स्वाध्याय स्वमन्थन स्वावलम्बन

UTTAR PRADESH RAJARSHI TANDON OPEN UNIVERSITY

(Established vide U.P. Govt. Act No. 10, of 1999)

Indira Gandhi National Open University

UP Rajarshi Tandon Open University

PGD-ESD-01
Integrated Environmental Management : Rural and Urban

FIRST BLOCK : Evolving Concepts and Principles
SECOND BLOCK : Sectoral Approaches
THIRD BLOCK : Dimensional Approaches
FOURTH BLOCK : Governance Approaches

Shantipuram (Sector-F), Phaphamau, Allahabad - 211013

SAFLI

South Asia Foundation
Learning Initiative

Integrated Environmental Management: Rural and Urban

Department of Environmental Science
Allama Iqbal Open University Islamabad

PGD-ESD-01(1A)

Block

1

Evolving Concepts and Principles

SAFLI - *an educational project of South Asia Foundation*

South Asia Foundation Learning Initiative (SAFLI) is designed to promote regional cooperation and lifelong, secular learning that emphasises humanism and celebrates the rich heritage of South Asia's unity in diversity at all levels and sections of society.

SAFLI - Post Graduate Diploma on Environment and Sustainable Development

1. Understanding the Environment, Open University of Sri Lanka, Colombo.
2. Sustainable Development: Issues and Challenges, Indira Gandhi National Open University, New Delhi.
3. Environment and Development, Bangladesh Open University, Dhaka.
4. Integrated Environmental Management: Urban and Rural, Allama Iqbal Open University, Islamabad.
5. Natural Resource Management: Physical and Biotic, Open University of Sri Lanka, Colombo.
6. Agriculture and Environment, Indira Gandhi National Open University, New Delhi.
7. Globalization and Environment, B. R. Ambadkar Open University, Hyderabad, India.
8. Towards Participatory Management, Allama Iqbal Open University, Islamabad.
9. Energy and Environment, BRAC University, Dhaka.

Foreword

South Asia- the land of extreme diversity in all respects covers only 5.38 percent of the total land area but inhabiting more than 20 percent of global population is an important region of the world. Acute population pressure, abject poverty and development with out environmental safeguards have resulted in irreparable environmental degradation and depletion of natural resources. Consequently, in South Asia, the highest priorities are poverty alleviation, population management and pursuing the goal of environmentally sound and sustainable development. The key to environmentally sound and sustainable development is the management of the environment and its resources on a sustainable basis.

The idea of environmentally sustainable development has gained growing recognition in recent years as an approach to environment and development issues in which the requirement to satisfy human needs is balanced with the capacity of the environment to cope with the consequences of economic development. In this idea the need for continued economic development and growth is fully recognized, but it should be promoted in a manner which does not jeopardize the position of vulnerable people nor deplete the future viability of the earth's environment and resource base. I believe that the environmental protection and sustainable development are the two sides of the same coin.

The vision of environmentally sustainable development is achievement of mutually complementary economic, environmental and social well being, for everyone, on an ongoing basis. It identifies a direction of change. Movement in the direction of this vision requires action at international, national, regional, and community levels.

The objectives of the SAF-Learning Initiative of South Asia Foundation are twofold. Firstly, to disseminate information and exchange knowledge and experiences gained in the pursuit of the goal of sustainable development. Secondly, to strengthen regional co-operation in environmental capacity building especially in the area of environmental management.

Prof. S. Dr. Altaf Hussain
Vice Chancellor

Preface

Since the Rio Summit in 1992, intense popular interest and concern in processes of environmental degradation at local, regional and global level has developed. However, it soon became clear that reversing such degradation would not be a purely technical and managerial matter. All the technical knowledge in the world does not necessarily lead societies to change environmentally damaging behavior. Hence a critical understanding of socio-economic, socio-cultural, legal and political, and moral and ethical structure has become of central importance in approaching the environmental problems. Most of these are complex problems whose solution will require people capable to grasp the big picture, able to appreciate and deal with complex problems and to support strategies having long-way of impacts. We don't have many of these kinds of people in the world; our program must generate more of them. This is only possible by integrating environmental ideology into socio-economic, socio-cultural and ethical systems. There is a dire need to develop an environmental ideology based on a system of collectively held normative reputedly factual ideas, beliefs and attitudes advocating a particular pattern of social relationships with the environment and arrangements aimed at justifying a particular pattern of conduct towards environment.

There is an increasing realization among environmental professionals that industry is now a permanent part of the environment. Therefore efforts are being made by engineers, natural scientists and policy-makers to "internalize" industry within ecological discourse. A salient feature of this new approach is its emphasis on the harmonization of various environmental disciplines and endeavors- hence the term "integrated environmental management" emerged in the last few years.

Dr. Muhammad Irfan Khan
Course Development Coordinator

UNIT 1

INTEGRATED ENVIRONMENTAL MANAGEMENT

Unit Introduction

The idea of environmentally sustainable development has gained recognition in recent years as an approach to environment and development issues in which the requirement to satisfy human needs is balanced with the capacity of the environment to cope with the consequences of economic development.

The unit includes:

- Brief history of environmental management: nature protection, pragmatic resource conservation, moral and aesthetic resource conservation and sustainable development.
- What is sustainable development? And what are its characteristics, which distinguish it from other types of development.
- The Principles and basic conditions for sustainable development.
- Pathways to sustainability: change, learning, commitment, innovation, and matrices.
- Different Approaches to sustainable development: segregated, integrated and holistic approach.
- Natural, human/social and financial/built capital for sustainable development.

Unit Objectives

The objectives of this unit are to enable students to learn about:

1. History of environmentalism and environmental management;
2. Relationship between environment and development;
3. The need, principles and characteristics of sustainable development; and
4. How sustainable development could be achieved?

1.1 Integrated Environmental Management

Since the Rio Summit in 1992, intense popular interest and concern in processes of environmental degradation at local, regional and global level has developed. However, it soon became clear that reversing such degradation would not be a purely technical and managerial matter. All the technical knowledge in the world does not necessarily lead societies to change environmentally damaging behavior. Hence a critical understanding of socio-economic, political and cultural structure has become of central importance in approaching the environmental problems. Most of these are complex problems whose solution will require people capable to grasp the big picture, able to appreciate and deal with complex problems and to support strategies having long-way of impacts. We don't have many of these kinds of people in the world; our program must generate more of them. This is only possible by integrating environmental ideology into socio-economic, socio-cultural and ethical systems. There is a dire need to develop an environmental ideology based on a system of collectively held normative reputedly factual ideas, beliefs and attitudes advocating a particular pattern of social relationships with the environment and arrangements aimed at justifying a particular pattern of conduct towards environment.

1.1.1 Historical perspective

Although many early societies were intimately familiar with nature and lived in relative harmony with their environment, historians see a gradual broadening and deepening of our concerns about humans and nature in the past two centuries. We can divide this progression into at least four distinct stages.

1. Nature protection
2. Pragmatic resource conservation,
3. Moral and aesthetic nature preservation,
4. Environment and development

1.1.1.1 Historic roots of nature protection

Recognizing human misuse of nature is not unique to modern times. Plato wrote in the fourth century B.C. that the Greek peninsula of Attica was once blessed with fertile soil and clothed with abundant forests of fine trees. He lamented that after the trees were cut to build houses and ships, heavy rains washed the soil into the sea, leaving only a rocky "skeleton of a body wasted by disease". Springs and rivers dried up while farming became all but impossible. Classical authors often regarded the earth as a living being, vulnerable to aging, illness, and even mortality. Periodic threats about the impending death of nature as a result of human misuse have persisted through the middle ages and into our own time. Many of these dire warnings have proven to be premature or greatly exaggerated. We have to be careful about "crying wolf" too many time.

French and British colonial administrators, who often were trained scientists and considered responsible environmental stewardship an aesthetic and

moral priority as well as an economic necessity, carried some of the earliest scientific studies of environmental damage out in the eighteenth century. These early conservationists observed and under-stood the connection between deforestation, soil erosion, and local climate change. The pioneering British plant physiologist Stephen Hales, for instance, suggested that conserving green plants preserved rainfall. His ideas were put into practice in 1764 on Caribbean island of Tobago, where about 20 percent of the land was marked as "reserved in wood for rains."

Pierre Poiver, an early French governor of Mauritius, an island in the Indian Ocean, was appalled at the environmental and social devastation caused by destruction of wildlife - such as the flight less dodo and felling of ebony forests on the island by early European settlers. In 1769, Poivre ordered that one quarter of the island was to be preserved in forests, particularly on steep mountain slopes and along waterways. Mauritius remains a model for balancing nature and human needs. Its forest reserves shelter a larger percentage of its original flora and fauna than most human occupied island.

1.1.1.2 Pragmatic resource conservation

Many historians consider the 1864 publication of man and nature by geographer George Perkins marsh to have been the wellspring of environmental protection in North America. Marsh, who was a lawyer, politician, diplomat, and geographer, traveled widely around the Mediterranean as part of his diplomatic duties in Turkey and Italy. He read widely in the classics (including Plato) and personally observed the damage caused by excessive grazing by goats and sheep and deforesting steep hillsides. Alarmed by the wanton destruction and profligate waste of resources still occurring on the American frontier in his lifetime he warned of its ecological consequences. Largely as a result of his book, national forests reserved were established in the United States in 1873 to protect dwindling timber supplies and endangered watersheds.

Among those influenced by Marsh's warnings were president Theodore Roosevelt and his chief conservation adviser Gifford Pinchot a champion of the populist, progressive movement, Roosevelt moved the forest service out of the corruption ridden Interior Department in 1905 and into the department of agriculture. Pinchot, who was the first native-born professional forester in North America, became the first head of this new agency. He put resource management on an honest, rational, and scientific basis for the first time in U.S. history. Together with naturalists and activists such as John Muir, William Brewster, and George Bird Grinnell, Roosevelt and Pinchot established the framework of out national forest, park, and wildlife refuge system, passed game protection laws, domain. In 1908, Pinchot organized and chaired the white House Conference on Natural Resources, perhaps the most prestigious and influential environmental meeting ever held in the United States.

The basis of Roosevelt's and Pinchot's policies was pragmatic utilitarian conservation. They argued that the forests should be saved "not because they are beautiful or because they shelter wild creatures of the wilderness, but only to provide homes and jobs for people." Resources should be used "for the greatest good, for the greatest number, for the longest time." Pinchot

observed, "there has been a fundamental misconception that conservation means nothing but husbanding of resources for future generations. Nothing could be further from the truth. The first principle of conservation is development and use of the natural resources now existing on this continent for the benefit of the people who live here now. There may be just as much waste in neglecting the development and use of certain natural resource as there is in their destruction." This pragmatic approach still can be seen in the multiple use policies of the Forest Service.

1.1.1.3 Moral and aesthetic nature preservation

John Muir, geologist, author, and first president of the Sierra Club, strenuously opposed Pinchot's influence and policies. Muir argued that nature deserves to exist for its own sake, regardless of its usefulness to humans. Aesthetic and spiritual values formed the core of his philosophy of nature protection. This outlook has been called biocentric preservation because it emphasizes the fundamental right of living organisms to exist and to pursue their own goods. Muir wrote, "The world, we are told, was made for man. A presumption that is totally unsupported by the facts is that the Nature's object in making animals and plants might possibly be first of all the happiness of each one of them. Why man ought to value himself as more than an infinitely small unit of the one great unit of creation?" Muir, who was an early explorer and interpreter of the Sierra Nevada Mountains in California, fought long and hard for establishment of Yosemite and King's Canyon National parks. The national park service, established in 1916, was first headed by Muir's disciple, Stephen Mather, and has always been oriented toward preservation of nature in its purest state. It has often been at odds with Pinchot's utilitarian forest service.

1.1.1.4 Environment and development

Over the past thirty years, growing numbers of people have come to recognize that efforts to improve their standards of living must be in harmony with the natural world. Many have realized that a lack of development can be as great threat to nature as reckless or misguided development. Relationship between environment and development is an integral part of the social environment. As principle 4 of Rio Declaration points out that the environment and development are interrelated. It states that:

> "In order to achieve sustainable development, environmental protection should constitute an integral part of the development process and cannot be considered in isolation from it."

At this moment, question might come in your mind that what is Development?

Development can be defined as:

- The acceleration or quickening of economic growth
- The reduction of inequality, and
- The elimination of absolute poverty

Lets take a closer look at the process of development as mentioned above.

Economic growth results from activities such as forestry, mining tourism agriculture and manufacturing. All economic activities directly or indirectly depend on resources (renewable or non-renewable). Todaro, in his book *Economic Development in the Third World*, published in 1989 explained that the basic function of all economic activity is to provide as many people as possible with the means of overcoming the helplessness and misery, which arises form, lack of food, shelter, health and protection. In his view therefore, economic growth can help in reducing inequality and eliminate poverty.

The development process has a direct impact on the environment, but conversely, the condition of the environment and its resources also affect development and therefore, the social environment. In fact you can say that it is a cyclical process. The degradation that results from the government and people of the countries involved. Thus on a long-term basis, over exploitation of the environment could lead to the continuation of a cycle of poverty. In effect, the environmental effects of our development strategies can hinder future efforts to develop countries.

Self-Answering Question 1.1

Briefly explain the relationship between environment and development. Compare your answer with those provided at the end of the unit.

1.2 Sustainable Development

Economists who were concerned about the problems caused when efforts to promote growth ignored the environmental dimensions of growth first used the expression sustainable development. Such efforts focused on activities in which projected benefits exceeded projected costs by the highest margin possible. In the 1980s, the term sustainable development was used to describe the development, which takes account of environmental consequences.

Now the question is; how this change was brought about?

During the 1980s a number of reports from agencies concerned with the environment and development called for a radical approach to natural resources exploitation and economic development. They suggested that existing forms of economic development were not sustainable because they undermined the natural resources and services on which all-economic activity is based. In fact, those form of development failed to meet the needs of a growing number of the world's people, many of who lived in a state of absolute poverty.

Approach of sustainable development would bring together two aspects of development, which the previous approach separated:

1. The socio-economic aspect. This involved economic production and the satisfaction of human needs.

2. The environmental aspect. This involved the capacity of the environment to cope with the effects of economic activity.

1.2.1 The concept of sustainable development

Since the release of the Brundtland Commission's report, Our Common Future, the concept of sustainable development has captured the world's attention and emerged as the new political ideology to be addressed. The term was defined by the Brundtland Commission as:

"Development that meets the need of present generation without compromising the ability of the future generation to meets their own needs."

The definition contains two key concepts:

1. The concept of need, in particular the essential needs of the world's poor, to which overriding priority should be given; and

2. The limitations imposed by the state of technology and social organization.

Essentially sustainable development is a process that implies continuous change. Therefore, to capture adequately the true needs of an interdependent and environmentally sustainable future, a paradigmatic shift for a new order is desirable which maintains flexibility consistent with the (re) conceptualization of sustainable development. Of course the concept of sustainable development has fundamentally changed the nature and scope of the debate on the environment and its relation to development. In the past, whenever a new situation emerged it was added to the concept of economic development. Sustainable development, on the other hand, has actually subsumed the entire notion of economic development within its orbit. As such the pursuit of economic growth is no longer the main core of value: rather it is a part of the larger picture, the central theme of which is how to integrate economic and environmental concerns in a development strategy. As the world commission on Environment and Development has stated: we have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impacts of ecological stress upon our economic prospects.

The concept of sustainable development implies a fusion of two imperatives: the right to develop, and the need to sustain the environment. What it means is that any future development ought to be achieved in a sustainable manner. Thus concept denotes a balance, so that sustainable brings environmental concepts into the developmental process, while "equitable" inserts developmental matters into international environmental protection efforts.

1.2.2 Characteristics of sustainable Development

The characteristics concern that distinguish sustainable development from other forms of development are concern for:

- Quality of life, and
- Social equity

1.2.2.1 Quality of life

Sustainable development view quality of life as the main concern of development. In fact the sustainable development is the gradual change in the quality of human life brought about by economic growth. The change must be gradual because sudden and rapid change requires over exploitation of environmental resources and defeat the purpose of sustainable development.

1.2.2.2 Social equity

Sustainable development also implies social equity, that is:

- Respect for regional, national, local and cultural diversity
- The strengthening and full exercise of citizens' participation in development
- Peaceful coexistence and harmony with nature.

1.2.3 Conditions for sustainable development

Although the purpose of sustainable development is to integrate social and environmental concerns into economic decisions, its achievement requires adherence to general principles that must be joined to the basic conditions for success. Those are nothing more or less than the five major principles governing life in society and relations between governments and nations. They have a number of underlying concepts, which are also considered essential to the attainment of sustainable development.

1.2.3.1 Democracy

Although they need not absolutely be linked. sustainable development can hardly be initiated or implemented in the absence of genuine democracy. It is hard to see just how to provide fairly for present needs, and without compromising the future of generations to come, without underlying mechanisms and institutions in which all can participate. To paraphrase the Brundtland Commission, which so aptly opened debate on the subject, isn't sustainable development everyone's business and everyone's future?

Thus, all human beings, no matter what their country of origin, may legitimately aspire to clean air and water, sufficient food, comfortable housing and satisfying work, in an atmosphere of peace and respect for differences and diversity. At the same time, they must be able to ensure the protection and survival of their natural and cultural heritage. In short, all human beings enjoy a fundamental right to an environment that is of high quality and is healthful. By democracy, we must understand respect not only for individual rights, but also for collective rights and in particular the

right of women and first peoples to participate actively and fully in the march toward sustainable development.

1.2.3.2 Autonomy

While sustainable development must be achieved in a democratic context, the autonomy of governments, peoples and ethnic groups in making their development choices must also be respected. This does not mean that governments must operate in isolation; on the contrary, they must adopt a global view of development and development planning by taking an active part in international forums and processes for determining major common objectives for sustainable development.

Nor does this exclude the establishment of common international environmental standards, although each government is free to adopt national standards consistent with these. It is important that governments adhere to the principle that, while protection of the environment is a joint responsibility, the development and implementation of environmental standards by less developed countries will take into account the limits and ability of those countries to act and pay the associated costs, as well as their responsibilities with respect to a particular environmental problem.

At the same time, it must be acknowledged that these countries have certain potential skills and practical knowledge that often remain under exploited in the absence of appropriate support structures. Thus a greater need for mutual assistance, cooperation and the transfer of knowledge and "clean technologies" arises directly from the interdependence of countries in the implementation of sustainable development.

1.2.3.3 Fairness

The concept of fairness is central to the entire issue of sustainable development, being based on recognition of the global and common nature of our environment and on the need for the planet's resources to be shared in a sustainable way. Achieving fairness in sustainable development must be addressed at three levels:

(1) Within populations or states,
(2) Between populations or states and
(3) Between generations.

Fairness within a single population or government essentially requires meeting the needs of all and improving the quality of life through a better distribution of wealth. Despite what is often thought, this objective does not apply solely to the poorest countries, but also to Western societies, where disparities between people have tended to increase over the last decade.

At the next level, the harmful effects of underdevelopment and the obvious disparities between developed and less developed countries show that sustainable development cannot be achieved without reducing discrepancies between the rich and poor countries, that is, without a relentless struggle against poverty. It is for this reason that sustainable development cannot be viewed solely from an environmental standpoint, particularly in the

countries of the South, where it must be achieved by accelerating development.

Lastly, one of the major challenges of sustainable development is beyond a doubt the objective of fairness between generations. As mentioned in A Strategy for Sustainable Living:

> Each generation should leave to the future a world that is at least as diverse and productive as the one it inherited. Development of one society or generation should not limit the opportunities of other societies or generations.

Once again, at this level, making certain development choices will, in many instances, require new approaches and attitudes and different behavior.

1.2.3.4 Interdependence

Interdependence, which derives from the notion of fairness, is another basic condition for sustainable development: the common interest can only be served through international cooperation. With industrialization, improved technological capabilities and the globalization of trade and commerce, has come increased interdependence, even at the local level. It brings with it its own set of problems, such as the loss of traditional rights to certain resources and increased commercial and industrial production, with an attendant reduction in the decision-making power of local communities and individuals. Interdependence extends beyond a local and regional framework, however; it is now global, particularly with respect to the environmental problems affecting the biosphere.

This interdependence of individuals and communities requires first that we acknowledge our common interest in the environment so that each decision is made and each action taken in full knowledge of the repercussions for the environment and the welfare of others. More than anything else, interdependence is based on the capability for mutual assistance and cooperation at all levels of action, from the local to the international. Although international cooperation in environmental matters has increased over the past decade, a number of aspects must still be reviewed and reoriented, taking sustainable development into account.

1.2.3.5 Responsibility and accountability

Since it is in everyone's interest to preserve the environment and to use it in a sustainable way, all countries have a responsibility from the outset to preserve and restore the environment and to achieve development, without harming their own environment or that of others. Consequently, all countries must take an active part and show solidarity in this cause. Furthermore, the concept of fairness, as it applies to countries and nations or to generations and individuals, implies that the responsibilities of all involved may be different but complementary, depending on the needs of each, and may vary in proportion to the extent of damage to the environment and the abilities of each party to rectify this. Furthermore, in the context of globalized trade and environmental problems, it is vital for the economic benefits of a given business activity to be linked with its environmental

repercussions, so that the responsibilities of each stakeholder are recognized; that is to say, so that all players are accountable for their own actions.

Some have argued that the question of accountability, and thus of every stakeholder's assumption of responsibility, may lead to a redistribution of profits so that compensation can be established, for example, for the use of natural resources or for environmental impacts. This proposal might be one way in which the richest countries can make a greater contribution to the sustainable development of poor countries and take an active part in solving environmental problems.

Collective and individual responsibility for managing the environment and natural resources in a sustainable manner must take into account both present and future generations. Making stakeholders responsible for their actions is at the same time encouraging the principle of stewardship, whereby a representative of both present and future generations acts as the "custodian" of natural resources and the environment.

1.3 Principles for Sustainable Development

In addition to the five basic conditions necessary for ensuring sustainable development, five major principles underlie its implementation. These principles, to an even greater extent than the aforementioned conditions, are vital to the definition of sustainable development.

Suggested Reading:

The Declaration on Environment and Development, outline 27 broad principles for sustainable development that were developed at the Earth Summit 92. Familiarize your self with these principles by reading The Declaration on Environment and Development also known as Rio Declaration.

1.3.1 Environmental and economic integration

The environment and the economy are obviously very closely related. This link is more than a mere principle; it is a necessity for sustainable development. Various economic tools and policies may promote sustainable development, or at least lead to a more environmentally conscious use of resources. These tools or policies, such as the polluter-payer or consumer-payer approach, may be applied equally to producers, consumers and taxpayers and to enable the market to determine the correct overall cost of using resources. In many instances, however, for the actual value of natural resources to be taken into account, producers and economic agents need to change their attitudes. As a result, tax incentives or other economic tools may be necessary to promote this coming together of the environment and the economy.

The integration of the environment and the economy is as advantageous for poorer countries as for rich ones because, if production models adhere to economic and environmental rules, there may be a better balance of

comparative production advantages. The result could be a softening of world trade rules whereby poorer countries would be enabled to lay claim to greater economic development.

Certain traditional economic indicators may also assist in assessing the degree to which the economy and the environment are integrated. Particular examples are the gross domestic product and per capita income; global indicators that reflect social aspects (such as the Human Development Index, which includes longevity, education and income); and strictly environmental indicators, such as water quality and land use.

1.3.2 Maintenance of biological diversity and conservation of natural resources

Achieving sustainable development presupposes that we can preserve biological diversity, maintain ecological processes and life support systems and use the world's species and ecosystems in a sustainable manner. Development based on the preservation of natural resources calls for energetic measures that will make it possible to protect the structure, functions and diversity of the natural systems on which life depends.

These measures must focus on species and ecosystems as well as on their genetic heritage. Consequently, the limits, on and the capacity for renewal of, natural resources such as soil, wild and domesticated species, forests, pasture and farm land, fresh water and marine ecosystems, must not be compromised. As well, the life of non-renewable resources should be extended by developing and using more effective and cleaner technologies and by encouraging re-use and recycling.

First of all must come changes in the behavior of individuals and communities and in their attitude to the environment, along with the provision of genuine means for managing it better. New approaches at the state level must then integrate development and conservation of resources on the basis of sufficient information and knowledge and through appropriate legal and institutional instruments. Effort at the international level must be on promotion of the development, and adoption and implementation of conventions and protocols on the environment and natural resources.

1.3.3 Precaution, prevention and evaluation

Precaution, prevention and evaluation are the starting points for genuine sustainable development; they must form an integral part of the planning and implementation of every development project. Planners and decision-makers must make it a routine to foresee and provide for the environmental consequences of their projects.

Current environmental protection measures are precautionary; however, in many cases, they are merely a band-aid solution that is not always compatible with the concept of sustainable development, particularly from a long-term perspective. However, the concepts of precaution, prevention and evaluation are difficult to instill because they are often removed from the day-to-day reality and have benefits that will be felt only in the more or less

distant future. Forewarned is forearmed, foresight is knowledge and evaluation enables planning: it is imperative that countries and societies adopt these three watchwords so that present development can be transformed into sustainable development.

1.3.4 Cooperation, partnership and participation

Achieving sustainable development has become a collective responsibility that must be fulfilled through action at all levels of human activity. Consultation and cooperation in all decision-making are essential to the sustainable management of terrestrial, aquatic and marine ecosystems. It is incumbent upon all states and all nations to cooperate in good faith and in a spirit of partnership in implementing effective strategies to protect, preserve and restore the environment. All must take an active part and do their fair share in accordance with their capabilities and the means at their disposal.

All governments must accept their responsibilities by introducing economic growth policies and programs compatible with the protection of their own environment and that of others. They must ensure the protection of ecosystems of particular importance for agriculture and the way of life of the populations that depend on it. Furthermore, they must facilitate the participation of non-governmental organizations and decentralized or local communities to ensure they can play a greater role in all development- and environment-related activities.

In addition, states must join forces to strengthen international law by adhering to existing environmental conservation and management conventions and protocols and by passing the necessary statutes for their implementation. They must also promote and develop new agreements an instruments considered necessary to achieving sustainable development.

Cooperation and partnership also presuppose that the richest countries introduce financial and technical assistance measures that will enable the poorer countries to integrate environmental issues more easily into their development programs. The creation of specific environmental protection and restoration funds is certainly worth considering.

