the EMS implementation process was to capture the institutional knowledge contained in the heads of employees. By consulting with employees and documenting the "how-to" of routine municipal operations, the participants found that the time required for training new staff decreased, and that they were protected from the loss of critical operating knowledge when senior employees retire. Additionally, the documentation of ongoing maintenance efforts required of the EMS has allowed many municipalities to coordinate municipal activities with greater efficiency and improve service delivery in some instances.

b) Streamlining Operations

By documenting the processes used to complete routine municipal duties, many Pilot Project Participants also found that they were able to reduce the number of steps involved in the process, saving time, energy and money. Further, the documents allowed them to standardize the way routine tasks were performed, improving processes and creating additional savings. The EMS implementation process also forced participants to document training, compliance and maintenance schedules, which helped them to stay current with these items, plan staff schedules more effectively, and avoid schedule conflicts with other municipal activities.

c) Regulatory Fine and Cost Avoidance

Pilot Project participants observed significant savings through the avoidance of fines and costs that it could have incurred had the EMS not been in place. Specific cost savings resulted through reducing incidents due to improper maintenance, reducing the need for on-the-job training, and retaining and communicating of critical information over time. One participant even cited a reduction in regulatory fines due to increased employee awareness from EMS training programs.

4.5.1 Case Studies

The *Hampden Township* EMS effectively "caught" information that a pump was out of service at a lift station and allowed corrective action to begin before a total loss of pumping capability occurred.

Hampden Township was apprehensive at first, but an EMS is a great way to translate the old 'verbal' way of doing things into documented written procedures. It forced them to organize and write everything down, something one talked about doing for years but never accomplished..

The *Lawrence County* long-term care facility effectively reduced solid waste disposal by 1.5 tons per year by switching to a coffee concentrate that was brewed on demand, reducing staff time and waste coffee sent to the wastewater collection system.

4.5.2 Key Success Factors

Several important lessons were learned in the course of the Pennsylvania EMS Pilot Project that will be useful to other municipalities seeking to improve their environmental performance through an EMS approach. The experience to date suggests that while there are many operations/facility-specific factors that influence the success of EMS development and implementation, there are some key factors in determining success that apply to almost all operations/facilities. Some of these factors include:

- Commitment from senior management
- A clear project team and dedicated project manager
- Routine meetings
- Publication of the municipal commitment to improved environmental performance
- Integration into existing municipal systems
- Recognition that an EMS is a continuous commitment that does not end with implementation

In this section you have read about the concept of environmental management system, basic elements of environmental management system, environment management system in municipalities. Now answer the questions given in *Check Your Progress-1*.

Check Your Progress 1

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

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

1) What do you understand by ISO14001?

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2) What are the key elements of environmental management system?

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4.6 LET US SUM UP

Environmental management system (EMS) refers to the management of an organization's environmental programs in a comprehensive, systematic, planned and documented manner. It includes the organizational structure, planning and resources for developing, implementing and maintaining policy for environmental protection. The term can also refer to software systems for organizational environmental management. An environmental management system can also be classified as a system which monitors, tracks and reports emissions information, particularly with respect to the oil and gas industry.

4.7 REFERENCES AND SLECTED READINGS

1) UDPFI Guidelines, Volume 1, 1996. Ministry of Urban Affairs and Employment , Government of India, New Delhi.

2) ISO 14001 Environmental Systems Handbook by Ken Whitelaw Second edition 2004 published Elsevier Ltd.

3) *Design Guidelines for Environmental Auditing at Federal Facilities* (EPA 300-B-96-011). EMS Primer for Federal Agencies (Spring 1998).

4) *Environmental Management System Benchmark Report: A Review of Federal Agencies and Selected Private Corporations*. (EPA 300-R-94-009).

4.8 CHECK YOUR PROGRESS- POSSIBLE ANSWERS

1) What do you understand by ISO14001?

ISO/DIS 14001 is one of a series of emerging international environmental management standards aimed at promoting continual improvement in company environmental performance through the adoption and implementation of an environmental management system. The (draft) standard specifies the core elements of an EMS, but contains only those elements that may be objectively audited for certification or self-declaration purposes

2) What are the key elements of environmental management system?

The key elements of any environmental management system are:

- **Environmental policy** - Develop a statement of the organization's commitment to the environment. Use this policy as a framework for planning and action.
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- **Objectives and targets** - Establish environmental goals for the organization, in line with the policy, environmental impacts, the views of interested parties, and other factors.
- **Environmental management program** - Plan actions necessary to achieve objectives and targets.