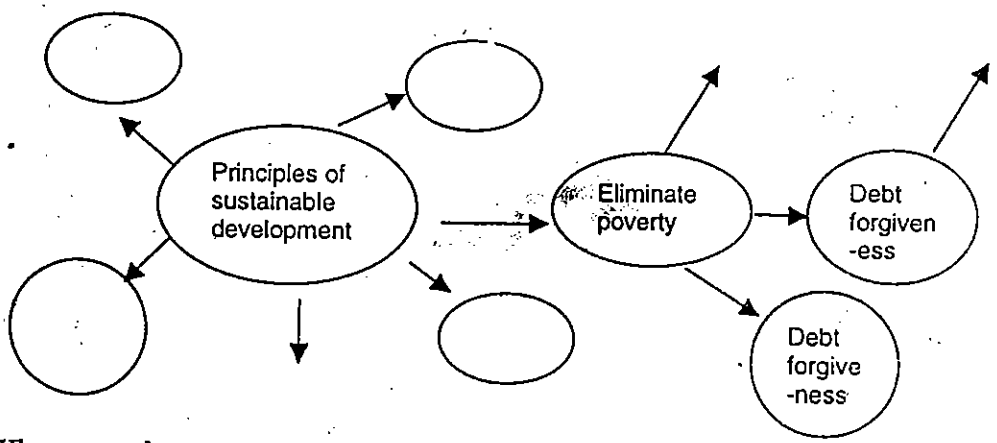
The preservation of biological diversity clearly illustrates how interdependent are the "North and South blocs" in the necessary establishment of new partnerships. The main "centres or sources of biological diversity" are situated more particularly in the countries of the South, whereas the major "technological or biotechnological centres" are mainly in the countries of the North. In other words, the countries of the South as well as those of the North must be party to all discussions, solutions and conventions necessary to the achievement of sustainable development. They must all ensure that the measures chosen are suited to the situation of each. The more developed countries will no doubt have to make the necessary efforts to bring about a higher degree of development in the poorer countries and, in particular, the latters' improved access to the most suitable technologies.

1.3:5 Education, training and awareness

Safeguarding the environment and achieving sustainable development depend not only on technical and economic matters, but also on changes in ideas, attitudes and behavior. The direct participation of individuals and communities is essential. All must become fully aware of their environment, know its demands and limits and alter their habits and behavior accordingly. To this end, countries must develop strategies to better educate, inform and sensitize their populations on environmental matters and sustainable development. For example, ecological and environmental concerns can be integrated into school programs; the awareness of the general public can be raised through extensive information campaigns, particularly through the media; "green" projects can be encouraged in local communities, and training programs can be developed to promote more informed resource management and the use of clean technologies.

Activity 1.1

A mind map is a graphic way of organizing information. You start with the main concept in a circle in the middle, e.g. sustainable development then attach all the ideas one can think of. In the mind map unlike list, ideas can be interconnected. Based on what you have already studied, try to draw a mind map of the principles of sustainable development. Here hoe it might look like few principles, see how much you can add.



When you have generated as many principles as you can, try to match them against the 27 principles of Agenda 21. Add any that you forgot.

1.4 Pathways to Sustainability

The development has focused single-mindedly on growth in production and the expansion of the market economy. In development this paradigm has proved mechanical and inflexible as in many countries it has not helped remove material poverty nor conserve valuable social and environmental resources. It is not capable of promoting sustainable development.

1.4.1 Change

There is a paradigm shift in the theory and practice of development. The paradigm shift represents a move from an industrial approach to technology development to holistic approach with sustainable improvement replacing profit as the implicit objective; from a technocratic and exclusive to a participatory and inclusive approach to development management; and from resource control by big organization to local resource management, often with a strong common property aspect.

1.4.2 Learning

Change in paradigm involves process of learning. Learning about new, better and environmental technologies and practices. The learning process will ensure quality growth, which is environmentally enhancing, socially just and acceptable, contributing to peace.

1.4.3 Commitment

Most important turning point in the pathway of sustainability is commitment. Commitment is required to change, to learn and for innovations.

1.4.4 Innovations

Once you are committed, to move from unsustainable pattern of development to sustainable one, innovations are required in every field from our life style to industrial technology.

1.4.5 Matrices

The innovations will require a set of criteria to assess the impacts on ecological and social environment and feasibility of a project or innovation with regards to its costs and benefits as a project that seems very sound environmentally may not be feasible economically.

1.5 Approaches to Sustainable Development

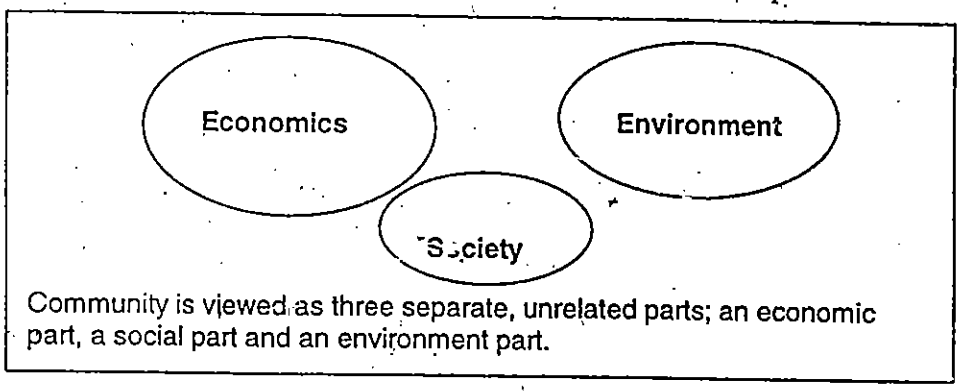
Sustainability is related to the quality of life in a community—whether the economic, social environmental system that makes up the community are providing a healthy, productive, meaningful life for all community residents, present and future. How has the quality of life in your community changed over the last 20 or 40 years? We use number to show progress; unemployment rose 0.4 percent in January, or the economy grew 2% last year.' However the traditional numbers only shows changes in one part of the community without showing the many links between the community's economy, society and environment. There are three spheres of community activity, economics, society and environment. Based on these three spheres of activity there are three approaches to sustainable development.

1. Segregated Approach

2. Integrated Approach
3. Holistic Approach

1.5.1 Segregated approach

It is as if community is made of three separate parts—an economic part, a social part and an environmental part that do not overlap.



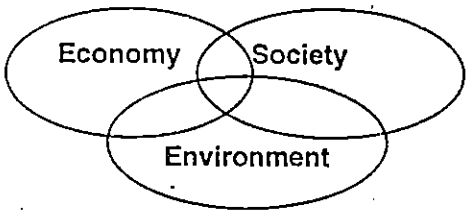
Community is viewed as three separate, unrelated parts; an economic part, a social part and an environment part.

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. Economic development council tries to create more jobs. Social needs are addressed by health care services and housing authorities. Environmental agencies need to prevent and correct pollution problems. This piecemeal approach can have a number of bad side effects:

- Solution to one problem can make other problem worse. For example creating affordable housing is a good thing, but when that housing is built in areas far from workplaces, the result will be traffic congestion, pollution and extra use of fuel or resources.
- Piecemeal solution tends to create opposing groups. How often have you heard the argument 'if the environmentalists win, the economy will suffer,' and the opposing view business has its way, the environment will be destroyed.
- Piecemeal solution tends to focus on short-term benefits without monitoring long-term results. The pesticide DDT seemed like a good solution to insect pests at the time, but the long-term results were devastating.

1.5.2 Integrated approach

Rather than a piecemeal approach what we need is a view of the community that takes into account the links between the economy, the environment and the society. The figure below shows the connections:

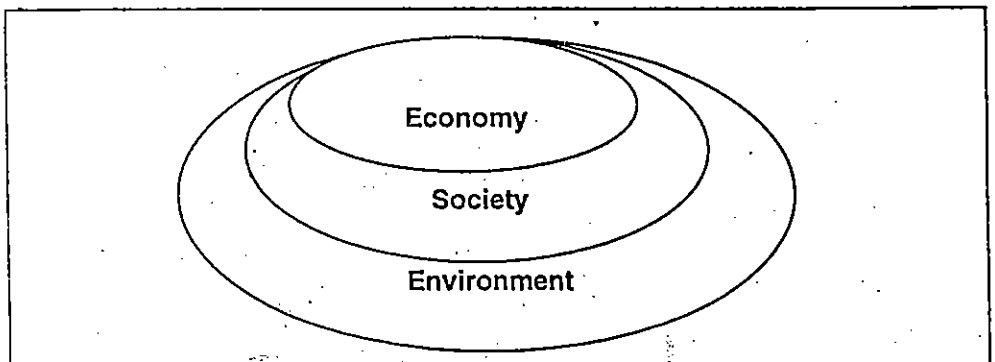


A view of community that shows the links among its three parts: the economic part, the social part and environment part.

Action to improve conditions in the community takes these connections into account. Understanding the connection in these three spheres is key to understanding sustainability, because sustainability is more than just quality of life. It is about understanding the connections between and achieving balance among the social, economic and environmental pieces of a community.

1.5.3 Holistic approach

However even a better picture of a sustainable community is the circles within circles rather than the three partially connected circles.



A view of community as three concentric circles: the economy exists within society, and both economy and society exists within the environment.

All parts of human economy require interaction among people. However society is not entirely society. Society is much more than economy including, religion, culture, friends, families, music, art and ethics. So the economy exists entirely within society.

Society in turn exists entirely within the environment. Environment fulfills our basic requirement of food, water, air and shelter. Environment surrounds society. At an earlier point in society the environment largely shape the society but now opposite is true as human activity is reshaping the environment at an ever-increasing rate. However as people need food, water, air to survive, society can never be larger than the environment.

Sustainability requires managing all households---individual, community, national and global—in ways that ensure that our economy and society can continue to exist without destroying the natural environment on which we all depend. Sustainable communities acknowledge that there are limits to the natural, social and built systems upon which we depend.

Sustainability is an issue for all communities for small rural towns that are losing the natural environment upon which there jobs depend, to large metropolitan areas where crime and poverty are decreasing the quality of life. Indicators measure whether a community is getting better or worse at providing all its members with a productive, enjoyable life, both now and in the future.

Activity 1.2

What do you think?

i) Are we using resources faster than it can be renewed? and

ii) Are we enhancing the social and human capital upon which our community depends?

Write your point of view in your notebook.

1.6 Considering social, economic and human capital for sustainable development

Capital by definition comprises those inputs that are necessary in economic processes and that endure (as opposed to inputs that are used up upon consumption). In other words what we pass on today so that the economy may continue tomorrow. As a concept, capital aligns very well with the temporal aspect of sustainable development. The essence of sustainability is that we wish economic production to continue for the benefit of the future not because production is inherently good but because it contributes to human welfare. To do this we need to maintain the means of production-or capital-intact over time. Capital embodies much of what is necessary to create the flows of services and materials necessary for economic production, today and for the future. If capital is maintained, constant or growing over time, than economic production, today and for the future. If capital is maintained constant or growing over time, then economic production, too, can be sustained over time.

There are various ways to categorize capital most popular being:

1.6.1 Natural capital

Natural capital is generally divided into three categories:

- Natural resource stocks (source of raw material used in the production of manufactured goods)
- Land (provide space for economic activity)
- Ecosystem (provide services directly and indirectly to the economy

  e.g. cleaning of polluted air and water, provision of productive soil, provision of biodiversity, protection from incident solar radiations, provision of relatively stable climate, and provision of reliable flows of renewable natural resources.

1.6.2 Human / social capital

The concept of human capital can be described as the capabilities and capacities, both innate and derived or accumulated. Embodied in the working age population that allows it to work productively with other types of capitals. The term traditionally applied to education, and includes the knowledge and skills that working age population accumulates through formal education attainment, training and experience. The more human capital is available in the economy the greater the value of the services rendered by its workers.

1.6.3 Economic or built capital

It includes produced goods, tools, machines, buildings and other forms of infrastructure as well as financial capital which enabled other types of capital to be owned and traded. It has no real value itself but is representative of natural, human, social or manufactured capital; e.g. shares, bonds or banknotes.

Unit Summary

Although many early societies are concerned and live in harmony with their environment, but a gradual deepening of concern about environment and its management can be divided into four major stages: Nature protection, Pragmatic Resource conservation, moral and aesthetic resource conservation and sustainable development.

Sustainable development as defined by Bruntland Commission Report *Development that meets the needs of present generation without compromising the ability of future generation to meet their needs.*

Sustainable development view quality of life and social equity as main concern. Democracy, autonomy, fairness, interdependence, responsibility and accountability are the basic condition required to attain sustainable development. In addition to the five basic conditions necessary for ensuring sustainable development, five major principles underlie its implementation, which are:

i. Environmental and economic integration,
ii. Maintenance of biological diversity and conservation of natural resources,
iii. Precaution, prevention and evaluation,
iv. Cooperation, partnership and participation,
v. Education, training and awareness

Sustainability involves, change in our perception and action, learning, commitment for managing environment, innovation and matrices to analyse costs and benefits of innovation. Sustainable development requires holistic approach of community activity in which three spheres of community activity, economy, society and environment are merged and present within a single sphere of environment. Human/social, natural and financial/built capital should be considered very important as if capital could be sustained over time the development could be sustained both for present and future generation.

Answers to self-answering question 1.1

Our environment can be defined into two interdependent parts

The physical environment
The social environment

The social environment also includes development strategies, which rely on the exploitation of the resources in the physical environment. The over exploitation or unsustainable uses of natural resources damage the environment which consequently effect development.

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Unit 2

INTEGRATING ENVIRONMENT INTO RURAL DEVELOPMENT

Unit Introduction

Rural development is set of activities and action of diverse actors, individuals, and organizations, groups, which taken together leads to progress in rural areas. There is a paradigm shift in rural development for modernization paradigm which concentrate on economic growth to integrated rural development which involves planning for rural diversification and address problems of drinking water supply, sanitation, health, education, land holding and tenure and poverty alleviation.

The unit deals with:

- Common goods and rural development
- Planning for rural diversification
- Provision of Drinking water supplies and sanitation facilities as part of rural development projects
- Health and education facilities as necessary tool for rural development
- Land holding and tenure problems
- Poverty alleviation projects in rural areas

Unit Objectives

After going through this unit student will learn:

1. Role of common good management in integrated rural development
2. How to plan rural diversification
3. Dealing with the problems of provision of basic facilities like water, sanitation, education and health in rural areas.
4. Problems of land holding and tenure
5. Combating poverty in rural areas through poverty alleviation projects.

2.1 Rural Development

Rural development is the set of activities and actions of diverse actors, individuals, and organizations, groups, which had taken together leads to progress in rural areas. Different people define progress differently: historically, material progress, growth of incomes and wealth, poverty alleviation, has been the main consideration in development theory and practice. Today other indicators of progress, cultural, spiritual, ethical are increasingly taking their place beside the material in a reformulated, more holistic concept of development.

2.2 Paradigms of Rural Development

There are two main paradigms of rural development;

1. The modernization paradigm
2. The holistic development paradigm

2.2.1 The modernization paradigm

Very roughly this paradigm equates development with four basic processes:

a) Capital investment; which lead to the productivity increases.
b) The application of science to production and services.
c) The mergence of nation-states and a large-scale political and economic organization.
d) Urbanization.

These processes are linked to change in values and social structure. However modernization paradigm is evidently failed on a number of counts. Poverty and insecurity are still there in many poor countries, as well as some resource-rich ones, despite four or five decades of independent government and development policies and programmes.

The conventional paradigm in rural development has focused almost single – mindedly on growth in production and the expansion of the market economy. If redistribution was part of the agenda, it was to be controlled by state. The assumption has been that growth and markets are best promoted by the sate and by a range of external interveners, donors and non-governmental organizations who know best about the kind of production and markets required. Rural development was achieved by big, bureaucratic organizations, with professionals and administrators in command of the process. Economic criteria dominated decision-making; social environmental, political factors were relatively unimportant and participation of the beneficiaries of this development was only included as an afterthought.

2.2.2 The holistic development paradigm

There is a paradigm shift in theory and practice of rural development. Th paradigm shift represents a move form an industrial approach to technolog development to an organic or holistic approach, with sustainabl improvement replacing profit as the implicit objectives from a technocrati and exclusive to a participatory and inclusive approach to developmen management; and from resource control by big organization to local resourc management, often with a strong common property aspect.

The paradigm shift in rural development could be summarized as below:

Table 2.1 A summary of the paradigm shift

The modernization paradigm	The holistic paradigm
▪ Economic growth as all costs	▪ Quality growth: environment enhancing, socially just and acceptable: contributing to peace.
▪ Redistribution, if any by the state	▪ Process of inclusion of the excluded in decision.
▪ Authorizationism tolerated as price of growth	▪ Intangibles valued: freedom, autonomy, dignity
▪ Subsidies for small enterprises, provided by the state	▪ An enabling environment for enterprise growth
▪ State-provided social security	▪ Local institutional development for security
▪ Transfer of technology form rich countries	▪ Value local technology and knowledge; participatory technology development
▪ Transfer of valuable assets to rich countries	▪ Institutions to protect assets of poor communities
▪ Tangibles, economic valuation of development; governments to define it	▪ Development as multi-faceted, and often intangible: people to define it
▪ Privatize/nationalize common properties	▪ Affirm common enterprise as common, and expand field of goods seen as common
▪ Build large powerful organization for development: focus on government and large NGOs	▪ Polycentric institutional arrangements: people's organizations, framework of governance
▪ Planning= central thought process	▪ Evaluation= central thought process
▪ Organizational hierarchal: to implement plans	▪ Non-hierarchical learning organizations
▪ Compartmentalized	▪ Holistic
▪ Role of the state: major producer provider and regulator	▪ Role of the state: creating enabling legal frame works, devolving power, encouraging associations

Source: (Shephard, 1998)

2.2 Managing Common Goods

Rural development is clearly about improving the life chances and well being of individuals and households, particularly the mass of rural poor who have been left behind in the process of economic growth. The dominant western strategy has always involved a focus on individuals and households, and assumptions that they exist in a context of well-functioning markets. Where markets do not function (market failure), Strategists resort to the state to provide and control.

However, all of these individuals and households depend quite. Directly on non-marketed common property resources for their livelihood. This is obviously true for marginalized societies such as pastoralists, landless and quasi-landless households, and, within peasant households, for women, who often have a strong role in taking animals to graze, collecting firewood out of common forests, and collecting water form common supplies. In many peasant societies all households rely on common sources of drinking and irrigation water, common forests and pastures. The well being of these societies depends substantially on the availability, quality, and survival: their construction and maintenance are important tasks, which must be accomplished, usually on a collective basis.

Common goods (sometimes called common pool resources) are a special type of public good. There is an important distinction between common and public goods. Public goods are those form which no one can be excluded; protection against air or water pollution generally benefits everyone. It would be impossible to change air users, but it is possible to fine or tax air polluters. Water users can generally be charged. This makes water a "toll" good. Roads are the classic "toll" good. These are public goods for which charge can be levied. If people are excluded from benefiting – those who do not pay, or who do not live in a certain area or are not members of a certain organization or kinship group – and if benefits are positively allocated to a restricted membership, then we can speak about common goods, or common pool resources. Common goods therefore overlap with toll goods, but are not necessarily toll goods: membership may be by ascription, or residence. The term is generally used to refer to cases where members identify with the good in question and perceive it as common to themselves. It often refers to local resources.

Just as there are common goods, so there are common baddies. Floods, or forest fires, events which generally affect the residents of certain areas and from which those residents require protection, are examples. Protection can be assured and organized locally, in which case it will only stretch so far and no further, some mechanism of local governance is required to enable the achievement of this common good, Sometimes hazards are so widespread that protection against them takes on the character of a public good, Similarly common goods are often regarded in low as public goods, there is often much confusion. Sometimes this is deliberate: nationalization of resource may be designed to facilitate transfer of access from one social group to another.

2.2.1 Rural development and common goods

Government and rural development efforts have a bad record of substituting public for what should be common goods. Many of the above resources have been nationalized in many countries-usually over the heads of people who think of the resources as. collectively, theirs. The tendency of state-led rural development in support of private enterprise has been to take over the provision and maintenance of naturally or previously collectively supplied goods. Then, having committed themselves in this way many states have not had the resources to honor their commitments, leaving substantial areas of provision unmet or subject to poor quality and low levels of maintenance. Centralized, competitive political processes have at the same time contributed to the decline of local institutions and leadership patterns, which could have taken up the unmet commitments. In some cases centralized states have actively prevented local communities or groups developing collective, locally appropriate provisions, in customary law there are often complex layers of rights to use common pool resources, which are completely disregarded by legislated nationalizations or privatization. It is important that rural development workers criticize these acts of disenfranchisement, fight them in the courts where relevant, and strengthen commoner's claims over common pool resources.

There are new (or newly conceptualized) commons as well as old genetic resources, for example. And there is scope for creating new commons in particular form resources previously under state control, but also from privately owned resources where ownership rights are becoming increasingly conditional. The new rural development agenda involves moving in from a defensive to an aggressive position on commons: exploiting opportunities to create new ones, and recreate old ones, as well as defending existing commons,

Paradoxically, while states were busy taking over functions to which they could not do justice, they also naively promoted community development. In many cases this turned out to mean the development of a village elite favorable to the central power, and allowing a trickle of funds to enable them to patronize supporters in the village. Among other things, village elites used their influence to privatize village common land, which was in important part of the survival kit of the rural poor.

State-controlled co-operative movements were another tool used in the same way. In fact the left-liberal or statist strain of rural development has consistently sought to develop new – and perfect- common institutions, community spirit and co-operative enterprise, and mistakenly frowned on individual enterprise and archaic (imperfect) institutions. These institutions usually led to the development of the few and the exclusion of the many. Typically, the poor women, and minority groups were excluded, or benefited significantly less. These perfect institutions were often too complex for ordinary members to understand, and assisted with external resources to grow too rapidly. The generation of internal resources was neglected, and external sponsors (usually governments) used the institutions to legitimate themselves (and sometimes to enrich themselves).

A later generation of development programmes promoted self-help and self-sufficiency as a method of spreading the benefits of development more rapidly to a large group of people. In the 1970s, prompted by the criticisms of the development equals growth school of thought, a strong concern emerged for the participation of the poor in both state-led development and self-help efforts. This did not rely so much on the notion of village as a community, characterized by equality and solidarity, and therefore good at working together for mutual benefit, as on the idea of groups with sufficient common interest to support each other in enterprises or common services. This represented progress conceptually, but practice often lagged behind, stuck with idealistic notions of community self-help.

Community development and self-help efforts relied heavily on idealism an altruism among participants if they were to work effectively in managing common resources or providing common services, Sociological analyses, such as those conducted for the United Nations Research Institute on Social Development (UNRISD) (e.g. Inayatullah, 1972) and the International Labour Organization (ILO) (*e.g.* Curtis *et al.*, 1979) in the 1970s and early 1980s, shed some light on why certain collectivities succeeded while others failed. These studies situated particular collective initiatives in wider analysis of the social structure and process of particular societies. Some generalizations were possible on the basis of comparative study – for example, that co-operative whose members were relatively homogenous in socio-economic terms were more likely to succeed than those with sharply differentiated memberships. There also emerged a more general pessimism about the prospects for collective action, since there seemed to be few success stories, which were not highly context-specific. This was reflected in the virtual demise of collectivist solution in the 1980s.

A more rigorous theoretical approach to the understanding of collective action has awaited the development of the new economics of institutional rational choice by economists and political scientists working on common property problems as policy issues. In enabling professionals and policy-makers to understand what the options of collective action might be in particular contexts, these writers have made it possible to be much less idealistic and wishy-washy about cooperation and much less pessimistic about the possibilities for well-managed common property in the modern world. They have begun to make it conceptually possible to think of renewing and creating common properties.

Reintroducing the notion of common property as central to the new rural development paradigm has other advantages too: it does not presume any kind of community of interest among the members of natural, communities, (e.g. villages administrative areas, etc.). Community of interest has to be discovered, and conflict among common property users is seen as the norm: the work of development agencies, in co-operation with users, is to evolve solutions to conflict of interest which advance the cause of the poor, of women, and of oppressed minorities. This may involve legal and institutional changes which have to be lobbied for.

2.2.2 The New Institutional Economics and Common Property

Until the 1980s, models of how common property resources are managed have been very crude. They have generally been dismissive of the possibility that groups of people with different and often competing interests can use and manage a resource in common. The phrase 'tragedy of the commons' says it all: policy prescriptions resulting from these crude models have tended to conclude that commons should be privatized or that 'the government' should regulate their use. Institutional economics applies economic concepts of rationality, and the calculation of costs and benefits to the analysis of institutions for the common good. 'The government" becomes one (or several) actor(s) in these models; but the most important actors are the users and managers. This economics is useful to analyze situations where commons users struggle to operate their common (be it land, water, forest, a fishery, or a computer network) through the development of operating strategies, rules and constitutions. Rather then government, it is better here to speak about the process of governance. This may be carried out by a government (village, local or central), or by an organization of civil society.

The economist's basis strategy is

> to identify those aspects of the physical, cultural and institutional setting that are likely to affect the determination of who is to be involved in a situation, the actions they can take and the costs of those actions, the outcomes that can be achieved, how actions are linked to outcomes, what information is to be available, how much control individuals can exercise, and what payoffs are to be assigned to particular combinations of actions and outcomes. Once one has all the needed information, one can then abstract from the richness of the empirical situation to devise a payable game that will capture the essence of the problems individuals are facing.

The key concepts for the analysis of common property resources (CPRs) are:

1. The resource system, which produces
2. a flow of resource units, which can be used by
3. Appropriators, who may or may not be the same people as the
4. Providers, who create or maintain the resource system.

- Appropriators learn about the impact of their actions on themselves and others through trail and errors over a period of time.
- Their decisions are affected by their time horizon: usually local appropriators expect their children and grandchildren to make use of the resource system so they will have a low discounting rate for future benefits.

- The behavior of all parties is affected by *values* of right and wrong and the degree of *opportunism* expected of other parties, and the degree of trust and sense of community.

In most CPRs resource units are subtract able, one appropriator's use affects that of others. This distinguishes CPRs from public goods where 'appropriation problems do not exist because resource units are not subtract able.'

Decisions to co operate depend on expected benefits, expected costs, internal norms and discount rates, in the context of an external world which affects all of these. These decisions are complex and involve weighing many uncertainties.

a) A successful working arrangement should be based on rules which can be agreed.

b) It must generate continued widespread commitment to those rules.

c) It must engage in mutual monitoring to support individuals' commitment to the rules and to the process of rule making.

d) Appropriators need to be assured that the (managerial) benefits of appropriation are greater then the (managerial) costs. Open access CPRs are likely to fail in this, as users have no incentive to leave resource units for other users. In a limited access CPR used by a well defined group, 'the incentives facing the appropriators will depend on the rule governing the quantity, timing, location and technology of appropriation, and how these are monitored and enforced'

e) Investment in the resource itself must be adequate to maintain or improve it, and appropriators' current use must not be at the expense of future use.

Decisions about CPR management occur at different levels:

- *the operational level* (where well known rules govern appropriation, provision, monitoring and enforcement),

- *the collective or management level* (where eligibility to make rules and manage is decided).

People involved in commons move between these different levels of decision, and all are important in determining whether a CPR is well managed.

For common property resources to be managed sustainable in environmental and equity terms the rules may need to change. Successful change, whoever proposes it, requires support from interested parties. Economics holds that individuals assess alternative rules and the costs and benefits of making changes rationally. However, the data to model individual behaviour adequately rarely exists, so that the analyst must be familiar with the situation as different parties experience, it, and identify the 'situational

variables' which will affect individuals' judgments about the benefits a costs of changing the rules.

These would include:

- The type of rule change proposed;
- The skills and assets of leaders;
- The degree of autonomy available in changing rules;
- The heterogeneity of interests involved, and so on

Setting new rules in extremely difficult: it is often impossible to calculate th effects of the new rules with any accuracy. People will weigh likely costs an benefits in a biased way (losses are weighed more heavily than gains; recer experience figures more prominently in people's minds than the more remot past; small changes are less opposed then big, etc.). Different groups c appropriators may have quite conflicting interests and derive very differer levels of benefit from existing or proposed arrangements. It will be easier t agree new rules where:

1. Most appropriators share a common judgment that they will b harmed if they do not adopt an alternative rule.
2. Most appropriators will be affected in similar ways be the propose rule changes.
3. Most appropriators highly value the continuation activities from thi CPR; in other words, they have low discount rates.
4. Appropriators face relatively low information, [rule] transformatior and enforcement costs.
5. Most appropriators' share generalized norms of reciprocity and trust that can be sued as initial social capital.
6. The groups appropriating from the CPR is relatively small and stable.

These conclusions are similar to those of the UNRISD studies mentioned above, and are from common sense. Where such conditions do not apply, CPR management may be enhanced (or simply made possible) by external intervention. However, in the interest of strengthening the institution managing the CPR, governments or other external agencies should not intervene without acquiring a great deal of understanding of the situation, and the different interests involved; they would act in support of local, sustainable institutional solutions rather than taking over the rule making and other management tasks. Social scientists working on these problems should be able to address their ideas as much to the users as to the agency that has employed them to give advice. Government provides the legal and institutional framework the courts, policy wary of providing and managing the solution.

2.2.3 Critical issues in the application of the new economics

It is support for local and popular institutions, and in its recognition of the limits to government or external action, the new economics is progressive. Like all economic theorizing and modeling, however, there remain strongly mechanistic notions at the heart of institutional economics. It assumes a material rationality, and relegates many important issues to the realm of values or norms. It needs to be complemented by social analysis, which would actress the importance of informal relationships and networks, cross cutting ties and sources of motivation, the importance of politics, and the existence of altruism based on personal or social philosophies, which reject or qualify materialism. A social analysis would also investigate the worldview and knowledge system upon which particular management strategies are based: economics assumes the disembodied (detached), context less (universal) system of knowledge of modern industrial society; but many societies operate with knowledge systems which are firmly embedded in a complex of thought and practice, and applied in a local context.

In any particular case the range of variable may be so complex as to defy easy analysis. People's perceptions of a situation also frequently vary from an "objective' (external) analysis of their interests because of the social, political and philosophical complexities involved. Model building can be done in a participatory way, however, such that interested parties are involved, share in the information which is generate, and are then in a stronger position to retain decision making powers in a local arena.

2.3 Policies and Planning for rural diversification

The relevant guidance

1. Local authorities should make provision in their development plans, appropriate to the needs of the area, for commercial and industrial development, which can be accommodated without serious planning problems. Wide and varied opportunities for employment should be provided for rural people, The process extends wider than farm based or farm business related diversification of the wider rural economy.

2. Policies in local plans should provide a guide to the scale of allowable development, and the criteria against which planning applications will be considered. Sensitive, small-scale new development, it is suggested, can be accommodated in and around many settlements. Additional topics, which may be addressed, include the effects of the future expansion of businesses in rural areas and the need to avoid the loss of employment uses in villages where there may be adverse effects on the local rural economy. The guidance places great emphasis on the opportunities for re use presented by many rural buildings. Re use should normally be acceptable providing the form, bulk and general design of buildings are in keeping with their surroundings. Some authorities have prepared non-statutory rural strategies in co-operation with a range of countryside interests. It is suggested that comprehensive

strategies which integrate conservation with economic and soci development can be a positive influence on development plans.

3. It is suggested that the levels of provision in development plan should be based on an assessment of the needs of the area. Suc development should be capable of being accommodated withou serious planning problems. This implies that authorities shoul have a clear analysis of factor such as unemployment, the skills i the local labour market, and the development intentions of existin employers. Rural areas are almost without exception highl dependent upon and increasingly interlinked with, urban area and wider production systems. In some country structure plans the needs of rural areas are not analyses separately from those o the urban areas, being regarded as almost a residual area o policy. There is no tradition of assessing rural areas requirement in the same detail at district level as other components of policy such as housing needs.

4. The most popular policy model put forward in development plans is that of compensating for change. This assumes that it would be desirable to replace jobs lost in agriculture and related industries. and in defence, by measures taken within the country or district. The view that sufficient new jobs can be created by in site diversification, or by forms moving into an area to replace those lost is often an optimistic one. Most local authorities are aware of this but are determined to continue to base policy on this premise. A second model, overlapping with the first, suggests that policies should reflect local needs. Development controllers should seek evidence of an employment need within a particular local community before regarding schemes as acceptable. A third model can be termed that of rural urban balance. It was suggested that if the planning system were to create an abundant supply of cheap industrial and commercial premises on farms an imbalance would be created. Land allocated for employment purposes in country towns (and larger cities) might not be taken up and activities could be unnecessarily attracted to the countryside.

5. Many of the local plans tended to operated from existing land commitments adding new land, if necessary, at the margins of settlements. This approach involves allocating greater amounts of land in the larger country towns, and defining small sites in villages. Where sites are not defined in the plan, criteria based policies are used. We found that the process of finding sites without serious planning difficulties was therefore being tackled. The major problem related to larger scale development opportunities. Assessing priorities for the reuse of abandoned military installations, particularly where these might provide very large areas of low rent accommodation or storage space was on such issue. Setting down criteria for large new job creating schemes should they wish to locate in rural areas, was another.

6. The rural urban balance model is however difficult to manage in practice. Local authorities in remote areas cannot find sufficient users for allocated land. In pressured areas any significant

weakening of the present position could lead to a dispersal of activities that are not necessarily assisting the rural economy, but are generating more travel.

7. Farm based and agricultural diversification, involves mobilizing resources such as land, buildings, or family labour to create new enterprises. These may be a direct extension of the farming activity, by creating a value added product and marketing it, or indirect, by selling contracting or other skills on and off the farm. Also, typically, buildings may be leased for office or other small business purposes unrelated to farming of the land.

8. The land use planning criteria for judging diversification schemes on farms fall under six headings. These are:

   - how far the scheme supports the variability of the farming enterprise;
   - the number of local jobs created or retained;
   - the scale of the activities, and any new buildings, and how they fit into the countryside;
   - a preference for the re use of existing buildings;
   - issues of vehicular access and its quality, and
   - the need to avoid additional dwellings in the open countryside.

2.4 Managing Health and Environment

Since sustainable agriculture has developed as a result of health and environmental concerns, it would be ironic if there were not evident benefits in these fields. The health impact of the Green Revolution has been very little studied; comparative studies are not surprisingly a very new field, and so far confined to industrial countries. For example, in Denmark it was found that male sperm counts were twice as high in consumers of organic produce compare with the rest of the population – and declining sperm counts is a feature of industrial society. This has now been replicated in the UK.

Environmentally, research has shown that species diversity is greater on organic than on non-organic farms in the north. Birdlife, insect and plant diversity is all significantly greater. Not surprisingly since the organic farmer attempts to live with nature rather than control it to a greater extent than the conventional farmer. However, the health and environmental benefits of non-Green Revolution agriculture would be much easier to substantiate in the south where careful comparisons can be made between regions where chemicals are widely used and those where their a use ins significant. This is a key area in which research needs to be funded.

2.5 Management of Drinking Water and Sanitation

Access to water supply and sanitation is a fundamental need and a human right. It is vital for the dignity and health of all people. The health and economic benefits of water supply and sanitation to households and individual (and especially to children) are well documented. Of special importance to the poor are the time saving, convenience and dignity that improved water supply and sanitation represent. Those without access are the poorest and least powerful. Access for the poor is a key factor in improving health and economic productivity and is therefore an essential component of any effort to alleviate poverty.

The water supply and sanitation sector will face enormous challenges over the coming decades. Although the greatest increase in population will be in urban areas, the worst levels of coverage at present are in rural areas. In Africa, Asia, and Latin America and the Caribbean, rural coverage for sanitation is less than one half that of urban areas. In those three regions alone, just under 2 billion people in rural areas are without access to improved sanitation, and just under 1 billion are without access to improved water supply.

Poor water supply and sanitation have a high health toll whereas improving water and sanitation brings valuable benefits to both social and economic development. The simple act of washing hands with soap and water can reduce diarrhoeal disease transmission by one third. Hygiene promotion, therefore, is an important priority.

2.5.1 Health hazards of poor water supply and sanitation

- Approximately 4 billion cases of diarrhea each year cause 2.2 million deaths, mostly among children under the age of five. This is equivalent to one child dying every 15 seconds, or 20 jumbo jets crashing every day. These deaths represent approximately 15% of all child deaths under the age of five in developing countries. Water, sanitation, and hygiene interventions reduce diarrhoeal disease on average by between one quarter and one third.

- Intestinal worms infect about 10% of the population of the developing world. These can be controlled through better sanitation, hygiene and water supply. Intestinal parasitic infections can lead to malnutrition, anemia and retarded growth, depending upon the severity of the infection.

- It is estimated that 6 million people are blind from trachoma and the population at risk from this disease is approximately 500 million. Considering the more rigorous epidemiological studies linking water to trachoma, it was found that providing adequate quantities of water reduced the median infection rate by 25%.

- 200 million people in the world are infected with schistosomiasis, of which 20 million suffer severe consequences. The disease is still found in 74 countries of the world. In reviewing

epidemiological studies, fond a median 77% reduction from well designed water and sanitation interventions.

- Arsenic in drinking water is a major public health threat. According to data from about 25,000 test on wells in Bangladesh, 20% have high levels of arsenic (above 0.05 mg/l). These wells were not, however, selected at random and may not reflect the true percentage. Many people are working hard in Bangladesh, West Bengal and other affected areas to understand the problem and identify the solution.

2.5.2 *Health benefits of improved water supply and sanitation*

Water supply and health

Lack of improved domestic water supply leads to disease through two principal transmission routes

- Waterborne disease transmission occurs by drinking contaminated water. This has taken place in many dramatic outbreaks of faecal oral diseases such as cholera and typhoid. Outbreaks of waterborne disease continue to occur across the developed and developing world. Evidence suggests that waterborne disease contributes to background rates of disease not detected as outbreaks. The waterborne diseases include those transmitted by the faecal oral route (including diarrhoea, typhoid, viral hepatitis A, cholera, dysentery) and dracunculiasis. International efforts focus on the permanent eradication of dracunculiasis (guinea worm disease).

- Water washed disease occurs when there is a lack of sufficient quantities of water for washing and personal hygiene. When there is not enough water, people cannot keep their hands, bodies and domestic environments clean and hygienic. Without enough water, skin and eye infections (including trachoma) are easily spread, as are the faecal oral diseases.

- Diarrhoea is the most important public health problem affected by water and sanitation and can be both waterborne and water washed. Adequate quantities of safe water for consumption and its use to promote hygiene are complementary measures for protecting health. The quantity of water people use depends upon their ease of access to it. If water is available through a house or yard connection people will use large quantities for hygiene, but consumption drops significantly when water must be carried for more than a few minutes from a source to the household.

Sanitation and health

Sanitation facilities interrupt the transmission of much feacal oral disease at its most important source by preventing human faecal contamination of water and soil. Epidemiological evidence suggests that sanitation is at least as effective in preventing disease as improved water supply. Often, however, it involves major behavioral changes and significant household cost.

Sanitation is likely to be particularly effective in controlling worm infections. Adults often think of sanitation in adult terms, but the safe disposal of children's faeces is of critical importance. Children are the main victims of diarrhoea and other faecal—oral disease, and also the most likely source of infection. Child friendly toilets, and the development of effective school sanitation programmes, are important and popular strategies for promoting the demand for sanitation facilities and enhancing their impact.

Adequate quantities of safe water and good sanitation facilities are necessary conditions for healthy living, but their impact will depend upon how they are used.

Three key hygiene behaviours are of greatest likely benefit:

- hand washing with soap (or ash or other aid).
- safe disposal of children's faeces.
- safe water handling and storage.

2.5.3 Water supply and sanitation technologies considered to be "improved" and those considered to be "not improved"

The following technologies were considered "improved":

Water supply
Household connection
Public standpipe
Borehole
Protected dug well
Protected spring
Rainwater collection

Sanitation
Connection to a public sewer
Connection to septic system
Pour flush latrine
Simple pit latrine
Ventilated improved pit latrine

The following technologies were considered "not improved":

Water supply
Unprotected well
Unprotected spring
Vendor-provided water
Bottled water
Tanker truck provision of water

Sanitation
Service or bucket latrines (were excreta are manually removed)
Public latrines
Open latrine

2.6 Education

Development, above all else, requires new ways of thinking acting. Education is the principal means for responding to new situations, requirements and possibilities with fresh thinking and effective action. Whether the issue be the reduction of poverty, the preservation of the environment, the improvement of urban life or the promotion of the rights of women, education is a part of the answer, often a very sizeable part. It is a vital force in the struggle to shape a happier future for humanity. Education has a powerful and pervasive impact in reducing mortality and fertility rates and, in tandem with communication, accelerating the demographic transition.

The relationship between education and population cannot be understood in isolation, but only in the context of the struggle for development and sustainability; and must, in turn, be placed in the broader context of the struggle to overcome poverty, promote justice and equity and ensure respect of the environment and, thus, for the right of future generations to live healthy and fulfilling lives. What ultimately counts is the quality of life people enjoy and the communities they form and foster. A world in which the richest fifth of humanity consumes 150 times more than the poorest fifth is rendered fragile both by the excesses for the rich and the desperation of the poor. To restore a sustainable balance we must begin by forging a new sense of community based on mutual responsibility and an ethics of the future; a far sighted acceptance of our shared interdependence and the long term action that it implies.

The type of education that can contribute to this ambitious yet essential goal is, evidently, an education of both breadth and quality. It is an education that not only activates the mind and imagination, but also touches the conscience, constantly reminding us of our obligations to one another.

Education plays a vital role in the quest to ensure the basic needs and well-being of all the world's people and this is the ultimate goal of the population policies.

The international conference on population and development deal with a cluster of critical and complexly interrelated issues: population economic development and sustainability. Its programme of Action (POA) stresses the need to "promote social justice and the eradicate poverty through sustained economic growth in the context of sustainable development and emphasizes the importance of education both as an inalienable human right and as a critical factor in promoting social and demographic change. "Everyone", the POA asserts, "has the right to education, which shall be directed to the full development of human resources and human dignity and potential, with particular attention to women and the girl child..."

Education is also identified as a "key factor in sustainable development" and "as a component of well being and a factor in the development of well being through its links with demographic as well as economic and social factors."

If education is to provide the answer to population growth and other societal problems or, more realistically, an important part of the answer it will first be necessary to develop education system capable of bearing the burden of

hopes and expectations that are being placed upon them. It is essential tha society first come to the rescue of education by providing it with the mission resources, staff, facilities, equipment and supplies that quality educatio requires. While the primary responsibility for education rests with nationa governments, the experience of recent years demonstrates that they canno shoulder the burden alone. They need the active involvement of civil societ and the effective solidarity of the international community.

The challenge is not merely to ensure survival, but to provide humanity witl a more productive, peaceful, just and meaningful future. In this challengin situation, education in humanity's best hopes. Without invention innovation, new systems of organization and values, and new ways o thinking and acting the products and by products of education future prospects are bleak. New learning and learning systems, open to all, are the keys to a brighter future.

2.7 Land Holding and Tenure

The extent to which the ownership and control of the land is concentrated in a few hands or widely distributed among those who live form farming is probably the most important single determinant of the welfare of the people on the land. Wherever there is widespread distribution of landownership one also observes:

1. the strongest propulsions to steady work and the maximum of thrift;
2. the highest average levels and standards of living;
3. the least development of social stratification, the fewest class distinction, the relative absence of caste, and very little class conflict and class struggle;
4. a high degree of vertical social mobility so that the individual comes nearest to occupying the social position commensurate with his effort and natural abilities;
5. general intelligence that is at a high level and a minimum in range: and
6. a rural population having well rounded and highly developed personalities.

The opposite of this system, the concentration of control in the hands of a few and reduction of the masses of the population the category of landless agricultural workers, appears to results in

1. a very low average level of living, and an equally low standard, although the members of the landowning elite may live in fantastic luxury;
2. Tremendous class distinctions between the favored few at the apex of the social pyramid and the toiling masses who lack any rights to the soil;

3. Relatively little vertical social mobility, because caste is strong and because the chasm which separates the upper classes from the masses is so great that the offspring of those of low estate even those of rare ability find it almost impossible to ascend in the social scale;

4. Low average intelligence, because the great attainments of the selected members of the small upper class are far more than offset by the meager development of the personal qualities of those who belong to the lower strata;

5. people skilled only in the performance, under the closest of supervision, of a limited number of manual tasks, and unable to carry on the self-directed activities involved in managerial and entrepreneurial work;

6. Personal contacts characterized by the features of domination-subordination, order-and-obey relationships;

7. A society that stress routine, regulation, and order rather than innovation, progress, and change.

Where large-scale agriculture prevails, the vast majority of those involved are nothing more than labourers whose total potential as human beings remains undeveloped and who are subject to all of the disabilities mentioned before. On the other hand, where landownership and control are widely distributed among those who make up the rural population, such problems are of little consequence. Middle-class social status is the rule arising not from the accident of birth, but from the individual's own abilities and efforts to succeed. Such a condition is a quite logical part of the pattern of social relationships associated with family sized farms, within this relatively large middle class, individuals move up and down to levels fairly commensurate with their talents and effort. Their farmer in such a system is a laborer, as in the one working on the large estate he does not own. However, unlike the serf, the peon, the sharecropper, or even the wage hand, he is also an entrepreneur and the manager of his own farming affairs. In these capacities he is constantly motivated to seek efficient, economical methods and he lacks any predisposition to preserve wasteful routine or a debilitating status quo. Where owner-operators of family-sized farms are typical, average levels of living and of intelligence are likely to be very high. There is little in the social relationships of these persons that would bring some under the domination of others; genuine leadership is common, but operates among a community of farmers who have no reason to fear each other or to acquiesce to principles and procedures with which they disagree.

Land tenure refers to the rights that people have in the land, that is, to their legal privileges to use, cultivate, dispose of, and even exploit specified portions of the earth's surface. Tenure is, therefore, a social relationship between human beings and the land; it is reflected in a broad array of social regulations regarding the use of the soil. In turn, tenure is closely associated with other relationships between can and the land, such as the size of agricultural holdings, class and caste systems, planes of existence and aspirations for improvement, changes in status, and system of agriculture.

However, the close tie between tenure and other social relationships does nc justify considering them identical.

Practically every society has placed some restrictions upon the use of lanc Provisions regulating the use of land and for governing the association between those who own and control it and those who do not are part of th earliest literature known to mankind. A study of the early law codes reveal that much attention was given to matters relating to the employment of land One of the earliest codes, and one that served as a pattern for many tha followed, is that of Hammurabi, written some four thousand year ago. It wa: prepared at a time when agriculturists lived within the town walls and wen out to cultivate the surrounding areas; its rules concerning several of th social relationships between people and the land are explicit. No less than 1 of its 247 section pertain to the use of the soil, and of these at least 13 dea with land tenure, defining specifically the accepted relationships of the landlord and the tenant. However, both in the codes and in present laws observers might complain that the regulations favor the interests of the landlord as opposed to those of the tenant.

For many purposes it is necessary to classify the agricultural population according to tenure; but the lack of data and the confusion in terminology make such an endeavor on a worldwide basis a very difficult task. Much of the difficulty arises from such problems as semantic inconsistencies when language barriers are crossed, the lack of adequate censuses of agriculture needed to supply basic data, imprecise and nuclear definitions of such terms as "renter", "tenant," "farm," and "farmer," and the frequent reluctance of social scientists to undertake this exceedingly complicated and often unrewarding kind of investigation. Perhaps one of the greatest handicaps in the inadequate distinction made between persons who own agricultural land and those who actually participate in one capacity or another in the process of agricultural production. For example, in areas where absentee owners, owner-operators, renters, tenants, and sharecroppers all are grouped into the single category of "operators," that designation becomes worse than meaningless. In places where a "farm" or "agricultural establishment" includes everything from the very tiny subsistence plot used by an agricultural laborer to a vast plantation or an immense "ranch" or "hacienda," developing a reliable and valid classification of the tenure statuses of the agricultural population is virtually impossible. As a result, it often becomes necessary into abandon any thought of using designations and classes that would make it possible to analyze tenure on a worldwide scale, and to use those that are peculiar to one country or a small group of countries.

2.7 Poverty Alleviation

Rural income is very low in most poor countries. Economic growth is thus an essential ingredient of rural development. Market-led economic growth has relied on benefit to trickle down to the rural poor, but this has only happened under very specific circumstances among countries coming late to the development process. As a result, thinking - at least in the international development agencies – has moved towards a new paradigm of poverty alleviation, – the IMF's high quality growth, which should be equitable, give attention to the poor and vulnerable, and protect the environment, the World

Bank's poverty reducing growth (1990), generating Income-earning opportunities and improved access to services for poor, Increasingly it is the positive participation of the poor in the development process which is seen to reduce poverty. This strategy is much cheaper than supporting growth biased to the rich since the poor will supply much of the overall cost of investment, through labour and even savings. By contrast, the rich typically require more expensive support in the form of capital. It may be cheaper, but it is institutionally complex.

Increased rural incomes generates greater demand, which in turn is the key to balanced and sustainable rural economic growth and food security, because it will promote a diversity of local services, trade and production, with impacts locally perceived and manageable. In agriculture diversification of farm and off-farm activities, including CPR –based ones (livestock, fishing, forestry, bee-keeping, wildlife management), has become a major thrust.

In the field of non-farm activities, the key components of the paradigm shift are as follows.

1. There has been a change during the last decade and a half of structural adjustment programmes from heavy direct promotion of enterprise involving subsidy, generally on capital investment, to the creation of an appropriate policy and market environment. This involves removing obstacles and decreasing equal opportunity for competition, usually removing discrimination in favour of large, urban-banded enterprise and external investors. The move is away from industrialization at all costs', costs not only to the state but also to rural communities. Pollution, unhealthy working conditions/sweated labour, child labour.

2. From providing subsidized bank credit for capital investment to creditworthy entrepreneurs, development efforts have increasingly turned to collateral-free group-based lending with a savings base, often supporting self-constituted groups of women, who would be considered accredit worthy by normal banking standards. These efforts swing between developing entrepreneurial skills among the very poor, to providing critical injections of working capital into existing artisan enterprises to enable a better chance of survival. This implies moving form a belief in modern industry to an understand ding that traditional occupations many have a lot to offer, provided there is good demand for their products.

3. There has also been a shift away from bureaucratically managed credit back to community/locally controlled rotating or accumulating savings a credit associations which function not only as financial intermediaries but often also as safety nets providing insurance and consumption loans to members. There is a debate about whether development agencies should intervene in such organization, which is otherwise independent.

4. Poverty alleviation in also about social security. It is clear that savings and credit schemes cannot reach all the poor: they poorest are usually very hard to reach. What they need is a wage; and help in sending their children to school. Many development agencies and

governments now offer wage guarantee schemes when the local labou market is slack. Then there is a small proportion among the poor wh cannot hold down a job and depend on charity. Most poor countrie have yet to provide effectively for these groups, who may be disablec chronically sick or mentally ill. There is still very great scope (innovation in the field of social security provision.

Unit Summary

The conventional modernization rural development has failed due to its inflexibility. Alternative paradigm for rural development involves a more holistic approach towards development focusing on social justice, environment and institutional sustainability.

The main problems that occur while developing a integrated plan for rural development is the management of common goods as management of common goods provides a wide field in which rural development ca make a distinctive impact on development practice thinking.

The integrated rural development demands policies and planning of rural diversification, which needs assessment of the needs of the particular area. The industrial or agricultural development and provisions of facilities should be based on the needs assessed.

The facilities, which are lacking in rural areas of South Asia include, Water Supply and Sanitation, health, education. The other major problems include land holding and tenure and poverty. Many poverty alleviation programmes run by NGOs deal effectively with these issues in the rural areas.

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UNIT 3

INTEGARTING ENVIRONMENT INTO URBAN DEVELOPMENT

Unit Introduction

Because the world is becoming increasingly urbanized, it is important to learn how to improve urban environments—to make cities more pleasant and healthier places in which to live and to reduce undesirable effects on their environments. City dwellers are subjected too much higher concentrations of most pollutant than are their rural neighbors. Some of this pollution comes form motor vehicles, which have contributed lead in gasoline (where it is still used), nitrogen oxide, ozone, carbon monoxide, and other air pollutants from exhaust. Stationary power source also produce air pollutants. Home heating is a third source, contributing particulates, sulfur oxides, nitrogen oxides, and other toxic gases. Industries are a fourth source, contributing a wide variety of chemicals. Although it is impossible to eliminate exposure to pollutants in city, it is possible to reduce the exposure by careful design, planning and development.

Unit Objectives

After reading this unit, you should understand:

1. How to view a city from an ecosystem perspective.
2. What elements are important to a city's site and situation, and the types of situations that have always been desirable?
3. How cities developed, as well as some of the major concepts of urban planning.
4. How cities change their own environment and affect the environment of the surrounding areas, and how we can plan cities to minimize some of these effects.
5. Why trees and other vegetation in cities are important as pleasing elements and as habitats for animals, and how we can alter the urban environment to encourage wildlife and to discourage pests.

3.1 City Life

In the past, the emphasis of environmental action has most often been on wilderness, wildlife, endangered species, and the impact of pollution on natural landscapes outsides cities. Now it is time to turn more of our attention to city environments. In the development of the modern environmental movement in the 1960s and 1970s, it was fashionable to consider everything about cities bad and everything about wilderness good. Cities were thought of as polluted, lacking in wildlife and native plants, dirty, and artificial and therefore bad. Wilderness was considered as unpolluted, clean, full of wildlife and native plants, natural and therefore good. Although it was fashionable to disdain cities, the majority of people lives in urban environments and suffered directly from their decline.

Comparatively little public concern has focused on urban ecology; as a result, many urban people see environmental issues as outside their realm. However, city dwellers are at the center of some of the most important environmental issues. Today there is a rebirth of interest in urban environments and in the development of urban ecology. People are realizing that city and wilderness are inextricably connected. We cannot fiddle in the wilderness while our Rooms burn from sulfur dioxide and nitrogen oxide pollution.

Worldwide, we are becoming an increasingly urbanized species. In the United States, about 70% of the people live on 3% of the land area and 75% live in urban suburban areas. It is projected that 50% of the people in the world will live in cities by the year 200. Economic development leads to urbanization: nearly 80% of the people in developed countries live in cities, but only 20% of the people in the poorest developing countries are city dwellers.

Not only is the human population becoming increasing urbanized, but there is a rapid growth of huge metropolitan areas with more than 10 million residents. In 1950 there are only two such areas in the world – New York City and its nearby New Jersey areas (12.2 million residents) and greater London (12.4 million). By 1975, Mexico City, Los Angeles, Tokyo, Shanghai, and Sao Paulo, Brazil, hand joined this list. It is estimated that by the year 2000, 0 more cities and their surrounding areas will have grown to this size. Almost 400 million people will be concentrated in the largest 25 urban areas (figure 26.3). It is clear that in the future most people will live in cities; in fact, in most nations, most of the urban residents will live in the country's ingle largest city. In the future, for most people, living in an environment of good quality will mean living in city that is managed carefully to maintain that environmental quality.

3.2 The City as a System

One of the ways in whys in which we can improve the management of a city environment is to analyze the city as an ecological system. Like any life-supporting system a city must maintain a flow of energy, provide necessary material resources and have ways of retained in a city by transportation and communication with outlying areas. A city is not a self-contained ecosystem: it depends on other cities and rural areas. A city takes in raw materials from

the surrounding countryside; food, water, wood, energy, mineral the city produces and exports material goods,and-if it is truly great city – exports ideas, innovations, inventions, arts, and the sprit of civilization. A city cannot exist without countryside to support it. As was said half a century ago, city and country, urban and rural, are one thing – one connected system of energy and material flows – not two things.

As a consequence, if the environment of a city declines almost certainly the environment of its surroundings will also declines, the city itself will be threatened. Some people suggest, for example, that the ancient Native American settlement in Chaco Canyon, Arizona, declined after the environment surrounding that settlement was adversely affected.

Cities also export to the countryside waste products, including polluted water, air, and solids, It an industrial nations annually uses (directly or indirectly) 208,000 kg (229 tons) of water 660 kg (0.8 tons) of solid wastes, and 200 kg (440 lb) of air pollutants. If these are exported without care, they pollute the countryside, reducing the countryside's ability to provide necessary resources for the city and making life in the surroundings less healthy and less pleasant.

With such dependencies and interactions between and surroundings, it is no wonder that relationships between people in cities and in the countryside have often been strained. Why, country dwellers want to know, should they have to deal with the wastes of those in the city? The answer is that many of our serious environmental problems occur at the interface between urban and rural areas. People who live outside but near a city have a vested interest in maintaining a good environment for that city and a good system for managing the city's resources.

A city can never be free of environmental constraints, even though its human constructions give us a false sense of security. Lewis Mumford, the historian of cities, wrote, "Cities give us the illusion of self-sufficiency and independence,and of the possibility of physical continuity without conscious renewal." But this security is only an illusion.

3.3 Site and Location

As the case study of Venice illustrates, the location of a city is influenced by two factors; site, which is the summation of all the environmental features of that location: and situation, which is the placement of the city with respect to other areas. A good site includes a good geologic substrate, such as a firm rock base and well-drained sols; dry land for buildings; good nearby supplies of water: good local agricultural land: abundant timber and other natural resources; and benign local climate.

The environmental situation strongly affects the development and importance of a city, particularly with regard to transportation and defense. Waterways are important for transportation. Especially in early times before, railroads, automobiles, and airplanes, cities depended on water for transportation. Most early cities were located on or near waterways. In the ancient Roman Empire, all-important cities were located near waterways. Waterways have continued to influence the locations of cities; most major

cities of the eastern United States are situated either at major ocean harbors or at the fall line on major rivers. The sitting of cities at the fall line in the past was no accident.

Cities are often founded at other crucial transportation points, growing up around a market, a river crossing, or a fort. Newcastle, England, and Budapest, Hungary, are located at the lowest bridging points on their rivers; other cities, such as Geneva, are located where are river enters or leaves a major like. Some well-known cities are located at the confluence of major rivers: Saint Louis lies at the confluence of the Missouri and Mississippi river Manaus, Brazil, Pittsburgh, Pennsylvania, Koblenz, Germany, and Khartoum, Sudan, are located at the confluence of several rivers. Many famous cities are located at crucial defensive locations, such as on or adjacent to easily defended rock outcrops. Examples include Edinburgh, Athens, and Salzburg, Austria. Other cities are situated on peninsulas, for example, Monaco and Istambul.

3.4 City Planning and The Environment

3.4.1 City planning

City planning has a long history. At various times city planners have taken environmental factors carefully into consideration. Unfortunately, at other times, including some periods in the twentieth century, the importance of site and situation has been ignored. Ideas of the fortress city and the park city influence the planning of cities in North America. The importance of aesthetic consideration is illustrated in the plan of Washington. DC, designed by Pierre Charles Enfant, who mixed a traditional rectangular grid pattern of streets (which can be traced back to the Romans) with broad avenues set at angles. The intention was to design a city of beauty, with many parks, including small ones at the intersections of avenues and streets. This design has made Washington one of the most pleasant cities in the United States.

3.4.2 The city as an environment and city design

Because a city changes the landscape, it also changes the relationship between biological and physical aspects of the environment. Many of these changes were discussed in earlier chapters as aspects of pollution, water management, or climate. They are mentioned again as appropriate in the following section, generally with a focus on how effective city planning can reduce the problems.

3.5 Pollution in the City

Everything is concentrated in a city, including pollutants; city dwellers are exposed to more kinds of toxic chemicals in higher concentration and to more human-produced noise, heat, and particulates than are their rural neighbors. This environment makes life riskier. The age-adjusted mortality rates for adults over 45 years old in the Unites States indicates a consistent 13% higher rate of cancer deaths in metropolitan counties that include central cities, intermediate in central cities. Intermediate in no central city metropolitan counties, and lowest elsewhere. This pattern holds regardless

of race or sex. Air pollution is heaviest in the central parts of cities, particularly along waterfronts where industries tend to be concentrated. Deaths from cancer are 50% greater for people living in the areas of highest air pollution than for those living in the least polluted areas.

Although it is impossible to eliminate exposure to pollutants in city. it is possible to reduce the exposure by careful design, planning and development. For example, when lead was used in gasoline, exposure to lead was greater near a road than away exposure to lead was grater near a road than away form it. Exposure to lead can be reduced by placing houses and recreational areas away from roadways and by developing a buffer zone that makes use of trees resistant to the pollutant. Trees absorb pollutants and slow the rate of spread. In addition such tree buffer zones can reduce the amount of noise in residential areas of a city.

3.5.1 The urban atmosphere and climate

Cities affect the local climate as the city changes so does its climate. Cities are generally less widely than no urban areas. Because buildings and other structures obstruct the blow of air but city buildings also channel the wind. Sometimes creating local wind tunnels with high wind speeds. The actual flow of wind around one building is influenced by nearby buildings. The total wind flow through a city is the result of the relationships among all the buildings must be taken into account. In some cases when this has not been done, dangerous wind around tall buildings have resulted in blown –out windows.

Recall that a city can receive less sunlight than the countryside because particulates in the atmosphere over cities are often 10 or more times greater than in surrounding areas. In spite of the reduced sunlight, cities are warmer than surrounding areas (a city is a heat island) because of increased heat pretrial and residential activities) and also because there is a decreased rate of heat loss, partly owing to the abundance of buildings and paving materials that act as solar collectors.

3.5.2 Solar energy in cities

Until modern times, it was common to make use of solar energy to heat city houses. Our century is one major exception because cheap and easily accessible fossil fuels have led us to forget certain fundamental lessons, Cities in ancient Greece, Rome, and China were designed so that houses and patios faced south and solar energy was accessible to each household. Today, we are beginning to appreciate the importance of solar energy once again some cities have enacted solar energy ordinances that make it illegal to shade another property owner's building in such a way that it loses solar heating capability.

3.5.3 Water In the urban environment

The construction of modern cities affects the water cycle greatly in turn affecting soils and, consequently, plants and animals in the city. Paved city streets and city buildings prevent water infiltration. As a result, most rain runs, off directly and is channeled into storm sewer systems. Hard city

surfaces prevent water in the soil from evaporating to the atmosphere. In natural ecosystem's evaporation is an important way of cooling the surface. The pavement increases the chances of local flooding within the city, and the increased runoff from the city to the countryside can increase the chances of flooding downstream. Mid-latitude cities generally record a lower relative humidity (2% lower in winter to 8% lower in summer) than the surrounding countryside.

Cities can have higher local rainfall than their surroundings, because dust above a city provides particles for condensation of raindrops. Some urban areas have 5% to 10% more precipitation and considerably more cloud cover and fog than do surrounding areas. Fog is particularly troublesome in the winter and may impede ground and air traffic.

Most cities have a single underground sewage system. During times of no rain or light rain, this system handles sewage alone. But during periods of heavy rain, the runoff is mixed with the sewage and can exceed the capacity of sewage alone. But during periods of heavy rain, the runoff is mixed with the sewage and can exceed the capacity of sewage treatment plants. During heavy rains, sewage is emitted downstream without sufficient treatment. It is too expensive to build a completely new and separate runoff system in an existing city, so other solutions must be found.

The problem with flooding and overtaxing storm-sewage systems is made worse in many cities built on floodplains. As mentioned earlier, floodplains are often chosen as sites for cities because the land is flat and easy to build on and river transportation is available nearby. This practice leads to a conflict, because cities are typically built as if there will never be flooding. Floods damage bu8ldings and other properties, causes the loss of lives, and are considered a natural catastrophe. More often than not the river is channeled ad levees built along the shores. Long stretches of major rivers are channelized. It is a fact that channelization has too negative effects. First, when the river is maintained in an artificial channel, its sediments load is not deposited on the lad, and the land's fertility is not renewed. Second this sediment load passes down river and is lost at the mouth, where it causes situation and may fill in important harbors and do damage to cities at the ocean side. It is important to note that these negative effects are an indirect result of building cities on floodplains without proper planning and then trying to prevent the inevitable floods.

3.5.4 Soils in the City

A modern city has a great impact on soils, most soil is covered by cement, asphalts, or stone the soil no longer has its natural cover of vegetation and the natural exchange of gases between the soil and air is greatly reduced. Such soils lose organic matter, because they are no longer replenished by vegetation growth. Soil organisms die from lack of food and oxygen. The process of construction and the weight of the buildings compact the soil, which restricts water flow. City soils are more likely to be compacted, waterlogged, impervious to water flow, and lacking in organic matter.

3.6 Bringing Nature To The City

A practical problem for planners and mangers of cities is how to bring natu to the city that is how to make plants and animals a part of a city landscap This activity has evolved into several specialized professions, includi urban forestry (whose professionals are often called tree wardens), landsca architecture, city planning, and city engineering. Most cities have an urb forester on the payroll who determines the best sites for planting trees ar the best species of trees to suit the environment. These professionals tal into account climate, soils, and the general influences of the urban settir Such as the shading imposed by tall building and the pollution from mot vehicles.

3.6.1 Vegetation in cities

Planting of trees, shrubs, and flowers improves the beauty of a city. Plant provide for different needs in different locations. Trees provide shade tha reduces the need for air-conditioning and make travels much more pleasar in hot weather.

In parks vegetation provides places for quiet contemplation, trees an shrubs can block some of they city sounds, and the complex shapes an structures create a sense of solitude. Plants also provide habitats for wildlif such as birds and squirrels, which many urban residents consider pleasan additions to a city.

Third world countries have to pay the price of rapid, unplanned urbanizatio that began decades earlier, when the popular view favoured growth at al costs. Growth became a buzzword that influenced planning, as the countr embarked on a frenzy of economic activity. Among much that was achieve in those years, the dramatic transformation of cities from sleepy towns int thriving megalopolises was seen as an inevitable part of the growth process Now, several decades down the road, economists, administrators, tow planners, engineers, social scientists and others of their ilk, no longer shar those sentiments.

The huge, unplanned cities, that have acquired a psyche of their own, are a nightmare for those who are required to manage the mess. The sprawling metropolises, apart from pulsating with the industry of people, are also a wasteland of environmental decline, social decay, conflict, poverty and the ubiquitous problems of crime and drugs. Even the best of the world's cities are not without the miseries that result form their unmanageable size; the third world cities fare much worse. Their rapid expansion, lacking plan and vision, means ad hoc urban expansion and a culture of survival.

The government is blamed for the shambles the cities are in today. From the time the process of large-scale urbanization started, an overall authority was exercised by an unresponsive administration, in spite of the fact that the governance of most cities had passed to municipal control. The failure of the government is seen not only in its indifference in the early years to ensure meaningful development of the cities, but also in the faulty planning at present which is creating more problems than it resolves. The official approach to issues is rigid and influenced by procedures that are

bureaucratic and divisive in nature rather than analytical and helpful. Experts already see the distinct fault lines that have emerged, which mark the boundaries between sectors organized, unorganized; formal, informal; affluent, poor.

3.7 Solid Waste Management

Human resources management and development center (HRMDC)

Case Study

In Pakistan, HRMDC initiated a pilot programme on effective waste management to evaluate the solid waste problem and explore ways of supporting and modernizing indigenous waste collection and recycling networks. The programme is designed to enhance the literacy level of scavengers, provide health education to women in the focus area, and build the capacity of relevant organizations. A preliminary study was conducted in Tehkal and Meena Bazaar two densely populated urban slums in Peshawar and based on the results, Tehkal Payan was selected for the implementation of the programme, With the help of community members, scavengers working in the area were selected and an educated female was identified to provide non-formal education to the children. Land for composting was leased with the help of the environmental Protection Agency. The purpose and objectives of the programme are as follows:

1- To improve solid waste collection management and recycling in selected areas of Peshawar.

2- To create awareness regarding solid waste and its effects on environmental degradation among the urban and semi urban population of the Peshawar district.

3- To contribute to the capacity building of relevant departments involved in solid waste management.

4- To improve the work environment and enhance the socio-economics and literacy level of selected juvenile scavengers working in Peshawar.

To achieve these objectives, HRMDC has adopted an integrated approach that includes community participation, primary health care for women, improving the socio-economic and literacy level of scavengers, compost making and marketing, and capacity building of concerned departments. Based on the findings of the preliminary study and the positive response of the community elders towards the programme, a cluster of streets in Tehkal Payan was selected for implementation of the programme. With the support of the community, the social organizers began collecting data from selected streets and assessing existing trends in waste disposal.

After developing a detailed area profile and a street map, work on awarenes raising and community mobilization began in January 1995. The communi is actively involved in all stages of the programme. As more and, mo households participate in the programme, it will become self-sustaining ar increasingly effective. In addition, work on forming a community-base organization has begun. Once in place, this organization will be responsib for record keeping and monitoring the programme.

3.8 Human Settlement- Slums, Security and Shelters

Links between villages and cities have become stronger through transpor exposure to the mass media and education, and flows of migration, trad and finance. As a result, urban concentrations have increased and urba areas have acquired greater salience in society. Simultaneously, th deepening of the cash economy and the introduction of Green Revolutio technologies have transformed villages. Finally, the role of the state ha changed dramatically, both by the expansion of its functions and a visib decline in its capacity to perform these functions. The most visible elemer in the decline of state institutions is at the municipal and local levels, a small and sleepy towns have been transformed into urban concentrations millions of people.

Given the inability of governmental institutions to cope with the high pace urbanization, much of the urban expansion took place in the unorganize and unplanned sector, which grew at twice the rate of urban growth. Sinc governmental resources were allocated mainly to formal sector settlement informal areas, including the traditional sectors of old cities, were deprive of investments in public infrastructure water supply, sewerage treatmer and disposal transportation systems, cargo terminals, warehousing an storage facilities, wholesale markets, social service facilities, planne housing, and credit facilities. Some of these services are provided throug informal arrangements, but both their quality and coverage are quit inadequate.

The result of this dualistic development is environmental degradatior growing inequity and cultural dualism, breakdown of communit strangulation of inner cities, and the destruction of cultural an architectural heritage. All of this has produced direct economic and soci costs. Environmental degradation has produced a perceptible increase i health problems. The breakdown of communities is associated with a shar rise in crime and civic violence, especially against women.

3.8.1. Social environmental and shelter issues in Pakistan

Housing conditions are evaluated on criteria developed in the First Worl The key evaluation criteria are persons per room, rooms per house, an density. These have vastly differing cultural meanings, especially because varying climatic conditions. Similarly, such categories as permanent, semi permanent, and temporary are not entirely representative of a situation i which houses are being upgraded constantly. Moreover, houses situated i ecologically dangerous zones can be made quite safe by developing floo

control measure or drainage. Finally, figures for home ownership pertain to *de jure* tenure rights, or physical possession.

Detailed housing statistics are available only for the period between 1961 and 1981. During this time, Pakistan's urban population increased by 4.7 per cent per year while the housing stock grew by 3.7 per cent per year. Indications are that this trend has continued (government of Pakistan, 1980). Although these statistics suggest an increasing housing shortage, the growth rate of households has been lower than the population growth rate.

This is because the average household size increased from 5.5 to 6.5 persons between 1961 and 1981. During the same period, the number of households increased by 2.86 per cent a year against a population increase of 3.75 per cent.

Persons per room increased from 3.3 to 3.5 between 1961 and 1981, whereas the rooms per housing unit increased from 1.7 to 1.9 per cent during the same period. However, 45 percent of the population of urban Sindh and 50 percent of urban Punjab live in one-room houses. An additional 31 per cent of urban Sindh and 32 per cent of urban Punjab live in 2 room houses.

In 1980, the households living in them as opposed to 48 per cent in 1961 owned 68 per cent of urban houses. In rural areas this figure increased from 89 per cent to 83 per cent during the same period. Over the next decade, an estimated 9,75,000 housing units will have to be constructed every year to meet existing and emerging housing needs (see Table 1 below). This includes 6,25,000 units to cater to the growing population, 1,40,000 units to make a dent in housing backlog, and 2,10,000 units to replace existing units.

The current estimate of the rate of Pakistan's population growth is 3.2 per cent per year; 4.4 per cent in the urban and 2.6 per cent in the rural areas. This means that a minimum of 3,00,000 new houses will be required per year in the urban sector and 3,25,000 in the rural sector simply to meet the population increase, assuming the average household size remains the same. Almost 65 per cent of this requirement, or 4,00,000 units, are for the lower income groups, and about 20 per cent (or 1,25,000 units) are for migrants from rural to urban areas. About 60 per cent of this migration takes place within the Punjab and almost all of it is to the province's intermediate cities of Faisalabad, Gujranwala, Gujrat, and smaller market towns (e.g. Sahival and Okara). Almost 90 per cent of this need is for the lower income groups.

Table 1 Housing Demand (per annum)

Area	Population Growth	Backlog	Replacement	Total
Urban	3,00,000	88,000	50,000	4,38,000
Rural	3,25,000	52,000	1,60,000	5,37,000
Total	6,25,000	1,40,000	2,10,000	9,75,000

Alternatives to the conventional approach to habitat development have been explored in the government as well as the NGO sector. These innovative

alternatives include the regularization of unplanned settlements and support for the direct involvement of communities in urban and rural resource management. Such NGO programmes as the Orangi Pilot Project (OPP) and the well-known government-led project, Khuda ki Basti identify the direction of sustainable development, and the potential for Cupertino between communities, NGOs and the state in planning, operation, and maintenance of civic facilities.

However, despite the visible success of such alternatives, their scope has been limited by larger socio-political factors. Government programmes have tended to remain small and isolated; and have not been able to enter the mainstream of governmental decision making, nor have they developed into broad-based national programmes. NGO strategies, on the other hand, are constrained by the limited reach of their proponent organizations. They cannot increase their coverage unless they can be integrated into a national programme that includes the state's planning process.

3.8.2.1 Habitat

The first Habitat conference was held in Vancouver in 1976 when time shelter was recognized as a basic human right, and member states were encouraged to develop national settlement policies to enable their populations to live in safe, decent, and healthy settlements. The conference also urged member states to formulate strategies for land resource management for human-settlement development, and ensure public participation at all levels of development related to human settlements.

3.8.3 Public sector housing programme

The goal of the programme is to remove obstacles in low-income groups' access to land, infrastructure, and credit. The major problems are in implementation. All governmental schemes for the urban poor are unaffordable: the procedures are long and cumbersome, government agencies and low income communities view each other with hostility and suspicion, and the time lag between application for allotment and actual possession may be as long as 10 years. The result is an increasing gap between demand and supply, and the need to turn to the informal sector for shelter needs.

3.8.3.1 Standard housing supply

The provision of built housing by the public sector for sale or rent is negligible. In Karachi, where the largest numbers of units have been constructed, the average annual supply since 1974 has been about 220 units). A typical scheme of this nature is on about 0.5 hectares and consists on average of 40 units.

About 50 per cent of such development has been aimed at low-income groups, but since the costs are too high, the units are invariably purchased by middle-income groups or by speculators. In many cases, the overhead costs are covered by the sale of shops and/or other commercial units in the project. The purchasers pay in installments during construction, thus

financing the projects. In the majority of such projects HBFC loans are arranged for the purchasers.

3.8.3.2 Site and services

Site and services schemes have been developed both by the development authorities and the provincial physical planning and housing departments. A typical scheme of this nature is on about 15 hectares and consists on average of 525 units. The Karachi Development Authority (KDA) and the Punjab Physical Planning and Housing Department (PPPHD) have run the most effective site and services programme in Pakistan. Between 1974 and 1990, the KDA developed an average of 4,758 units annually against an average Karachi demand of over 60,000. Similarly, the PPPHD developed an average of 6,500 plots annually a Punjab demand of over 78,000. The performance of other public sector agencies is far poorer than that of the KDA and PPPHD.

The main problem with these schemes is the rising cost of land, and the failure to target low-income groups. State land has been depleted in almost all urban areas of Pakistan, with the exception of Sindh. The public sector agencies do not posses the financial resources to purchase land on the open market. With the instrument by which the public sector can acquire land for housing at a lower than market rate.

3.8.3.3 Katchi Abadi improvement and Regularisation Programme

The Katchi Abadi improvement and Regularisation programme (KAIRP) began in 1978 and envisaged the grant of tenure rights, and the provision of basic infrastructure to the residents of Katchi Abadis, against the payment of land and development charges. The programme is implemented by provincial Katchi Abadi authorities, municipal Katchi Abadi directorates, and in the case of the Punjab and NWFP, the urban development authorities. The implementing authorities are granted government funds for the purchase of state land, on which the Katchi Abadis are located, at well below market prices. Without this facility, the programme could not possibly operate. These funds are supplemented by large-scale international assistance.

3.8.3.4 House Building Credit

Formal long-term credit for housing is available only from the HBFC through mortgage financing against land. However, only 5 per cent of the HBFC loans reach households earning less than 1,500 rupees a month. In addition, HBFC finances no more than 20 per cent of the total housing units built by the formal sector.

3.8.3.5 Private formal sector supply- individual builders

Individuals for themselves build the largest number of houses in Pakistan. In Karachi, which has a significant public sector programme, as well as large-scale private construction companies, individuals for themselves construct 16,600 units required due to population increase. Of these, not

more than 12 per cent are for sale. In other urban ar... percentage of owner built housing is bound to be muc...

3.8.3.6 Standard developer built housing

Of the larger urban developers, the majority are memb... of Builders and Developers (ABAD). ABAD has ... organization, and lobbies for changes in government pol... involvement in housing production.

Until the early 1980s, the larger developers had acc... developed land at well below market prices, but they no... on the open market. Developers acquire 50 per cent of th... for construction through sale of their units of the op... construction has commenced, and the balance well bef... complete. Thus, apart from the land cost and initial ow... investment from the developers. The more influential d... get purchase units in their schemes.

3.8.3.7 Land subdivisions

Many city master plans have declared certain agricultural ... around the city as urban. This has led to the sale of this lan... for development. Many of the owners themselves have fo... partner, and undertaken subdivision and sale of their lan... the layout plan, the developer advertises the scheme and s... customers at 25 per cent of its cost well before develop... recovers the investment at this stage. The balance payme... installments while development is taking place. Profits in s... over 200 per cent of the initial investment.

3.8.3.8 Employer built housing

Laws in Pakistan require employers of industrial labour to ... about 20 percent of their employees who belong to low-i... However, these laws are not implemented and, instead of ... most formal sector organizations provide a "housing all... employees for renting accommodation. In addition, ma... employees make use of their provident fund for buying lan... for construction purposes.

3.8.3.9 Co-operative housing societies

There are a large number of co-operative housing societ... However, they have been misused by formal sector develop... land speculation, not paying back their loans, and relax... rules and operational procedures. Their large size makes ... powerful vested interests and the "land mafia", backed ... drug money.

3.8.3.10 The informal sector

There are tow distinct types of informal sector activities in Pakistan. These are the establishment of katchi abadis through the illegal occupation and subdivision of state land, and the development of settlements through the informal (but legal) subdivision of privately owned agricultural land or wastelands.

3.8.4 Illegal subdivisions of state land

State land, wherever it is available, is illegally occupied by dalals (middlemen) and subdivided and sold to low-income groups at prices they can afford. No services are provided to the settlement, but some form of water supply is initially arranged by the Dallal till the settlement is big enough to set up an organization to manage such needs independently, or to attract the attention of municipal authorities. The residents, backed by the dallal, lobby for services. Thus, with time (usually between 10 to 20 years), most settlements acquire electricity, water supply systems, transport and a road network.

3.8.5 Informal subdivision of Agricultural (or waste) land

In cities in NWFP and Punjab, state land is no longer available. Consequently, the newer settlements are developing through the Informal Subdivision of Agricultural Land (ISAL). Agricultural land in and around large and intermediate towns is expensive and not easily affordable to low-income groups. As a result, most ISAL settlements are increasingly middle-income areas, or alternatively very small plots (16-20 square meters) with lanes as narrow as 2 meters, that ensure their accessibility to low-income groups. Increasingly, waste lands (such as quarries), or lands prone to flooding, are being subdivided and sold to low income groups since these settlements come to an informal arrangement with municipal solid waste collection vans to ensure that the level of their settlements is raised above the flood plains.

3.8.6 Responses to inadequacies of formal sector programmes

The government has failed to provide an alternative for low-income groups to katchi abadis and ISAL settlements. Having recognized this, it has initiated a katchi abadis improvement and Regularisation programme. Small projects funded by municipal governments on the advice of ward councilors having to do with open drains, water distribution networks, street paving, etc, fall into disuse due to the absence of an area master plan, and a lack of co ordination with other areas government initiatives.

3.9 Urban planning and the shelter sector

Urban development authorities and municipal governments have neither the capability nor the capacity to deal with the high rate of urban growth. Development thus takes place before planning, and is largely ad hoc and unguided. Government agencies are incapable of providing basic urban requirements, such as wholesale markets, warehousing and storage facilities, transport terminals, transportation, and housing. Most of these

facilities also develop in an ad hoc fashion in the city center. This process degrades the city both in social and environmental terms, and also destroys the urban, cultural, and historic heritage.

3.9.1 Inadequate master plans

All major and most secondary cities have master plans. However, these master plans do not reflect the social, economic, and political reality of the cities. The informal sector in the city plays a very important role in employment generation, provision of land and housing, development of infrastructure, and transportation. In major cities, powerful mafias finance and control these activities with support from various political lobbies.

3.9.2 The real estate lobby and speculation

The formal real estate lobby in Pakistan is playing an increasingly important role in determining the directions and nature or urban growth. It seeks to acquire control of all private and public land in key locations and to use it for commercial and high-income residential use. This often brings it into conflict with the recommendations of city master plans and areas development schemes. However, the lobby is powerful and it has been known to successfully subvert these recommendations and to prevent the implementation of a number of public use development projects.

3.10 Development and Evictions

In the 1970s and early 1980s evictions in the urban areas of Pakistan were rare because of few urban development programmes and comparative availability of land for the expansion of formal sector commercial developments. Since the mid 1980s however, a very large number of evictions have taken place, creating a considerable population of homeless people. Apart from Karachi, where the Urban Resource Center (URC, an NGO) monitors these evictions, there are no figures available. Between 1990-95, over 21,500 families were evicted form their homes in Karachi. Over 60 per cent of these evictions were the result of the real estate lobby's activities, which were supported unofficially by civic agencies. The remaining evictions were carried out as a result of government development programmes, or as a result of pressure from residents of high-income localities, who wanted to remove katchi abadis from their areas so as to upgrade them environmentally.

3.10.1 Informal sector and infrastructure development

Surveys show that low-income communities who have *de facto* tenure security invest large sums of money for the development of water and sewerage facilities in their neighbourhood. Most of this investment is substandard except where it is supported by technical advice from NGOs or professional groups. Similarly, over 80 per cent of all city transport in Pakistan is provided by the private sector, financed mostly through informal credit arrangements. Most of the older low-income settlements acquire education and health services form the informal sector as well. Entrepreneurs or community managed education societies as well set up primary and often secondary schools. These are affordable since the teachers

are poorly paid educated women from the neighbourhood. Health services are also provided through private clinics, often run by paramedics or quacks. However, governments and most NGOs do not recognize the role of the informal sector in the development and provision of infrastructure and services. No attempt is made to integrate its functioning in larger city planning exercises, or to support and upgrade its activities. On the contrary, most of this activity is persecuted and unofficially taxed by corrupt government agencies.

Mingora, Swat: A case study of Government Policy Failure

Mingora, situated on the left bank of the river swat, is the district headquarters of swat and its only urban center. It is also the major transit, trade and industrial center of the district. There is also a thriving hotel industry, given that swat is endowed with natural beauty and attract national and foreign tourists. Mingora is located at a height of 3,200 feet above sea level on an area of 25 km². Today, the Mingora municipal area encompasses the old city as well as Saidu Sharif and other neighboring settlements, such as Aankot, Shagai, Islampur, Rahimabad, Panr, Fizagat, Nawakalay, etc. The climate of the area is characterized by cold winters with below freezing temperatures and mild to warm summers.

Mingora presents a picture of urban environmental decay. The city does not have a sewerage or solid waste disposal system. All the solid and liquid waste generated by households and commercial and industrial establishments are ultimately disposed off in the Swat river. Industries have been set up in residential areas leading to a high degree of industrial pollution. Noise pollution and traffic congestion caused by the sharp rise in the number of trucks, buses, rickshaws and private automobiles pose a serious problem traffic management is lax and roads and streets are encroached upon by building and shop projections and hawkers. There is virtually no open space in the city. Flowers can only be seen in graveyards.

Socio Economic Profile
City population largely consists of poor and lower middle class households. City has high residential density with average and model household sizes are estimated at 10.8 and 8.5, indicating a housing shortage.

Housing profile
The inhabitants live in three types of houses pucca semi pucca and katcha located in the plains area as well as on the hillsides. Pucca houses have paved floors, brick walls and concrete roofs. Semi pucca houses have paved floors, brick walls and roofs made of tiles, asbestos, tin, wood, etc. katcha houses are characterized by unpaved/earth floors, unplastered stone or wood walls, and roofs made of tiles, asbestos or tin sheets, wood, thatch, etc .Due to harsh weather conditions and depending upon the insulating property houses, about 57 percent of households live in pucca houses, 24 per cent in semi pucca houses and 19 per cent in katcha houses.

In Mingora as a whole, plot area per person stands at 224.5 square feet and that there are 3.2 rooms per house and 3.4 persons per room.85 per cent of the pucca houses and 60 percent of semi pucca houses are owner occupied, but the majority of katcha houses are rented.

Official Housing Policy of Pakistan

The planners and policy makers noted the housing shortage in Mingora. The NWFP government in 1988 established a housing estate on the outskirts of Mingora. However, the scheme has failed to cater to the housing needs of the people of Mingora, since it was conceived and executed without considering socio-economic ground realities.

The housing needs of the poor and the lower-middle class are being met by the informal housing sector, private estate agents acquire agricultural land, hillsides, sliding areas, low lying areas, and carved out plots for sale. Land prices are low and affordable for the poor and the lower middle class. The gestation period between booking a plot and delivery is at most a few weeks. Construction can commence without any formalities and can be paced according to the needs and financial means of the household. Utilities and services are usually arranged for by the residents themselves and generally include electricity connection and a community water tap. Sewage and solid waste is disposed outside the house.

Needless to say, some of these sites are prone to environmental risks like landslides and flooding, and the housing as well as community environmental standards are found to be significantly below minimum norms in many respects.

3.10.2 Evaluation of Government Policies

Government policies related to the housing sector in the rural areas are of four varieties:

1. Subdivision of land and its distribution among the poor,
2. Village improvement schemes that seek to involve people in the development process
3. The HBFC's house building and improvement loan.
4. House building for the deserving with zakat funds.

3.10.3 Alternative practices

There are numerous projects being undertaken by NGOs in an attempt to fill the void left by the government's (in) action with regard to shelter issues and the provision of basic necessities. Several deserve special mention: they are: the Orangi Pilot Project (OPP) in Karachi; the Khuda ki Basti project near Hyderabad; BUSTI in and around Karachi; the Karachi Administrative women's welfare Society (KAWWS); the urban waste management programme (implemented by the HRMDC) in Peshawar; and the Aga Khan Housing Board for Pakistan (AKHBP) projects in Karachi and in the NWFP.

3.11 Transparency and Participation in Governance

Participants at the consultation called upon all countries, both developed and developing, to deal with habitat issues within the broader, overall perspective of sustainable human development, which submits itself to the logic of nature and promotes and egalitarian world society. A perspective in

which every human being women, child and man gets an opportunity for full self expression, in which every life from has the right to non-extinction, and the which all life support systems are nurtured and sustained.

The forum strongly felt that the governance practices in any democracy, developed or developing, would have to have governance practices and planning laws along the lines below;

Empowered local governments;
Urban and rural civic authorities should be empowered as local governments, which are the prime managers of local social, economic and natural assets. Higher levels of governments would be given some of their powers for handling regional, national and international issues.

Bottom up integrated planning:
Integral socio economic infrastructure and environmental planning shall be initiated by urban and rural local governments and processed upwards where necessary.

Negotiation between Urban and Rural Areas:
Statutory planning committees at the district, or other approximate level, shall be established under the planning laws to aggregate rural and urban plans, and act as a forum to negotiate the shared use of environmental and financial resources between rural and urban areas.

Right to information:
Every citizen should have the right to information and to participate in decision processes, which affect her or his life. A commission for informed citizenship shall be set up to monitor and ensure that the right is not violated.

Mandatory public hearings:
Elected leaders should be required to go back to the people on every planning proposal (and not only after every four or five years seeking votes) through the process of mandatory public hearing of planning proposals on areas exceeding, for example, 1,000 m^2 or three floors, at all sites and villages affected by the proposal.

Grassroots democracy:
Grassroots democracy in the form of neighbourhood committees should be established as the first tier of civic management in both urban and rural areas. This would facilitate neighbourhood management and subjugate the aspirations of individuals to the good of the immediate community, a practice which contemporary societies need to learn from indigenous societies.

Participatory Councils:
To involve academics, professionals, NGO activists, business, and other knowledgeable citizens in decision-making, statutory participatory councils should be established (at state and local levels) on various critical issues such as natural resource management and urban and rural poverty.

Participatory tender committees:
Central and local governments should be required under the law to constitute participatory tender committees for considering financial decisions on competitive proposals thereby ensuring complete transparency in decision-making.

Planning with nature:
The survival of human being is dependent on the survival of the natural environment. Rural systems need to regenerate natural ecology; urban system needs to follow the logic of nature.

The critical thrust in rural areas of most developing countries should include: (i) regeneration of ground water and forest cover, and conservation of soil resources; (ii) creation for sustainable rural industry, etc, and the provisions of markets for their products.

The critical thrust in urban systems should be planning with nature. This would include: (i) declaration of water courses and their embankments, flood zones, aquifer regeneration zone and other ecologically sensitive areas as recreation areas, protecting them form exploitation by the government and the rich and form encroachment by the poor; (ii) promotion of human and the limits of water availability set by the local watershed, and not allowing land prices to rise to levels which distort the urban economy, raise the cost of infrastructure and thereby further marginalize the poor; (iii) development of planning instruments like one acre forested homes as privately owned protective green belts around cities as a check against urban sprawl which dislocates the ecology and leads to additional poverty.

Case Study - Khuda Ki Basti

The Khuda Ki Basti project applied the katchi abadi model to a government-housing scheme. The objective of the scheme was provision of affordable land with minimum red tape. The key to the Khuda Ki Basti model was incremental, step-by-step development. Land was handed over directly to shelter less families, who were required to build on the immediately utilizing their own resources. Community efforts have been geared toward the provision of education and health services following establishment of water and sewerage facilities.

BUSTI (Basic Urban Services for Katchi Abadis) is an NGO with a multi sectoral development programme aimed at improving the living conditions of the poor, with particular emphasis on women and children. BUSTI includes programmes on sanitation, home schooling, water supply, primary health care, and vocational training.

BUSTI initiates its programme by identifying needs in a particular area, and collecting data through its social and community organizers. It undertakes an assessment of the capacity of NGOs operating in the area. Once NGOs have been identified, they are organized and trained in development activities and data collection.

BUSTI's credit scheme encourages economic self-reliance through an affordable and attainable credit system, thereby improving both the level of income and the living standards of the poor in urban and rural communities.

Sanitation has been the cornerstone of BUSTI's programme. The use of low cost sanitation technology and local material in the construction of soak pits have helped to overcome the financial constraints prevalent in areas where BUSTI operates.

While basic necessities were being provided income generation remains a problem in many of the areas in which industrial centers geared primarily toward women, which include centers for stitching, sewing and embroidery. This training has afforded women the ability to earn an independent income.

Aga Khan Housing Board of Pakistan (AKHBP)

The AKHBP, an institution of the Aga Khan Development Network (AKDN) has under taken various development projects to improve the quality of life for people in the northern part of Pakistan, specifically the northern areas and Chitral.

In an attempt to address the issue of low-income shelter within the Housing Co-operative Society framework in Karachi, AKHBP encouraged two housing co-operative societies and a charitable trust to launch a joint venture of middle and low-income housing.

Karachi Administrative Women's Welfare Society (KAWWS)

The Karachi Administrative Women's Welfare Society (KAWWS) was formed to ameliorate the deteriorating environment in certain neighborhoods. The women responsible for its formation began by addressing problems such as garbage disposal, open sewers, broken roads, contaminated water, and the threat of malaria and other infectious diseases arising from these unsanitary conditions. The women worked as a pressure group to influence and educate municipal authorities and to seek their support in local initiatives.

After several obstacles and sheer perseverance, a dialogue between the authorities and the KAWWS was reached: Now the women monitor the work of the municipality, and through fund raising and donations, have planted trees in the area, repaired the roads, and restored the parks. The KAWWS also networks with other NGOs to raise awareness of environmental issues.

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UNIT 4

ENVIRONMENTAL MANAGEMENT SYSTEMS

Unit Introduction

In the few past decades, issues such as global warming, acid rain and ozone depletion has made the fact clear that something is wrong with our development. Business and environmental integrity are considered two-opposing forces in the past but now business has started to involve environmental consideration in their operations which also result in economic advantage to business. Integration of environmental considerations into business operation requires the building of institutional environmental management capabilities base don coherent and comprehensive environmental management systems (EMS). EMS includes organization structure, tasks, auditing and accreditation procedures and its part of company's overall management system.

The chapter discuss in details

- Environmental management its benefits, and approaches
- EMS and its procedures
- Tools to implement EMS
  - Initial Environmental Examination
  - Environmental Impact Assessment
  - ISO 14000
  - National Environmental Quality Standards

Unit Objectives

After going through this unit you will be able to learn:

1. How environmental considerations could be integrated in to processes at business as well as policy and plan level.

2. How environmental management system could be implemented.

3. What are the different tools of environmental management system including IEE, EIA, NEQS, ISO's etc.

4.1 Introduction

Seveso, Bhopal, Exxon Valdez and Chernobyl, global warming and Ozone Depletion open our minds to the fact that there is some thing wrong with our development, but there are also minor incidents, which may induce a change in mind. For instance think about the distance you have to travel for attending the class or reaching your work place. You might have suffered irritation from noise and bad feelings due to smoke coming out of the vehicles. Since 1972, when the Club of Rome published its report *The Limits to Growth*, much has happened to our ecological environment and our perception of it.

Are the interest of business and the integrity of the natural environment naturally opposing forces? In the past, it often seemed so. Exploitation of natural resources was directed more by financial balance sheets than by environmental concerns. More recently however industries have become more responsible for the environmental side effects of their operations.

How can societies meet human needs and nurture economic growth while preserving the natural resources and environmental integrity? James Gustaves Speth, the president of World Resource institute (WRI), a policy research center, list four reasons why it is important for business to care about and care for the environment:.

1 National economies depend upon the wise use of natural resources. The industries of agriculture, energy, forestry, pharmaceuticals, chemicals, fishing, real estate, recreation and tourism could all be jeopardized by the poor management of the environment.

2 The management of resources in developing countries has a direct impact on the economic well-being of developed countries. The failure of a country to observe the policy of sustainable development could lead to economic restrictions, social turmoil, and even political instability. Any of these factors could affect access to both materials and markets, and result in long term repercussions to the local and world economy.

3 Global economic interdependence is affected by factors such as explosive population growth, which affects the consumption of natural resources.

4 It is in the best interest of corporation to resolve environmental problems before the government becomes involved and imposes on industry.

Good environmental management can be of economic advantage to an organization. The benefits of environmental management for a company include:

4.1.1 Economic benefits

A. *Cost Saving*

i. Saving due to reduced consumption of energy and other resources.
ii. Saving due to recycling, selling of bye products and wastes, resulting in decreased waste disposal costs.
iii. Reduced environmental charges, pollution penalties, and compensation following legal damage suits.

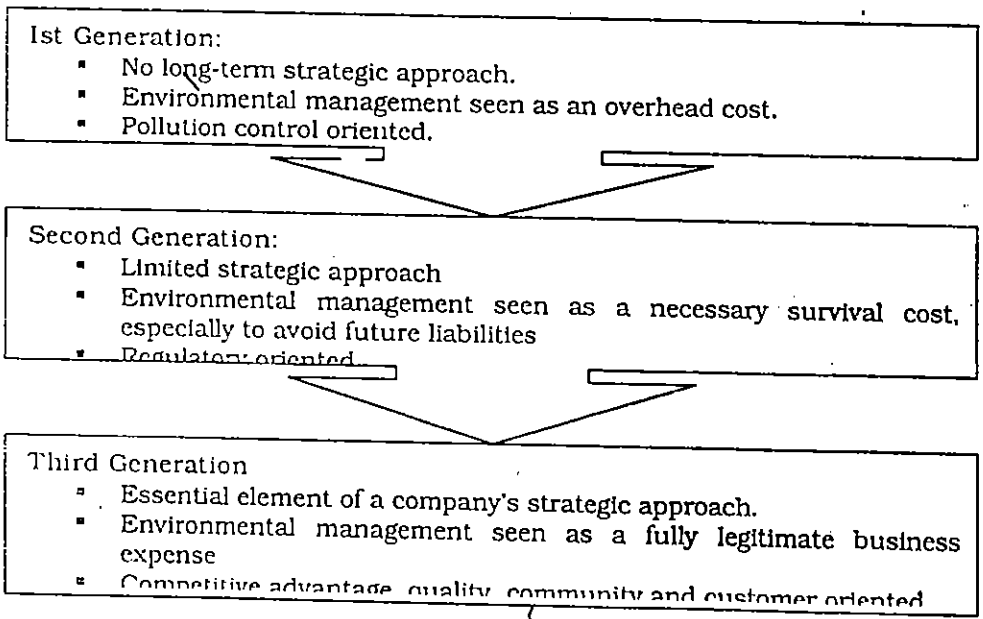
B. *Revenue Increases*

i. Increased marginal contribution of "Green Products" which sell at higher prices.
ii. Increased market share due to product innovation and less performative competitors.
iii. Completely new products open up new markets.
iv. Increased demand for a traditional product, which contributes, to pollution abatement.

4.1.2 Strategic Benefits

i. Improved public image.
ii. Renovation of product portfolio.
iii. Productivity improvement.
iv. Higher staff commitment and better labour relations.
v. Creativity and openness to new challenges.
vi. Better relations with public authorities, community and Green activist groups.
vii. Assured access to foreign markets.
viii. Easier compliance with environmental standards.

There are indeed many starting points to becoming Green. We are witnessing important changes in the approaches to environmental management. These changes can be described as three generations of organizational environmental management.



Third generation approach requires the building of institutional environmental management capabilities based on coherent and comprehensive environmental management.

4.2 Environmental Management System

What is an environmental management system (EMS)?

The official definition of EMS as defined in ISO 14001 is;

"An EMS is that part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy."

However it could be defined also as:

"An EMS is that facet of an organization's overall management structure that addresses the immediate and long term impacts of company's products, services and processes on the environment" (ISO14001, 1996).

The EMS standard approach brings together three concepts:

- Every thing we do in business has some impacts on the environment.
- Management system controls everything we do in business.
- Standards can be set for environmental management system

An EMS makes possible controlling environmental impacts, setting initiatives to improve environmental performance, to achieve these and to demonstrate that they have been achieved on an ongoing, continual basis. An effective EMS makes good sense, whether the implementing organization is in the public or private sector. By helping to identify the causes of environmental problems and then eliminate them, an EMS can help save money and improve productivity.

4.2.1 Principle of an EMS

- A *policy statement* that indicates the organization's overall commitment to the improvement of environmental performance, including conservation and protection of natural resources, waste minimization, pollution control and continual improvement.

- A set of *plans and programs* to implement the policy throughout the organization including the advancement of the program through suppliers and customers.

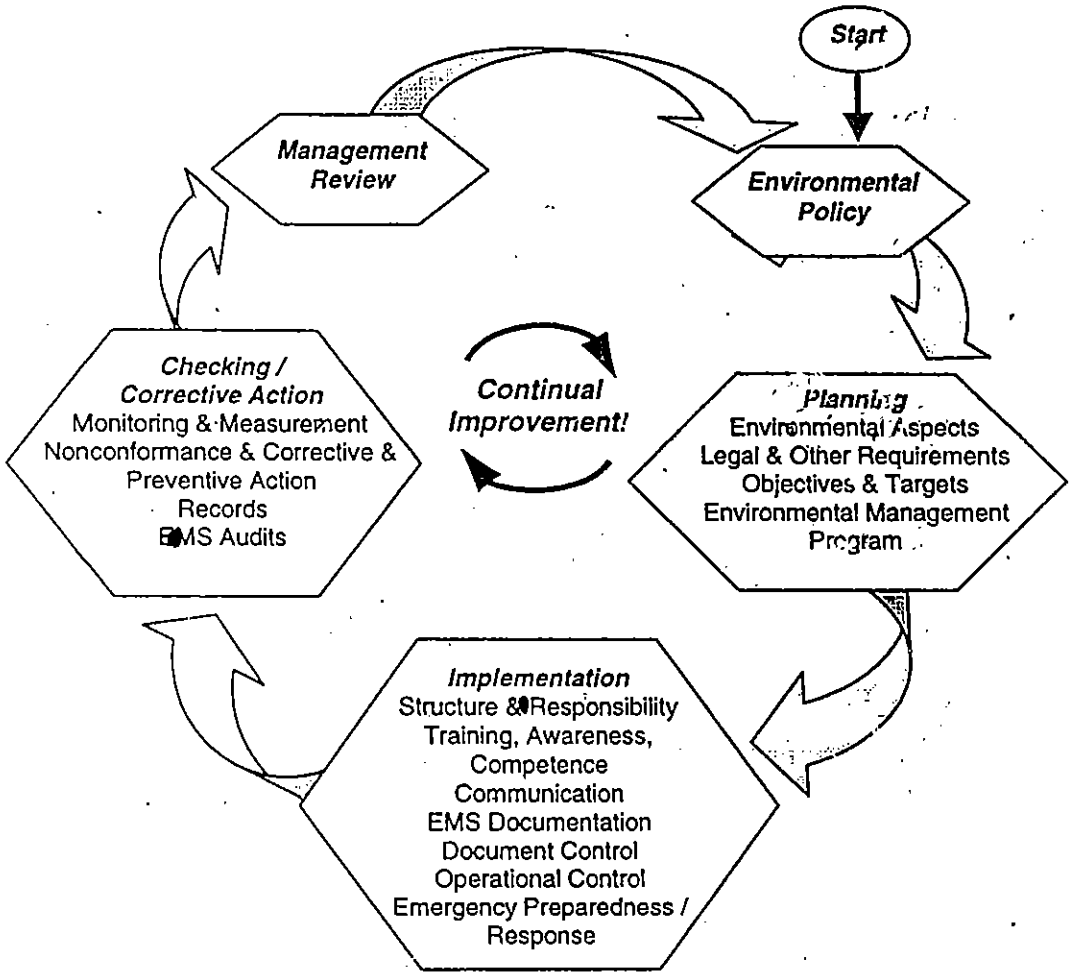
- The integration of the environmental plans in to the day-to-day *operation* of the organization, developing innovative techniques and technologies to minimize the impact of the organization on the environment.

- The *measurement of* the environment management performance of the organization against the plans and programs-auditing and reviewing progress towards achieving the policy.

- The *communication* of information, education and training to improve understanding of environmental issues-publicizing aspects of the environmental performance of the organization.

4.2.2 EMS Model

Conceptually, Environmental Management System is no different from other management system that have typical "Plan, Do, Check, Act" loop. This loop ensures that environmental matters are systematically identified, controlled, and monitored (ISO 14001 EMS, 1996).



4.2.3 Tools for EMS

To implement an EMS a number of management tools are needed. These tools include

- An environmental impact assessment before new operation start.
- An environmental audit by which the environmental performance of the company and its units can be assessed, weak points can be identified and subsequently the required mitigating measures may be determined.

- An appropriate organization of environmental functions in the enterprise ensuring that initiatives are taken, expertise is available and responsibilities are clear.

- Communication and participation inside and outside the enterprise, which play a decisive role in the creation of a positive company image to avoid resistance and commit staff to contribute to a common cause.

- Environment-related training, which raises awareness, introduces behavior changes and helps to acquire the necessary managerial and technical skills.

4.3 Initial Environmental Examination/Review (IEE)

IEE is an important tool for incorporating environmental concern at the project level. IEE should be carried out as early as the project planning stage as part of feasibility thus it can assure that the project will be environmentally feasible. The general objectives of IEE study should at least cover the following:

- To provide information about the general environmental settings of the project area as baseline data
- To provide information on potential impacts of the project and the characteristics of the impacts, magnitude, distribution, who will be the affected group and their duration;
- To provide information on potential mitigation measures to minimize the impacts including mitigation costs;
- To assess the best alternative project at most benefits and least costs in terms of financial, social and environment. It is not always necessary to change location of the project but it can be changed in project design or project management and
- To provide basic information on formulating management and monitoring plan.

4.3.1 The process of preparing IEE

An early step is to determine the scope of the IEE study. This activity is known as "scoping" as a procedure designed to establish the terms of reference for the IEE. The scoping procedure should at least produce the following outputs:

i. Identify the likely environmental impacts or other environmental concerns and considerations that need to be further investigated in IEE study.
ii. Identify environmental components, which need detailed or further study.
iii. Determine in general approach and methodology required to carry out the IEE study
iv. Identify in general all affected interest to be consulted in carrying out IEE study.
v. Identify the need to fit the outputs of IEE into the project context especially on environmental management and monitoring plan.

The next step is undertaking IEE study, and the following are key important activities:

a) Describing environmental condition of the project area: collection of baseline information on biophysical, social and economic aspects of the project area is the most important reference for conducting IEE study. Normally information is obtained from secondary sources when there is a facility of maintaining database or other existing documentation, and through field sampling. Collection of baseline data should be designed to satisfy information requirements and should focused on relevant aspects that are likely to be affected by the proposed project. Therefore, the level of details in this description of study area should be sufficient to convey to readers nature of environmental and social resources condition of the affected areas.

b) Assessing Potential Impact: the "technical heart" of the environmental assessment process involves the prediction of changes over time in various environmental aspects as a result of a proposed project. The prediction of the nature, extent and magnitude of environmental changes likely to result from proposed project is aided by various tools and techniques, the choice of which depends upon the impacts of concern, data availability or lack thereof, and the appropriate specificity of quantitative models.

c) Formulating Mitigation measures: once the impacts have been analyzed, their significance will be determined i.e. whether they are acceptable,, require mitigation or unacceptable. Subsequently, measures will be devised to mitigate anticipated environmental changes and consequential impacts during project implementation and operation or further reduce the residual environmental changes inherent in the selected project design. They normally include technical, social and institutional measures to be implemented as integral element of the project.

d) Preparing the institutional Requirements and Environmental Monitoring Plan: environmental management involves the implementation of environmental protection and mitigation measures and monitoring for significant environmental impacts. Environmental protection measures are taken to:

i. Mitigate environmental impacts
ii. Provide in kind compensation for lost environmental resources
iii. Enhance environmental resources.

These measures are usually set out in a plan, which covers all phases of the project form pre-construction through decommissioning and outlines mitigation and other measures that will be undertaken to ensure compliance with environmental regulations and reduce or eliminate adverse impacts. Environmental monitoring involves; (i) planning a survey and sampling collection of data/information relevant to environmental assessment and project environmental management (ii) conduct of the survey and sampling program (iii) analysis of samples and data information collected and interpretation of data and information and (iv) preparation of reports to support environmental management.

4.3.2 Documenting IEE Studies

IEE reports and their summaries are presented in certain specific format, which is given below.

Outline of an IEE Report

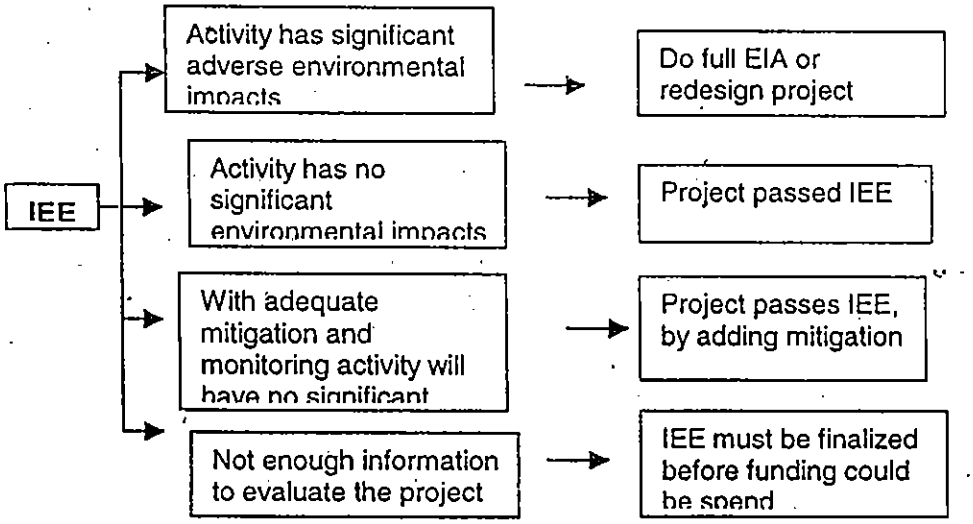
- Introduction; includes purpose of the report, brief description about project and its importance, any other background information, scope of study, magnitude of efforts, who is performing IEE and acknowledgement.
- Description of the project: provide sufficient details to give clear picture of the project.
- Description of the environment; furnish sufficient information to give a brief but clear picture of the existing environmental resources including physical, ecological, economic, social and cultural resources in the area affected by the project.
- Screening of potential environmental parameters for different sector projects, no significant impacts are screened out from those with potential significant adverse impact by reviewing each relevant parameters according to the operation stages. Mitigation measures where appropriate will also be recommended.
- Institutional requirements and environmental monitoring Plan: this section includes impacts that are to be mitigated and activities to implement the mitigation measures including, how, when and where they will be implemented.
- Public Consultation and information Disclosure: this section will describe the process undertaken to involve the public in project design and recommended measures for continuing public participation; summarize major comments received from beneficiaries, local officials, community leaders, NGOs, and others and describe how these comments were addressed.
- Findings and recommendations: this section includes an evaluation of the screening process and recommendation will be provided whether significant environmental impacts exist needing further detailed study or EIA. If there is no need of further study, the IEE itself, which at times may need to be supplemented by a special study in view of limited but significant impacts, becomes the complete environmental assessment for the project and no follow-up EIA will be needed.
- Conclusions: this section will discuss the result of the IEE and justification, if any, of the need for additional study or EIA.

4.3.3 Summary Initial Environmental Examination Report

The summary IEE report is the executive summary of the IEE report. It describes the significant findings of the IEE report and recommendations to manage them. It is presented clearly and concisely as a stand-alone document for submission to the Board and disclosure to the public.

4.3.4 Possible outcomes:

Possible outcomes of IEE are:



(Source: www.encapafrica.org/MSE_CP_Course/mod%206/6Bhanout2.doc)

4.4 Environmental Impact Assessment

In order to predict environmental impacts of any development activity and to provide an opportunity to mitigate against negative impacts and enhance positive impacts. Environmental impact assessment (EIA) procedures were developed in the 1970s. An EIA may be defined as:

> *A formal process to predict the environmental consequences, of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects.*

Basically the EIA is a management tool to:

- Forecast the impact that a project will have on the environment: and
- Find ways to reduce unacceptable impacts.

EIA should apply to all actions likely to have a significant environmental effect. So the potential scope of an EIA could include the appraisal of polices, plans, programmes and projects.

4.4.1 Why EIA is needed.

There are a number of reasons to carry out EIA.

- Assurance of adequate procedures for managing environmental risks, and compliance with procedures.
- Improved statutory compliance.
- Identification of environmental risks and problem areas, early warning and prevention of potential adverse environmental effects (risk identification, assessment and management).

- Improved financial planning, through the identification of future and potential capital, operating and maintenance casts, associated with environmental activities.
- Improved preparation for emergency and crisis situation management.
- Improved corporate image and positive public relations.
- Enhancement of environmental awareness and responsibility throughout the corporate hierarchy.
- Improved relations with regulatory authorities.
- Facilitation of obtaining insurance coverage for environmental impairment liability.

4.4.2 Principles of EIA

An EIA is not a one off process ending with the preparation of a repot. It provides an essential input to project management through a continuing evaluation and re-evaluation of the various environmental issues as project plans are developed and defined. This process should continue throughout the life of the development from conception to final abandonment or closure. It is important, therefore, that careful consideration be given to the scope, management and planning aspects of an EIA. In the management and planning of EIA there are a number of factors that require consideration. There are five basic principles of managing an EIA.

4.4.2.1 Principle 1: Focus on the main issues

- It is important that an environmental impact assessment does not try to cover too many topics in too much detail.
- At an early stage, the scope of the EIA should be limited to only the most likely and most serious of the possible environmental impacts, which could be identified by screening or a preliminary assessment.
- Where mitigation measures are being suggested, it is again important to focus the study only, on workable, acceptable solutions to the problems.

4.4.2.2 Principle 2: involve the appropriate persons and groups

- Those appointed to manage and undertake the EIA process.
- Those who can contribute facts, ideas or concerns to the study, including scientists, economists, engineers, policy-makers and representatives of interested or affected groups.
- Those who have direct authority to permit, control or alter the project—that is, the decision makers including, for example, the developer, aid agency or investors, competent authorities, regulators and politicians.

4.4.2.3 Principle 3: link information to decisions about the project

An EIA should be organized so that it directly supports the many decisions that need to be taken about the proposed project. It

should start early enough to provide information to improve basic designs, and should progress through the several stages of project planning and implementation.

4.4.2.4 *Principle 4: present clear options for the mitigation of impact and for sound environmental management*

- To help decision makers, the EIA must be designed so as to present clear choices on the planning and implementation of the project, and it should make clear the likely results of each option. For instance, to mitigate adverse impacts, the EIA could propose:
  - Pollution control technology or design features;
  - The reduction, treatment or disposal of wastes;
  - Compensations or concessions to affected groups.
- To enhance environmental compatibility, the EIA could suggest:
  - Several alternative sites;
  - Changes to the project's design and operation;
  - Limitations to its initial size or growth;
  - Separate programmes, which contribute in a positive way to local resources or to the quality of the environment.
- To ensure that the implementation of an approved project is environmentally sound, the EIA may prescribe:
  - Monitoring programmes or periodic impact reviews;
  - Contingency plans for regulatory action;
  - The involvement of the local community in later decisions.

4.4.2.5 *Principle 5: provide information in a form useful to the decision-makers*

The objective of an EIA is to ensure that environmental problems are foreseen and addressed by decision-makers must fully understand the EIA's conclusions, which should be presented in terms and formats immediately meaningful.

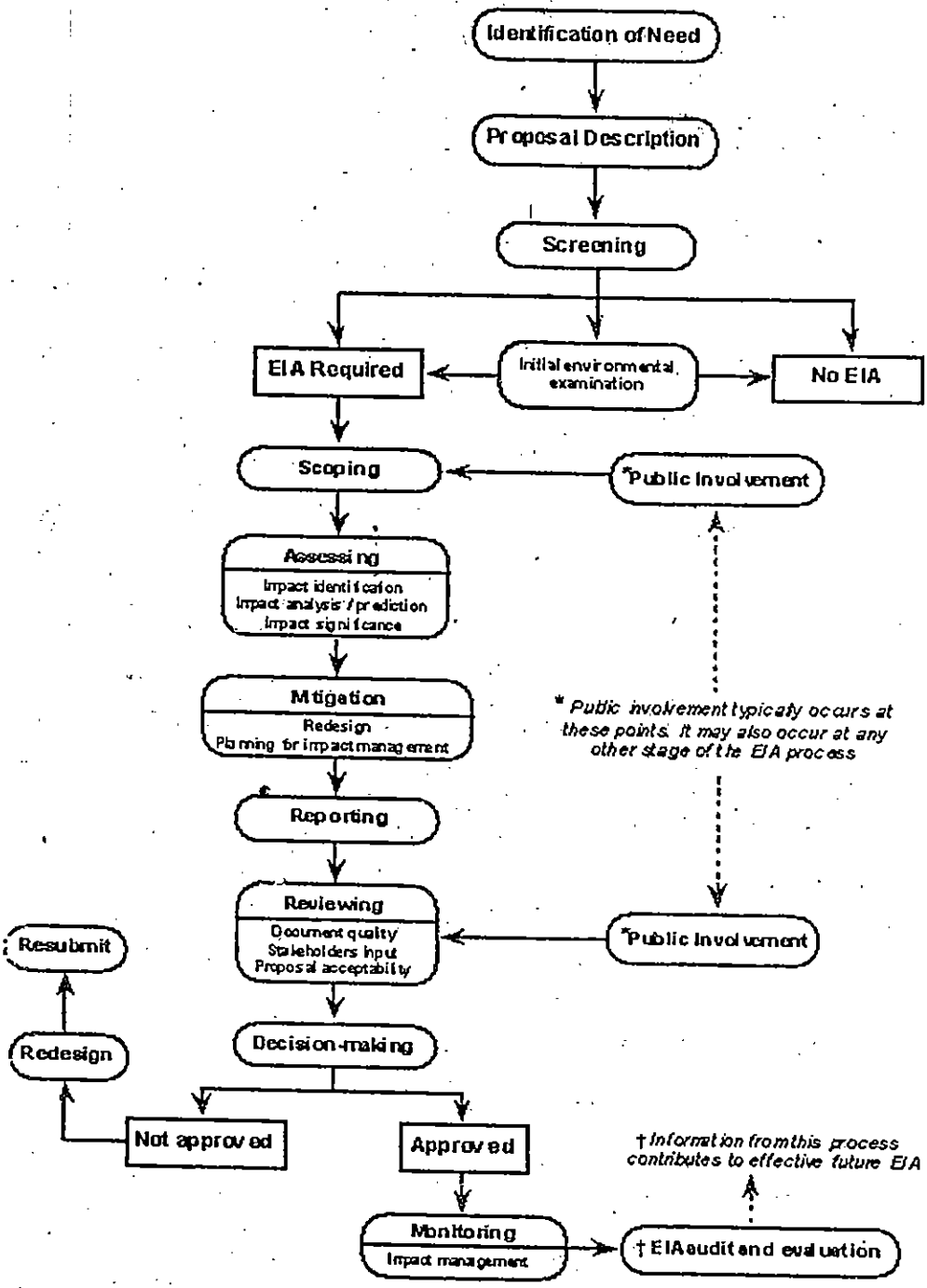
4.4.3 The Process of EIA

The way in which an EIA is carried out is not rigid: it is a process comprising a series of steps. These steps are outlined below and the techniques more commonly used in EIA are described in some detail in the section Techniques. The main steps in the EIA process are:

- Screening
- Scoping
- Prediction and mitigation

- Management and monitoring
- Audit

Fig 4.1: Flow Chart of EIA Process



Source:(http://www.unep.ch/etu/publications/EIA man_2edition.htm.)

4.4.3.1 *What is Screening?*

Screening is the process of deciding on whether an EIA is required. This may be determined by size or it may be based on site-specific information. The

output from the screening process is often a document called an Initial Environmental Examination or Evaluation (IEE). The main conclusion will be a classification of the project according to its likely environmental sensitivity.

4.4.3.2 *What is Scoping?*

Scoping is used to identify the key issues of concern at an early stage in the planning process. Scoping occurs out at an early stage in order to aid site selection and identify any possible alternatives. The scoping process should involve all interested parties such as the proponent and planning or environmental agencies and members of the public. The results of scoping will form determine the scope, depth and terms of reference to be addressed within the Environmental Statement.

4.4.3.3 *Prediction and mitigation*

Several major options are likely to have been proposed either at the scoping stage or before and each option may require separate prediction studies. An important outcome of this stage will be recommendations for mitigating measures. The aim will be to introduce measures, which minimize any identified adverse impacts and enhance positive impacts.

4.4.3.4 *Management and Monitoring*

The part of the EIS covering monitoring and management is often referred to as the Environmental Action Plan or Environmental Management Plan. The purpose of monitoring is to compare predicted and actual impacts. The results of monitoring can be used to manage the environment, particularly to highlight problems early so that action can be taken.

The Environmental Management Plan needs to not only include clear recommendations for action and the procedures for their implementation but must also define a programme and costs. It must be quite clear exactly how management and mitigation methods are phased with project implementation and when costs will be incurred.

4.4.3.5 *Auditing*

It will usually done by a separate team of specialists to that working on the bulk of the EIA. The audit should include an analysis of the technical, procedural and decision-making aspects of the EIA., (adapted from Sadler in Wathern, 1988). The audit will determine whether recommendations and requirements made by the earlier EIA steps were incorporated successfully into project implementation.

4.4.4 EIA Tools and Techniques

4.4.4.1 *Baseline studies*

Baseline studies using available data and local knowledge will be required for scoping. Once key issues have been identified, the need for further in-depth studies can be clearly identified and any additional data collection

initiated. Specialists, preferably with local knowledge, will be needed in each key area identified. They will need to define further data collection, to ensure that it is efficient and targeted to answer specific questions, and to quantify impacts. A full year of baseline data is desirable to capture seasonal effects of many environmental phenomena.

4.4.4.2 *Check-lists*

The Check-list are prepared by experts for non-specialists and enables much time-consuming work to be carried out in advance of expert input. It includes extensive data collection sheets. The collected data can then be used to answer a series of questions to identify major impacts and to identify shortages of data. A matrix indicates which data are linked to which questions.

4.4.4.3 *Matrices*

The major use of matrices is to indicate cause and effect by listing activities along the horizontal axis and environmental parameters along the vertical axis. In this way the impacts of both individual components of projects as well as major alternatives can be compared. The greatest drawback of matrices is that they can only effectively illustrate primary impacts.

4.4.4.4 *Network diagrams*

A network diagram is a technique for illustrating how impacts are related and what the consequences of impacts are.

4.4.4.5 *Overlay*

Overlays provide a technique for illustrating the geographical extent of different environmental impacts. Each overlay is a map of a single impact. The original technique used transparencies, which is somewhat cumbersome. However, the development of Geographic Information Systems (GIS) can make this technique particularly suitable for comparing options, pinpointing sensitive zones and proposing different areas or methods of land management.

4.4.4.6 *Mathematical modeling*

Mathematical modeling is one of the most useful tools for prediction work. It is the natural tool to assess both flow quantities and qualities (e.g. salt/water balances, pollution transport, changing flood patterns). However, it is essential to use methods with an accuracy, which reflects the quality of the input data, which may be quite coarse.

4.4.4.7 *Expert advice*

Expert advice should be sought for predictions, which are inherently non-numeric and is particularly suitable for estimating social and cultural impacts. It should preferably take the form of a consensus of expert opinion.

Local experience will provide invaluable insight. Expert opinions are also likely to be needed to assess the implications of any modeling predictions.

4.4.4.8 *Economic techniques*

Economic techniques have been developed to try to value the environment and research work is continuing in environmental economics. The most commonly used methods of project appraisal are cost-benefit and cost-effectiveness analysis. It has not been found easy to incorporate environmental impacts into traditional cost-benefit analysis, principally because of the difficulty in quantifying and valuing environmental effects.

4.4.4.9 *Environmental Health Impact Assessment*

There are various stages in an Environmental Health Impact Assessment:

1. Hazard Identification
2. Exposure Assessment
3. Exposure-Response relationship
4. Estimation of risks to health, and communication of these risks to all concerned
5. Determination of health costs (potential or actual),
6. Option appraisal ...

4.4.4 Environmental Impact Statement (EIS)

Environmental Impact Statement is the final report of an EIA. EIS is defined as a documents prepared to describe the effects for proposed activities on the environment. The report consists of summary of impact of alternatives and a section on follow up action required to enable implementation of proposals and to monitor long-term impacts. Recommendations are a crucial part of EIS. The format of the report should preferably follow a standard as recommended by the appropriate institution or required by legislations. The main text should include:

- A description of the program, plan or project
- A summary of the EIA methodology
- The policy, legal and administrative framework
- A summary of the base line data
- A description of the government and non-government participation
- Environmental impacts
- Environmental action plan
- Recommendations and guidance to the decision maker
- A statement of provision for auditing, who should carry it out and when.

The appendixes should include:

- A glossary of technical and units
- A list of the team who prepared the EIA
- Records of public meeting and consultations
- A catalogue of information, both data and written material and their source
- Technical information too detailed for the main text.

4.5 Environmental Auditing (EA)

EA is a management tool comprising a systematic, documented, periodic and objective evaluation of how well management and equipment are performing in environmental terms, with the aim of helping to safeguard the environment by:

- Facilitating management control of environmental practices; and
- Assessing compliance with company policies, which would include meeting regulatory requirements.(UNEP/IE, 1990).

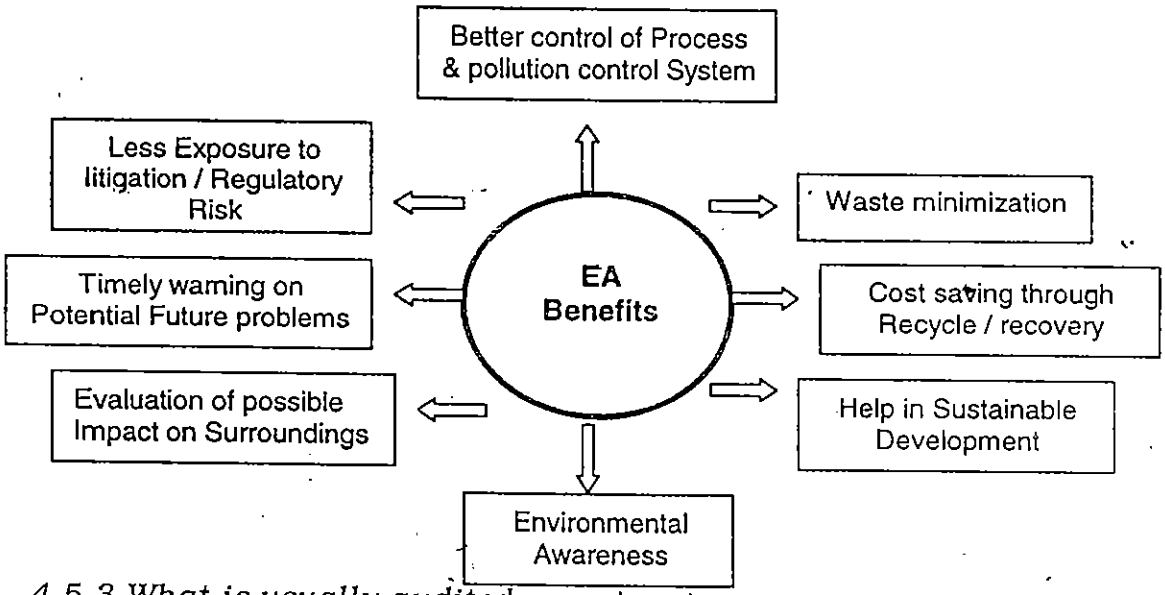
So EA is "systematic, documented, periodic and objective review by a regulated entity of facility operation and practices related meeting environmental requirements."

4.5.1 Principles of EA

EA should:

- Meet a clear purpose.
- Be objective, independent and proficient
- Reflect professional care
- Employ systematic methods
- Ensure Quality Assurance.

4.5.2 Benefits of EA



4.5.3 What is usually audited

- Policy, responsibilities and organization
- Planning, monitoring and reporting procedures
- Management and staff awareness and training
- External relations with regulatory authorities and the community
- Compliance with regulations
- Emergency planning and response

- Pollution sources and minimization pollution treatment and discharge
- Resource savings
- Housekeeping
- Land management

How frequently do we need to audit it depend upon the nature of operations, the significant environmental aspects/impacts identified earlier, result of monitoring program and the result of previous audit.

4.5.4 Process of Auditing

Depending upon the needs, companies have developed their own auditing procedures, but the result of international working groups on this topic suggest that there is a consensus on the main characteristics of the steps of environmental auditing. The basic steps of an EA developed by the Canadian Naranda Corporation, have been adopted by the International Chamber of Commerce's (ICC) working party on environmental auditing. An Audit is divided in to three parts:

- Pre audit activities;
- Activities at the site and
- Post audit activities

4.5.4.1 Pre audit activities:

How to select facilities? Most companies who apply this tool audit all of their facilities regularly. One company, for example, audits each refinery every 18 months, medium-risk facilities every three years, and low-risk facilities every five to six years. In each category, facilities to be audited each year are generally selected randomly.

Who should form the audit team? The audit team tends to comprise two to eight people. They may be full-time auditors, subject specialists, representatives from the business unit being audited, and representatives from other company plants or qualified external consultants. It is also advisable to include workers' representatives, who will require adequate training and information on the auditing process.

4.5.4.2. Activities at the Site:

Each company has developed its own methodology and set of procedures for conducting an audit. Site visits; questionnaires, interviews and review of documents are used. In general, the performance of units is audited according to:

- ☐ Government requirements (national, state and local); and
- ☐ Internal requirements (corporate, divisional and facility policies, procedures and standards).

Once the audit has been performed at site, the so-called post-audit activities follow.

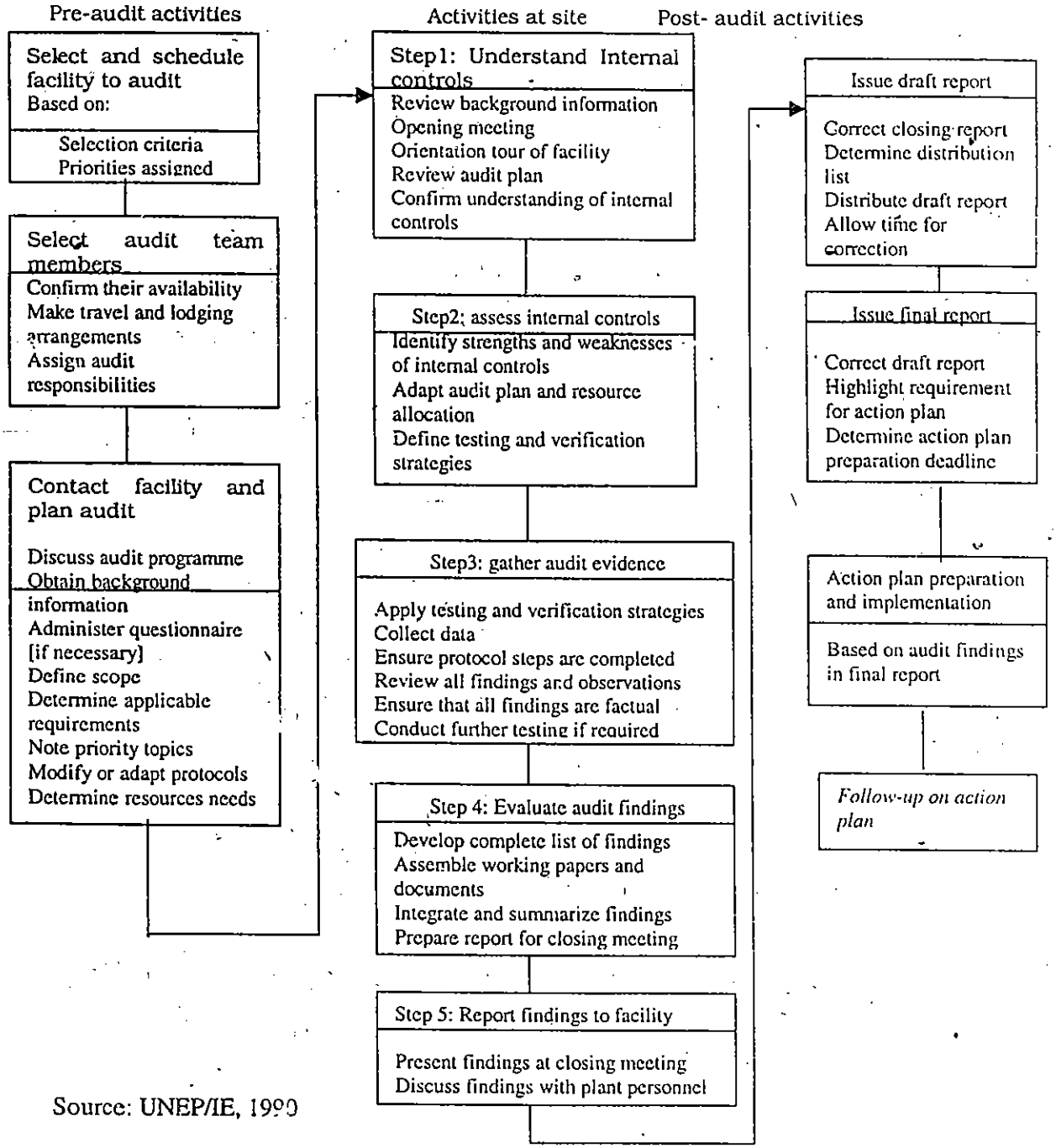
4.5.4.3 Post Audit Activities:

A draft report should be issued and discussed with management and workers' representatives of the audited unit. Some companies prefer the

audit report to be only a statement of acts; others prefer to include proposals on how to improve things. Once a final report has been issued and adopted, an action plan based on the audit findings has to be prepared, usually be the audited unit assisted by the respective specialists. Proposals for improved environmental performance have to be implemented by the department in charge of the audit.

To improve confidence, at both local authority and community levels, in a company's operations, information should be periodically supplied about audit results and measures taken to improve environmental performance.

Figure 18. Basic steps of an environmental audit



Source: UNEP/IE, 1990

4.6 ISO 14000

ISO is the International Organization for Standardization. It is a network of National Standard Institutes from 140 countries working in partnership with International Organization, Government, Industry, Business and Consumer Representatives. ISO is a non-governmental organization and its members are the Standards Institutes in their respective countries instead of their Government. Pakistan is also Member of ISO and is represented by Pakistan Standards and Quality Control Authority (PSQCA).

ISO 14000 is a series of voluntary generic standards developed / being developed by ISO that provides business management with the structure for managing environmental impacts. The standards include a broad range of environmental management disciplines, including the basic management system, auditing, performance evaluation, labelling and life cycle assessment.

ISO 14001 refers to the first of the ISO 14000 series standards, which is Environmental Management System and is the only standard available so far in this series against which organization can go for certification/registration. (ISO 14000 – Meet the whole family!, ISO Central Secretariat, Switzerland, 1998 (ISBN 92-67-10283-4)

Jenson, (2001) has categorized the ISO 14000 family standards into seven major groups as shown in the table below.

ISO 14000 Family of Standards	
GROUP	STANDARDS
Environmental Management Systems	ISO 14001 ISO 14004 ISO/TR 14061
Environmental Auditing	ISO 14010 ISO 14011 ISO 14012 ISO 14015 ISO 19011
Environmental labeling	ISO 14020 ISO 14021 ISO 14024 ISO/TR 14025
Environmental Performance Evaluation	ISO 14031 ISO/TR 14032
Life Cycle Assessment	ISO 14040 ISO 14041 ISO 14042 ISO 14043 ISO/TR 14047 ISO/TR 14048 ISO/TR 14049
Environmental Management Vocabulary	ISO 14050
Environmental Aspects in Product Standards	ISO 14062 ISO Guide 64

Source: Jenson, 2001

4.6.1 Why ISO 14000

World Trade is playing an increasingly important role in the economic health of nations. This trade is dependent on various bilateral or multilateral agreements amongst industrial countries, most of which are under the umbrella of WTO. These trade agreements, however, require an underpinning by technical agreements, which provide for compatible standards of products of the trading partners. Trade between countries thus become easier and fairer by using standards which are widely acceptable. (Roshan Pakistan Web Magazine, Thursday, June 6, 2002).

4.6.2 ISO 14000 Certification, Registration and Accreditation

In common usage and even in publications, the term certification and registration are used interchangeably. Scholars may make the distinction that "registering" a management system and "certifying" to a product standard but this distinction is rarely noted in the world of ISO 14001. Even the Standard refers to "certification/registration."

Each country has its own accreditation body established either nationally or by their government. UKAS Directory of Accredited Third Party Certification Bodies Mentions following accreditation services, which they perform.

- Quality Management Systems
- Product Conformity
- Environmental Management Systems and/or EMAS
- Certification of Personnel E
- Information Security Management Systems

Pakistan National Accreditation Council (PNAC) is the official accreditation body of Pakistan, working under ministry of Science and Technology.

Each accreditation organization has developed their criteria for accreditation ISO 14001 registration or Certification companies. Accreditation is not a legal requirement. However, accreditation provides organizations assurance that their registrar has met the accreditation requirements for things such as impartiality, confidentiality, a documented registration system, quality assurance, and policies to handle complaints and appeals.

A common myth about EMS and ISO 14001 certification is that the organization shall completely eliminate all sorts of pollution before deciding to get it certified for ISO 14001 standards.

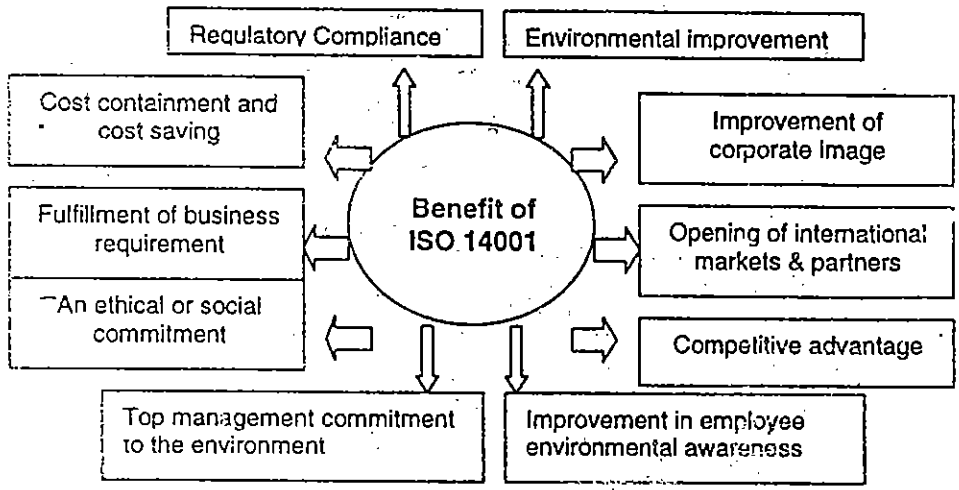
However this is not entirely true. ISO 14000 is a management standard, and does not mandate any specific requirements for improved environmental performance. Instead, the requirement is more obliquely stated, requiring organization to identify their environmental impacts; prioritize those impacts; set targets and objectives for reducing those impacts; select activities to achieve the identified targets and then to use a continuous improvement cycle to evaluate and re-approach the system. (ISO 14001 Workgroup, 1998). There is nothing in the standard that tells organizations

what goals to set, which means that improved environmental performance is not guaranteed.

The central concept of ISO 14001 is continual improvement. During certification audits, what an auditor would look like to see is the Continual improvement or in other words a "delta improvement" from time to time. So if an organization, which plans to go for ISO 14001 certification, and is far from the legal and other compliances, it has equally good.

4.6.3 *Benefits of ISO 14001*

There are many benefits most common of which are presented below:



Source: Nyati, (http://www.cleantechinititative.com/cti/cpnyati.htm.)

4.6.4 *ISO 14001 Certification Process*

The ISO 14001 certifications process is generally divided in the following four steps. However there could be exception where some organization may opt to skip or merge some of the steps. The four steps are:

1.Gap Analysis

All organization would have some environmental practices and procedures in place. Therefore it is a usual practice that organizations seeking ISO 14001 certification, conduct a Gap Analysis exercise to see how the existing practices and procedures are complying with the Standard, and what additional needs to be done.

2. Initial Planning

Implementation of an ISO 14001 EMS will require an organization to:

a) Develop an implementation strategy (including selecting a certification agency);
b) Develop or redesign documentation (policies, programs, procedures, forms);

3. Registrations and Certification

The selected certification company usually performs three EMS audits to test for the conformance of the organization's EMS to the requirements specified in ISO 14001. These audits are usually titled as:

- Pre stage assessment: baseline conditions for EMS are developed
- First stage assessment: first formal audit followed by a report of system non conformities
- Second stage assessment: this is the assessment on which certification without any Non-conformance. There are four possible scenarios as a result of this certification assessment:

  Scenario 1: recommendation for certification without any non-conformance.

  Scenario 2: recommendation for certification with some minor non-conformance.

  Scenario 3: not recommended for certification because of some major non-conformances.

  Scenario 4: not recommended for certification and whole EMS or major part of it is declared in non-compliance with the standards.

4. Surveillance and maintenance

Once certification is conferred upon the organization, it undergoes a series of surveillance audits. The frequency of surveillance visits will be a function of the rate of change within the organization and/or the scale of the environmental impacts.

4.7 National Environmental Quality Standards:

To approach the environmental pollution control, various countries of the world have adopted different approaches so as to suit their local and socioeconomic conditions. Nevertheless all the approaches start from the desire to achieve and maintain an acceptable quality of the environment. In this respect, many countries have technically specified quality standards even though many difficulties are inherent in establishing such specifications. By general definition "a standard as a documents, established by consensus and approved by recognized body, that provides, for the common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree or order in a given context".

Standards are varied in character, subject and medium. They cover several disciplines dealing with all technical, economic and social aspects of human activity. Standards are developed by technical committees, which are coordinated bay a specialized body.

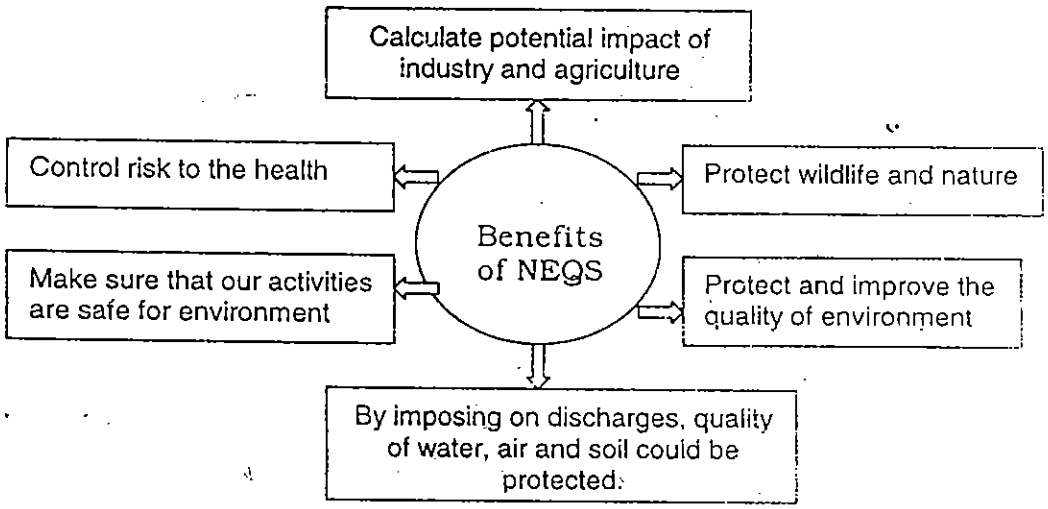
Environmental quality standards are the "measuring stick" for substances in soil, surface water and groundwater at sites. They tell us how "clean is clean". The environmental quality standards can be defined in terms of Primary, secondary and Emission Standards.

a) Primary Environmental Quality Standards: these are defined as those standards that establish the maximum and minimum concentration and period values for elements, compounds, substances, chemical or bio-chemical derivatives, energy, radiation, vibration, noise or a combination of them, whose presence or lack there of in the environment can constitute a risk to life or health of the population, defining the levels that give rise to emergency situations".

b) Secondary Environmental Standards" those standards that establish the maximum or minimum concentration and the period values for substance, elements, energy or a combination of them, whose presence or lack thereof in the environment can constitute a risk for the protection or conservation of the greater environment; or the preservation of nature.

c) Emission Standards; those that establish the maximum permissible quantity of a polluted measured in the effluent of the emission source.

4.6.1 Benefits of Environmental Quality Standards



Unit Summary

Development is considered as necessary evil. To meet the human needs we have to grow economically while preserving resources for ourself and for future generation also. A holistic approach to environment should be incorporated into business operations. EMS is one of such approach, that ensure operationaliziation and self-regulation of company as compared to government imposed regulations.

EMS as defined by ISO 14000 certification documents

"An EMS is that part of the overall management system which includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy."

The tools to implement an EMS include

Initial Environmental Examination (IEE): helps in deciding whether an EIA is required or not, Environmental Impact Assessment (EIA): describe details of impacts its mitigation measures and monitoring, Environmental Auditing (EA): comprising a systematic, documented periodic and objective evaluation of how management and equipments are performing in environmental terms ISO 14000 provides guidelines for business management with the structure for managing environment, National Environmental Quality Standards (NEQS) designed to control pollution and tells how much environment friendly your product and services are?

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INTEGRATED ENVIRONMENTAL MANAGEMENT:
RURAL AND URBAN

Block II

Sectoral Approaches

Post Graduate Diploma
Environmental Sustainable Development
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UNIT 5

SUSTAINABLE AGRICULTURE

Unit introduction

The main focus of this unit will be on explanation of the following topics to introduce the basic concepts and practices of different models of agriculture, with focus on the sustainable agriculture in the context of integrated environmental management in rural and urban areas:

- Traditional Organic Farming,
- Modern Farming and Green Agriculture,
- Sustainable Agriculture,
- Integrated Pest Control and Rational Use Of Agro-chemicals,
- Integrated Farming practices to promote sustainable agriculture.

Unit Objectives

After studying this unit you will have improved your ability to:

1. Know about the green agricultural practices leading toward modern agriculture and Green Revolution,
2. Compare traditional organic farming and modern farming,
3. Understand the concept, perspective, goals, elements and practices of sustainable agriculture,
4. Learn the appropriate use of natural resources, like water, energy, air and soil in farming to promote sustainable agriculture,
5. Use the agrochemicals in a rational manner, to develop integrated pest control for sustainable agriculture,
6. Comprehend the methods and plant production practices to promote sustainability of the farming system,
7. Realize the sustainable animal production practices to promote animal husbandry and livestock,

8. Sensitize yourself and farming/non-farming communities and other stakeholders about the socio-economic and political context, required for promotion of sustainable agriculture,
9. Relate the integrated farming practices, like apiculture, sericulture, livestock, and poultry farming, with the sustainable agriculture.

5.1 Agriculture: Traditional to Modern Farming Systems

5.1.1 Agriculture after World War II

Agriculture has changed dramatically, especially since the end of World War II. Food and fiber productivity soared due to new technologies. mechanization, introduction of new and better seeds/varieties, increased use of chemical fertilizers and pesticides, specialization and government policies that favored maximizing production. These changes allowed fewer farmers with reduced labor demands to produce the majority of the food and fiber in the developed countries of North America like United States and in some of the European states and partially in some parts of the Third World.

Although these changes have had many positive effects and reduced many risks in farming, there have also been significant costs. Prominent among these are topsoil depletion, groundwater contamination, the decline of family farms, continued neglect of the living and working conditions for farm laborers, increasing costs of production, and the disintegration of economic and social conditions in rural communities.

5.1.2 Green Revolution Agriculture

The Green Revolution in agriculture was an attempt to solve world hunger problem by dramatically boosting food production through increasing the yield of grain crops. In the 1960s and 1970s, scientists, often working in agricultural research institutes, mostly, funded by public money, began to carry out research into ways in which the yield of the grain crops – in particular wheat, maize and rice – could be improved. The new crops, known as hybrids, were introduced by selectively crossbreeding different plant varieties.

There were two distinctive waves of these new crops:

- Maize hybrids, adapted from varieties grown in the USA and Zimbabwe, spread across large parts of Central America and, to a lesser extent, East Africa.
- Fertilizer-responsive varieties of crops were introduced in East Asia (rice), and in North Mexico, India and Pakistan (wheat).

These hybrid crops were accompanied by chemical and mechanical innovations, like:

- Chemical innovations included artificial fertilizers, pesticides and herbicides.
- Mechanical innovations included the use of tractors, combine harvesters; pump irrigation and food processing technologies.

5.1.3 The effects of the Green Revolution

In many areas the use of Green Revolution technology enabled food production to increase two-or-three-fold. In some areas it enabled farmers to

plant two or even three crops a year. However, the supporters and opponents of the Green Revolution are still debating the consequences.

In some countries national food production has dramatically increased as a direct result of Green Revolution technology: for example, India, once a net importer of wheat, is now a major exporter. Other countries' agriculture has been largely untouched by the Green Revolution: for example, it is generally accepted that most African countries benefited little from Green Revolution, if at all.

At the household level, the issues are more complex. On the one hand, promoters of Green Revolution technology point to the fact that in those areas most affected (South and South East Asia) the proportion of the population that is under-nourished declined rapidly between 1970 and 1990, while in regions unaffected (such as Sub-Saharan Africa) it has risen. On the other hand, many critics argue that the introduction of Green Revolution technology has had serious consequences for the poor. According to them:

- Green Revolution crops lend themselves to mechanical farming which is most efficient on large farms. This has lead to many small farms and holdings being subsumed into larger farms, displacing tenant farmers and sharecroppers and resulting in increased landlessness.
- The increased production of new crops has sometimes taken place at the expense of crops traditionally grown and eaten by the poor. For example, traditionally, pulses have been a source of protein for poor people in India and Pakistan, yet in Green Revolution areas pulses have been replaced by wheat, which is more expensive and less nutritious.
- Many farmers have become dependant on the chemical industries that supply the agro-inputs (chemicals, fertilizers, pesticides, herbicides, etc.), necessary for growing Green Revolution crops. In India alone, during the mid-1990s, fertilizer consumption was 200 times higher than it was at the beginning of the 1960s.
- Traditionally, farmers have taken care not only to over-exploit their resources such as land, soil and water. However, the excessive use of artificial fertilizers and pesticides has harmed water quality in many areas, and has contributed to land degradation.
- Some have argued that the heavy use of fertilizers and pestiddes has had adverse effects on the health of farmers and consumers.

The debates about the benefits of the Green Revolution will continue. However, an increase in pests and diseases, coupled with declining soil and water quality, cast serious doubts on whether the high crop yields can be sustained.

5.1.4 Problems related to the Green Revolution

Cooper, D., writing on the "Sustainable Agriculture", in *New Ground* December, 1990, (pp. 16-17), highlights the following Problems related to the Green Revolution, based on the conventional agriculture practices:

- There is wide spread famine despite the dramatic increase in food production during the last half a century (caused by new seed varieties, chemical fertilizers and pesticides, and increased irrigation).
- New more productive methods have detrimental effects on the environment, for example:

  - **Soil erosion** (for every ton of grain produced, approximately 20 tons of top soil is lost);
  - **The lowering of the water table** (as more crops are planted than the land can sustain and new seed varieties often need large amounts of water);
  - **The salinisation and alkalization of soils** (through irrigation and removal of trees);
  - **Residues of pesticides and herbicides** (fond in other living things, food and water supplies).

- Farm subsidies in industrialized nations affect the terms of trade in Third World countries.
- Third World debt leads to the use of land for large scale cash crop production, pushing subsistence farmers onto marginal lands and contributing to wide spread soil degradation.
- Deforestation and the advance of desert areas through harmful farming methods.

5.2 Sustainable Agriculture: Philosophy, Basic Concepts, Goals, Elements and Practices

5.2.1 Transition toward Sustainable Agriculture

A growing movement has emerged during the past two decades (1980s and 1990s), to question the role of the agricultural establishment, especially with reference to Green Revolution, in promoting practices that contribute to the socio-economic and other problems. This movement for sustainable agriculture is, gradually, garnering increasing support and acceptance within mainstream agriculture through out the world. Not only does sustainable agriculture address many environmental and social concerns, but it offers innovative and economically viable opportunities for growers, laborers, consumers, policymakers and many others in the entire food system.

Because the concept of sustainable agriculture is still evolving, this chapter is an effort to identify the basic ideas, practices and policies that constitute our concept of sustainable agriculture, clarifying the research agenda and

priorities and suggesting practical steps that may be appropriate for moving toward sustainable agriculture.

5.2.2 Definitions of Sustainable Agriculture

According to the FAO sources, "Agriculture is sustainable when it is ecologically sound, economically viable, socially just, culturally appropriate and based on a holistic scientific approach."

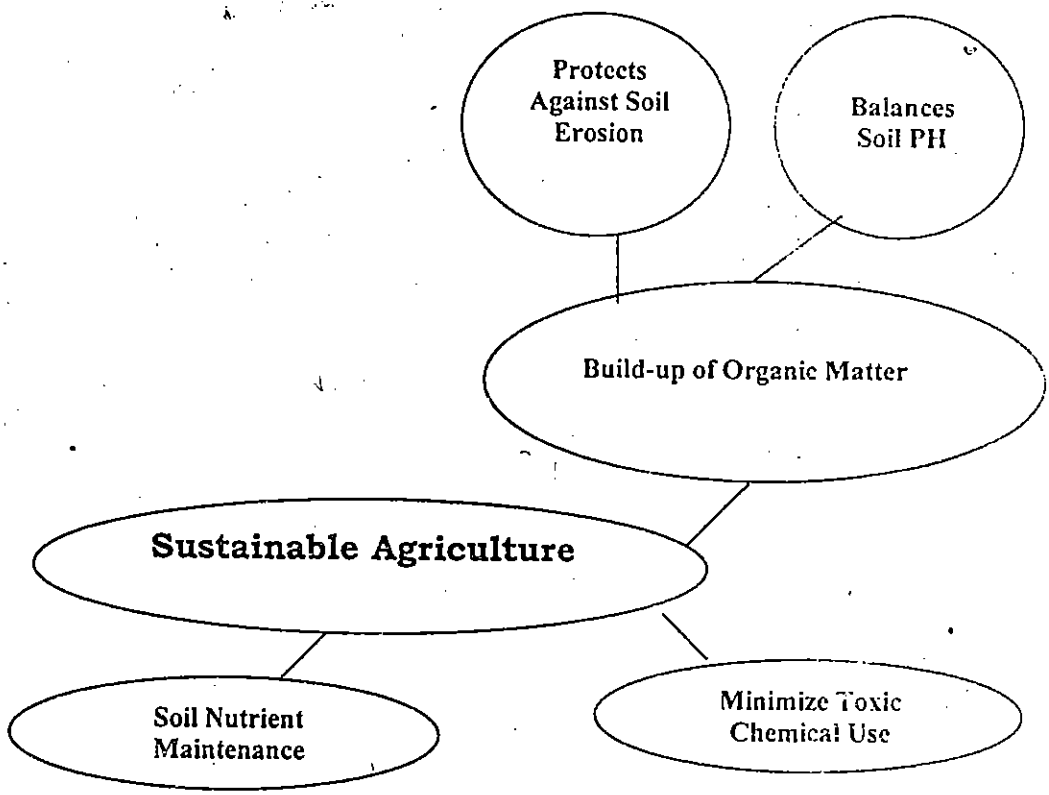
Reijntjes, Haverkort and Water-Bayers, in *Farming for the Future* (1992), write that "Low External Inputs and Sustainable Agriculture (LEISA), is agriculture which makes optimal use of locally available natural and human resources (such as soil, water, vegetation, local plants and animals, and human labor, knowledge and skill) and which is economically feasible, ecologically sound, culturally adapted and socially just.."

5.2.3 Key Elements of Sustainable Agriculture

Coetzee, H. in his article entitled "Sustainable Development: Goodbye to the Good Life, published in *New Ground,* summer, (1991/2), pp. 31-33. outlines the following key elements of sustainable agriculture:

- Appropriate land use not monoculture
- Working in harmony with natural systems
- Harnessing the powers of nature, for example in pest control
- Soil protection using mulch and minimal tillage methods
- Organic matter build up through use of manure and compost
- Animals are important for manure and therefore for soil fertility
- Plant nutrient maintenance through crop rotation
- No use of artificial fertilizers or chemical pesticides
- Local markets and decentralized systems of distribution
- Biological diversity

5.2.4 Sustainable Agriculture: Consequence Wheel



5.2.5 Main Goals of Sustainable agriculture

Sustainable agriculture integrates three main goals:

a) Environmental health,
b) Economic profitability, and
c) Social and economic equity.

A variety of philosophies, policies and practices have contributed to these goals. People in many different capacities, from farmers to consumers, have shared this vision and contributed to it. Despite the diversity of people and perspectives, the following themes commonly weave through basic concepts and definitions of sustainable agriculture.

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. Therefore, *stewardship of both natural and human resources* is of prime importance. Stewardship of human resources includes consideration of social responsibilities such as working and living conditions of laborers, the needs of rural communities, and consumer health and safety both in the present and the future. Stewardship of land and natural resources involves maintaining or enhancing this vital resource base for the long term.

A *systems perspective* is essential to understand sustainability. The system is envisioned in its broadest sense, from the individual farm, to the local ecosystem, *and* to communities affected by this farming system both locally and globally. An emphasis on the system allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. A systems approach gives us the tools to explore the interconnections between farming and other aspects of our environment.

A systems approach also implies *interdisciplinary efforts in research and education.* This requires not only the input of researchers from various disciplines, but also farmers, farm workers, consumers, policymakers and others.

Making the transition to sustainable agriculture is a process. For farmers, the transition to sustainable agriculture normally requires a series of small, realistic steps. Family economics and personal goals influence how fast or how far participants can go in the transition. It is important to realize that each small decision can make a difference and contribute to advancing the entire system further on the "sustainable agriculture continuum." The key to moving forward is the will to take the next step.

Finally, it is important to point out that *reaching toward the goal of sustainable agriculture is the responsibility of all participants and stakeholders in the system,* including farmers, laborers, policymakers, researchers, retailers, and consumers. Each group has its own part to play, its own unique contribution to make to strengthen the sustainable agriculture community.

5.2.6 Strategies to promote Sustainable Agriculture System

The specific strategies for realizing the broad themes or goals of the sustainable agriculture to establish an effective system may be grouped according to four separate though related areas of concern:

i) Appropriate use of Natural Resources in Farming,
ii) Sustainable Plant Production Practices,
iii) Sustainable Animal Production Practices, and
iv) The Economic, Social and Political Context.

These strategies represent a range of potential ideas for individuals committed to interpreting the vision of sustainable agriculture within their own circumstances.

I. Appropriate use of Natural Resources in Farming

a) Water: A Principal Resource

When the production of food and fiber degrades the natural resource base, the ability of future generations to produce and flourish decreases. The decline of ancient civilizations in Mesopotamia, the Mediterranean region, Pre-Columbian southwest U.S. and Central America is believed to have been

strongly influenced by natural resource degradation from non-sustainable farming and forestry practices. Water is the principal resource that has helped agriculture and society to prosper, and it has been a major limiting factor when mismanaged.

Water supply and use: In drought hit areas, drought-resistant farming systems should be introduced. For this purpose following steps should be taken:

1) Improving water conservation and storage measures,
2) Providing incentives for selection of drought-tolerant crop species,
3) Using reduced-volume irrigation systems,
4) Managing crops to reduce water loss, or
5) Not planting at all.

Water quality: The most important issues related to water quality involve salinization and contamination of ground and surface waters by pesticides, nitrates and selenium. Salinity has become a problem wherever water of even relatively low salt content is used on shallow soils in arid regions and/or where the water table is near the root zone of crops. Tile drainage can remove the water and salts, but the disposal of the salts and other contaminants may negatively affect the environment depending upon where they are deposited.

Temporary solutions include the use of salt-tolerant crops, low-volume irrigation, and various management techniques to minimize the effects of salts on crops. In the long-term, some farmland may need to be removed from production or converted to other uses. Other uses include conversion of row crop land to production of drought-tolerant forages, the restoration of wildlife habitat or the use of agro-forestry to minimize the impacts of salinity and high water tables. Pesticide and nitrate contamination of water can be reduced using many of the practices discussed later in the following sections on Plant and Animal Production Practices.

Wildlife: Another way in which agriculture affects water resources is through the destruction of riparian habitats within watersheds. The conversion of wild habitat to agricultural land reduces fish and wildlife through erosion and sedimentation, the effects of pesticides, removal of riparian plants, and the diversion of water. The plant diversity in and around both riparian and agricultural areas should be maintained in order to support a diversity of wildlife. This diversity will enhance natural ecosystems and could aid in agricultural pest management.

b) Energy: Non-Renewable versus Renewable Sources

Modern agriculture is heavily dependent on non-renewable energy sources, especially petroleum. The continued use of these energy sources cannot be sustained indefinitely, yet to abruptly abandon our reliance on them would be economically catastrophic. However, a sudden cutoff in energy supply would be equally disruptive. In sustainable agricultural systems, there is reduced reliance on non-renewable energy sources and a substitution of renewable sources or labor to the extent that is economically feasible.

c) Air and its Quality

Many agricultural activities affect air quality. These include smoke from agricultural burning; dust from tillage, traffic and harvest; pesticide drift from spraying; and nitrous oxide emissions from the use of nitrogen fertilizer. Options to improve air quality include incorporating crop residue into the soil, using appropriate levels of tillage, and planting wind breaks, cover crops or strips of native perennial grasses to reduce dust.

d) Soil and its Erosion

Soil erosion continues to be a serious threat to our continued ability to produce adequate food. Numerous practices have been developed to keep soil in place, which include reducing or eliminating tillage, managing irrigation to reduce runoff, and keeping the soil covered with plants or mulch. Enhancement of soil quality is discussed in the next section.

II. Sustainable Plant Production Practices

a) Approaches for production

Sustainable production practices involve a variety of approaches. Specific strategies must take into account topography, soil characteristics, climate, pests, local availability of inputs and the individual grower's goals. Despite the site-specific and individual nature of sustainable agriculture, several general principles can be applied to help growers select appropriate management practices:

- Selection of species and varieties that are well suited to the site and to conditions on the farm;
- Diversification of crops (including livestock) and cultural practices to enhance the biological and economic stability of the farm;
- Management of the soil to enhance and protect soil quality;
- Efficient and humane use of inputs; and
- Consideration of farmers' goals and lifestyle choices.

b) Selection of site, species and variety

Preventive strategies, adopted early, can reduce inputs and help establish a sustainable production system. When possible, pest-resistant crops should be selected which are tolerant of existing soil or site conditions? When site selection is an option, factors such as soil type and depth, previous crop history, and location (e.g. climate, topography) should be taken into account before planting.

c) Diversity

Diversified farms are usually more economically and ecologically resilient. While monoculture farming has advantages in terms of efficiency and ease of management, the loss of the crop in any one year could put a farm out of business and/or seriously disrupt the stability of a community dependent on that crop. By growing a variety of crops, farmers spread economic risk and

are less susceptible to the radical price fluctuations associated with changes in supply and demand.

Properly managed, diversity can also buffer a farm in a biological sense. For example, in annual cropping systems, crop rotation can be used to suppress weeds, pathogens and insect pests. Also, cover crops can have stabilizing effects on the agro-ecosystem by holding soil and nutrients in place, conserving soil moisture with mowed or standing dead mulches, and by increasing the water infiltration rate and soil water holding capacity. Cover crops in orchards and vineyards can buffer the system against pest infestations by increasing beneficial arthropod populations and can therefore reduce the need for chemical inputs. Using a variety of cover crops is also important in order to protect against the failure of a particular species to grow and to attract and sustain a wide range of beneficial arthropods.

Optimum diversity may be obtained by integrating both crops and livestock in the same farming operation. This was the common practice for centuries until the mid-19th century, when technology, government policy and economics compelled farms to become more specialized. Mixed crop and livestock operations have several advantages:

- First, growing row crops only on more level land and pasture or forages on steeper slopes will reduce soil erosion.
- Second, pasture and forage crops in rotation enhance soil quality and reduce erosion; livestock manure, in turn, contributes to soil fertility.
- Third, livestock can buffer the negative impacts of low rainfall periods by consuming crop residue that in "plant only" systems would have been considered crop failures.
- Finally, feeding and marketing are flexible in animal production systems. This can help cushion farmers against trade and price fluctuations and, in conjunction with cropping operations, make more efficient use of farm labor.

d) Soil management

A common philosophy among sustainable agriculture practitioners is that a "healthy" soil is a key component of sustainability; that is, a healthy soil will produce healthy crop plants that have optimum vigor and are less susceptible to pests. While many crops have key pests that attack even the healthiest of plants, proper soil, water and nutrient management can help prevent some pest problems brought on by crop stress or nutrient imbalance. Furthermore, crop management systems that impair soil quality often result in greater inputs of water, nutrients, pesticides, and/or energy for tillage to maintain yields.

In sustainable systems, the soil is viewed as a fragile and living medium that must be protected and nurtured to ensure its long-term productivity and stability. Methods to protect and enhance the productivity of the soil include:

- Using cover crops,
- Compost and/or manures,
- Reducing tillage,
- Avoiding traffic on wet soils, and

- Maintaining soil cover with plants and/or mulches.

Conditions in the soils, which are warm, irrigated, and tilled, do not favor the buildup of organic matter. Regular additions of organic matter or the use of cover crops can increase soil aggregate stability, soil tilth, and diversity of soil microbial life.

e) Efficient use of inputs

Many inputs and practices used by conventional farmers are also used in sustainable agriculture. Sustainable farmers, however, maximize reliance on natural, renewable, and on-farm inputs. Equally important are the environmental, social, and economic impacts of a particular strategy. Converting to sustainable practices does not mean simple input substitution. Frequently, it substitutes enhanced management and scientific knowledge for conventional inputs, especially chemical inputs that harm the environment on farms and in rural communities. The goal is to develop efficient, biological systems, which do not need high levels of material inputs.

Growers frequently ask if synthetic chemicals are appropriate in a sustainable farming system. Sustainable approaches are those that are the least toxic and least energy intensive, and yet maintain productivity and profitability. Preventive strategies and other alternatives should be employed before using chemical inputs from any source. However, there may be situations where the use of synthetic chemicals would be more "sustainable" than a strictly non-chemical approach or an approach using toxic "organic" chemicals. For example, one grape grower switched from tillage to a few applications of a broad-spectrum contact herbicide in the vine row. This approach may use less energy and may compact the soil less than numerous passes with a cultivator or mower.

f) Consideration of farmer goals and lifestyle choices

Management decisions should reflect not only environmental and broad social considerations, but also individual goals and lifestyle choices of the farmers and farming communities. For example, adoption of some technologies or practices that promise profitability may also require such intensive management that one's lifestyle actually deteriorates. Management decisions that promote sustainability nourish the environment, the community *and* the individual.

III. Sustainable Animal Production Practices

a) Traditional to modern

In the early part of the last century, most farms integrated both crop and livestock operations. Indeed, the two were highly complementary both biologically and economically. The current picture has changed quite drastically since then. Crop and animal producers now are still dependent on one another to some degree, but the integration now most commonly takes place at a higher level--*between* farmers, through intermediaries, rather than *within* the farm itself. This is the result of a trend toward

separation and specialization of crop and animal production systems. Despite this trend, there are still many farmers, particularly in the developing countries like, located in the South Asia, that integrate crop and animal systems--either on dairy farms, or with range cattle, sheep or hog operations.

Even with the growing specialization of livestock and crop producers, many of the principles outlined in the crop production section apply to both groups. The actual management practices will, of course, be quite different. Some of the specific points that livestock producers need to address are listed below.

b) Management Planning

Including livestock in the farming system increases the complexity of biological and economic relationships. The mobility of the stock, daily feeding, health concerns, breeding operations, seasonal feed and forage sources, and complex marketing are sources of this complexity. Therefore, a successful ranch plan should include enterprise calendars of operations, stock flows, forage flows, labor needs, herd production records and land use plans to give the manager control and a means of monitoring progress toward goals.

c) Animal Selection

The animal enterprise must be appropriate for the farm or ranch resources. Farm capabilities and constraints such as feed and forage sources, landscape, climate and skill of the manager must be considered in selecting which animals to produce. For example, ruminant animals can be raised on a variety of feed sources including range and pasture, cultivated forage, cover crops, shrubs, weeds, and crop residues. There is a wide range of breeds available in each of the major ruminant species, i.e., cattle, sheep and goats. Hardier breeds that, in general, have lower growth and milk production potential, are better adapted to less favorable environments with sparse or highly seasonal forage growth.

d) Animal nutrition

Feed costs are the largest single variable cost in any livestock operation. While most of the feed may come from other enterprises on the ranch, some purchased feed is usually imported from off the farm. Feed costs can be kept to a minimum by monitoring animal condition and performance and understanding seasonal variations in feed and forage quality on the farm. Determining the optimal use of farm-generated by-products is an important challenge of diversified farming.

e) Reproduction

Use of quality germplasm to improve herd performance is another key to sustainability. In combination with good genetic stock, adapting the reproduction season to fit the climate and sources of feed and forage reduce health problems and feed costs.

f) Herd Health

Animal health greatly influences reproductive success and weight gains, two key aspects of successful livestock production. Unhealthy stock, waste feed and require additional labor. A herd health program is critical to sustainable livestock production.

g) Grazing Management

Most adverse environmental impacts associated with grazing can be prevented or mitigated with proper grazing management:

- First, the number of stock per unit area (stocking rate) must be correct for the landscape and the forage sources. There will need to be compromises between the convenience of tilling large, unfenced fields and the fencing needs of livestock operations. Use of modern, temporary fencing may provide one practical solution to this dilemma.
- Second, the long-term carrying capacity and the stocking rate must take into account short and long-term droughts. Properly managed grazing significantly reduces fire hazards by reducing fuel build-up in grasslands and brush lands.
- Finally, the manager must achieve sufficient control to reduce overuse in some areas while other areas go unused. Prolonged concentration of stock that results in permanent loss of vegetative cover on uplands or in riparian zones should be avoided. However, small-scale loss of vegetative cover around water or feed troughs may be tolerated if surrounding vegetative cover is adequate.

h) Confined Livestock Production

Animal health and waste management are key issues in confined livestock operations. The moral and ethical debate taking place today regarding animal welfare is particularly intense for confined livestock production systems. The issues raised in this debate need to be addressed.

Confinement livestock production is increasingly a source of surface and ground water pollutants, particularly where there are large numbers of animals per unit area. Expensive waste management facilities are now a necessary cost of confined production systems. Waste is a problem of almost all operations and must be managed with respect to both the environment and the quality of life in nearby communities. Livestock production systems that disperse stock in pastures so the wastes are not concentrated and do not overwhelm natural nutrient cycling processes have become a subject of renewed interest.

IV. The Socio-Economic & Political Context of Sustainable Agriculture

a) Commitment to change

In addition to strategies for preserving natural resources and changing production practices, sustainable agriculture requires a commitment to changing public policies, economic institutions, and social values. Strategies for change must take into account the complex, reciprocal and ever changing relationship between agricultural production and the broader society.

The "food system" extends far beyond the farm and involves the interaction of individuals and institutions with contrasting and often competing goals including farmers, researchers, input suppliers, farm workers, unions, farm advisors, processors, retailers, consumers, and policymakers. Relationships among these actors shift over time as new technologies spawn economic, social and political changes.

A wide diversity of strategies and approaches are necessary to create a more sustainable food system. These will range from specific and concentrated efforts to alter specific policies or practices, to the longer-term tasks of reforming key institutions, rethinking economic priorities, and challenging widely-held social values. Areas of concern where change is most needed include the following.

b) Food and agricultural policy

In most of the Third World countries, existing federal, state and local government policies often impede the goals of sustainable agriculture. New policies are needed to simultaneously promote environmental health, economic profitability, and social and economic equity. For example:

- Commodity and price support programs could be restructured to allow farmers to realize the full benefits of the productivity gains made possible through alternative practices.
- Tax and credit policies could be modified to encourage a diverse and decentralized system of family farms rather than corporate concentration and absentee ownership.
- Government and land grant university research policies could be modified to emphasize the development of sustainable alternatives.
- Marketing orders and cosmetic standards could be amended to encourage reduced pesticide use.
- Coalitions must be created to address these policy concerns at the local, regional, and national level.

c) Land use

Conversion of agricultural land to urban uses is a particular concern in both developed and developing countries, as rapid growth and escalating land values threaten farming on prime soils. Existing farmland conversion patterns often discourage farmers from adopting sustainable practices and a long-term perspective on the value of land. At the same time, the close proximity of newly developed residential areas to farms is increasing the public demand for environmentally safe farming practices. Comprehensive new policies to protect prime soils and regulate development, in developed and developing countries are needed to be introduced. By helping farmers to adopt practices that reduce chemical use and conserve scarce resources,

sustainable agriculture research and education can play a key role in building public support for agricultural land preservation. Educating land use planners and decision-makers about sustainable agriculture is an important priority.

d) Labour

In some of the developed and most of the developing countries, like India and Pakistan, the conditions of the farmers and agricultural labor are generally far below accepted social standards and legal protections in other forms of employment. Policies and programs are needed to address this problem, working toward socially just and safe employment that provides adequate wages, working conditions, health benefits, and chances for economic stability. The needs of migrant labor for year-around employment and adequate housing are a particularly crucial problem needing immediate attention. To be more sustainable over the long-term, labor must be acknowledged and supported by government policies, recognized as important constituents of land grant universities, and carefully considered when assessing the impacts of new technologies and practices.

e) Rural Community Development

Rural communities in all the South Asian countries are currently characterized by economic and environmental deterioration. Many are among the poorest locations in the nations. The reasons for the decline are complex, but changes in farm structure have played a significant role. Sustainable agriculture presents an opportunity to rethink the importance of family farms and rural communities. Economic development policies are needed that encourage more diversified agricultural production on family farms as a foundation for healthy economies in rural communities. In combination with other strategies, sustainable agriculture practices and policies can help foster community institutions that meet employment, educational, health, cultural and spiritual needs.

f) Consumers and the Food System

Consumers can play a critical role in creating a sustainable food system. Through their purchases, they send strong messages to producers, retailers and others in the system about what they think are important. Food cost and nutritional quality have always influenced consumer choices. The challenge now is to find strategies that broaden consumer perspectives, so that environmental quality, resource use, and social equity issues are also considered in shopping decisions. At the same time, new policies and institutions must be created to enable producers using sustainable practices to market their goods to a wider public. Coalitions organized around improving the food system are one specific method of creating a dialogue among consumers, retailers, producers and others. These coalitions or other public forums can be important vehicles for clarifying issues, suggesting new policies, increasing mutual trust, and encouraging a long-term view of food production, distribution and consumption.

Self-Answering Questions

Q. 1 Discuss the status of the agriculture since World War II, focusing on the transition from Traditional to Modern Farming Systems?

Q, 2 discuss the nature, rise and effects of the Green Revolution Agriculture?

Q. 3 what were the factors resulting in the transition toward Sustainable Agriculture?

Q. 4 Discuss the Philosophy, Basic Concepts, Goals, Elements and Practices of Sustainable Agriculture?

Q. 5 Define Sustainable Agriculture and list out the key elements of Sustainable Agriculture?

Q. 6 what are the main Goals of Sustainable agriculture?

Q.7 Discuss and elaborate the following:

v) Appropriate use of Natural Resources in Farming,

vi) Sustainable Plant Production Practices,

vii) Sustainable Animal Production Practices, and

viii) The Economic, Social and Political Context.

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UNIT 6

SUSTAINABLE FORESTRY MANAGEMENT

Unit Introduction

Forests, like many natural resources, are improved through use if certain basic principles are followed. More mature trees, with slow growth, should be harvested and replace with younger rapidly growing trees, to maintain a high level of forest productivity. Over-mature trees also become susceptible to disease and insect attacks, which further reduces forest productivity. Since the variety of life or biodiversity is maximized in old forests, however, there is a case for preservation of representative communities.

The essential biological requirement for sustainable forestry is the regeneration and nurturing of a new crop of trees as quickly as possible after the harvest. The basic institutional requirement is clear and enforceable property and use rights. For management plan in terms of a conservation strategy, it is important to distinguish forests both physical type and ownership- whether by individuals, the community or the government. Therefore it is important to increase awareness and thereby muster the community and political support for sustainable development of forestry resources.

Unit Objectives

After studying this unit the students will learn about:

1. Different types of forests,
2. What are the common forest conservation practices? and
3. The idea of sustainable development of forest resources

6.1 Forest Management

The wise management of forests is a major environmental priority. Many new plans and programs have been proposed, especialy for tropical forests. The management of forests is called **silviculture.** As explained earlier, a major goal of forest management is sustained yield, some forests are managed like mechanized farms A single species is planted in straight rows, and the land is fertilized, sometimes by helicopter. Modern machines make harvesting rapid some remove the entire tree, root and all, intensive management such as this is characteristic of Europe and parts of the northwestern United States. Other forests, such as those of New England, are managed less activity. In these regeneration takes place from seeds from existing trees, an ecological succession follows. What approach is best depends on the type of forest, the environment, and the characteristics of the commercially valuable species.

Approximately 25 percent of the world's forests are managed scientifically for wood production. Forest management involves planning for sustainable harvests, with particular attention paid to forest regeneration. Aside from human use, what are some factors that contribute to forest loss? Fires, insects, and diseases damage up to one quarter of the annual growth in temperate forests. Recently, reduced forest growth and sudden die off of certain tree species in industrialized countries have caused great concern. It is though that on grange transport of air pollutants is contributing to this sudden forest death, but not all the causes and solutions are yet understood.

6.1.1 Reforestation

As the original forests of the world are cut and the need for timber increases, it is important to plant new trees and develop programs in reforestation. There are many international and national efforts for reforestation. Most countries with a significant amount of economic forestry have such programs. Many private forestry corporations plant trees and reforest areas they have cut. One of the largest of these programs, global ReLeaf, is conducted by American Forests, the oldest conservation organization in the United States. The World Bank has a reforestation program with 48 projects in different nations. In chiha, 700,000 farmers have cooperated to plant a green wall to protect crops a shelterbelt of trees 100 m (328 ft) wide and 2400 km (1500-mi) long. Although impressive, such programmes are small compared to the rate of forest cutting.

Most countries replant far less forest than is harvested or converted to other uses, but there are some outstanding examples of its forests one thousand years ago and has suffered centuries of erosion and terrible floods as a consequence. Recently, however, a massive reforestation campaign has been started. An average of 4.5 million hectares per year were replanted during the last decade. South Korea also has had very successful forest restoration programs. After losing nearly all its trees during the civil war 30 years ago, the country is now about 70% forested again.

In spite of being the world's largest net importer of wood, Japan has increased forests to approximately 68 percent of its land area. Strict environmental laws and constraints on the harvesting of local forests encourage imports so that Japan's forest are being preserved while it uses those of its trading partners. It is estimated that two thirds of all tropical hardwoods cut in Asia are shipped to Japan.

Many reforestation projects involve large plantations of single species single use intensive cropping called monoculture agro forestry. Although this is an efficient approach, high density of a single species encourages pest and disease infestations. High levels of pesticides and herbicides often are required to protect monocultures. This type of management lends itself to clear-cut harvesting, which saves money and labour but tends to leave soil exposed to erosion. Monoculture often requires higher fertilizer inputs than does a mixed species forest. Where profits from these agro forest projects to absentee landlords or government agencies, local people have little incentive to prevent fires or keep grazing animals out of newly planted areas. In some countries, such as the Philippines, Israel, and El Salvador, government reforestation projects have been targets for destruction by antigovernment forces, with devastating environmental impacts.

Very promising alternative reforestation plans are being promoted by conservation and public service organizations such as The New Forest Fund and Oxfam. These groups encourage people to plant community woodlots of fast growing, multipurpose trees such as Leucaena. Millions of seedlings have been planted in hundreds of self-help projects in Asia, Africa, and Latin America. Leucaens is a legume, so it fixed nitrogen and improves the soil. Its nutritious leaves are good livestock fodder. It can grow up to 3 meters per year and quickly provides shade, forage for livestock, firewood, and good lumber for building. A well-managed Leucaena woodlot can yield up to 50 tons per hectare on a sustained basis. Community woodlots can be planted on wasteland or along roads or slopes too steep to plow so they do not interfere with agriculture. They protect watersheds, create windbreaks, and also provide useful food and forest products such as fruits, nuts, mushrooms, or materials fore handicrafts on a sustained yield basis.

6.1.2 Managing with and for fire

For much of the twentieth century, it was the practice to try to suppress all fibers. However, people have come to realize that some tree species and some forest animals depend on fire and grow only in areas that have burned. Areas with very great danger of forest fires, such as Yellowstone National Park, may best be managed through the intentional introduction of frequent light fires, which clear the ground of fuel and prevent conditions that lead to the fires that destroy homes, property, and life.

Prescribed fire, also called controlled burning, is becoming increasingly common. In the southeastern United States, prescribed fire is used on about 1 million ha (2.5 million acres) annually. Study of the practice suggests that it has no significant effect on soil, nutrient cycling, or water low from the forests, but reduced risk from wildfires, controls certain tree diseases, increases food and habitat for wildlife, and can be used to manage the forests for greater production of desirable tree species.

6.1.3 Shorter rotation times

In older, traditional forestry, rotation times were long a century or more, in recent years; however, there has been an increasing emphasis on shorter and shorter rotation times. In some cases, where seedlings are harvested for paper pulp-- which requires wood fibers, not actual timber the rotation times is as short as 10 years. Such very short rotations can be hard on the soil and the forest ecosystem. Each cut results in some erosion and soil loss, especially when heavy machinery is used. Artificial fertilization also becomes necessary in this case.

6.1.4 Old growth and biological conservation

Some of the most hotly disputed forest issues concern the conservation of old growth forests (in spite of the lack of precision about the term). This has become a major debate in the northwestern United States as well as in discussions of tropical rain forests. The issue is particularly acute in the Pacific Northwest. Trees there live a very long time and are famous for their large size, and forests can take centuries to develop. For example, the Douglas fir, an important commercial timber species, lives more than 600 years and can grow more than 61 m (200 ft) high.

Coastal redwood is well known for its ability to live thousands of years and to reach more than 61 m (200 ft) in height. When a previously uncut stand is clear cut, a forest stand is eliminated that may take 500 to 1000 years to regenerate. These unique forests of the Pacific Northwest are appreciated for their beauty and as habitats for many species of plants and animals. The old growth stands, however, also provide the best timber. As the percentage of original forest declines, disputes over how to use and conserve remaining old growth increase. One difficulty in resolving this issue is the lack of direct legislation concerning virgin forest and old growth stands. As a result, the disputes are reduced to surrogate issues, such as the conservation of specific endangered species whose habitats lie within these forests.

6.2 Productivity Management

The productivity of a forest varies according to soil fertility, water supply, and local climate. Foresters classify sites by site quality, which is the maximum timber crop the land can produce in a given time. Site quality can decrease with poor management, For example; too frequent burning of forests decreases the potential for tree growth by lowering soil fertility. Foresters develop site indexes for types of forestlands and derive yield tables to estimate future production. "The management of forests can involve removing poorly formed and unproductive trees (or selected other trees) to permit larger trees to grow more rapidly, planting genetically controlled seedlings, and fertilizing the soil. Forest geneticists breed new strains of trees just as agricultural geneticists have bred new strains of corn, wheat, tomatoes, and other crop plants, new super trees are supposed to be able to maintain a high rate of growth and increase the total production of forests.

There has been relatively little success in controlling diseases in forests. Managers attempt to protect trees from disease and insect infestations. Insect outbreaks tend to occur infrequently, but when they do they can have

devastating results, Some insect problems are due to introductions of exotic species The gypsy moth was introduced intentionally into New England around the turn of the century as a source of silk, but it escaped and has spread through many eastern states. A plague of loathsome worms" that removed all the leaves from large areas of forest. Insects affect trees by defoliating them, by eating the buds at the tops of the trees and destroying a straight form (destroying the main trunk of the tree, causing a forked Growth), by eating fruits, and by serving as carriers of diseases. Herbicides are sometimes used to combat these insects. Tree diseases are primarily fungal. Often, as with the Dutchelm disease, an insect spreads the fungus from tree to tree.

Forests are complex and difficult to manage. However, trees provide many kinds of easily obtained information that can be of great assistance in management. The age and growth rate of trees can be measured from tree rings; in temperate and boreal (northern) forests, trees produce one growth ring per year, and a tree can be aged by counting the number ofrings.

It is important for silviculturists to take an ecosystem approach to management, because the success of trees depends on soil, climate, competition, and the abundance of parasites and herbivores– on ecosystem and ecological community processes. One way in which an ecosystem approach is taken in forest management is in the use of the concept of ecological succession the process of development of an ecosystem over time explained in component of an ecosystem over the time. Some forests are managed for early successional species, and other are managed for late successional specie. For example, in northern forests such as those in Canada, useful species include aspen, birch, and pine, all of which are early successional. For these, rotation times are comparatively short – less than a century. In contrast, oaks in Germany or maples in the eastern united States are late success ional species, Forests of these species, which are used to make furniture, must be managed for a long rotation time, or cutting must be done very selectively so that the forest ins never opened up greatly.

6.2.1 Clear-cutting and its alternatives

Clear-cutting is the practice of cutting all trees in a stand at the same time. Alternatives to clear-cutting are **selective cutting** and **strip cutting.** In selective cutting individual trees are marked and cut. Sometimes, smaller, poorly formed trees are selectively removed. This practice is called thinning. At other time's trees of specific species and sizes are selectively removed. For example, some forestry companies in Costa Rica cut only some of the largest mahogany trees, leaving other, less valuable trees to help maintain the ecosystem, and permitting some of the large mahogany trees to continue to provide seeds for future generations.

In strip cutting, narrow rows of forest are cu, leaving wooded corridors, Strip cutting offers Several advantages, The uncut strips protect regenerating trees from wind and direct sunlight, an these remaining trees provide seeds, in addition, strip cutting can minimize the negative aesthetic effects of logging by leaving buffer zones and allowing the corridors of forest that remain to be used for recreation and as wildlife habitats.

Experimental tests of clear-cutting

Scientists have tested the effects to clear-cutting. For example, in the U.S. Forest service Hubbard Crook experimental forest in New Hampshire an entire watershed was clear-cut and herbicides were applied to prevent regrowth for 2 years. The results were dramatic. Erosion increased, andthe pattern of water runoff changed substantially. The exposed soil decayed more rapidly. And the concentrations of infiltrates in the stream were exceeded public health standards.

Recognizing factors that should be taken into account, some scientists have begun to call for a new forestry that uses a variety of practices to increase the likelihood of sustainability, including recognition of the dynamic characteristics of forests and of the needs for management with in an ecosystem context.

6.3 Community Forestry

In many parts of the world, people cut nearby forests to meet the needs of small communities. This is particularly true in the developing nations, where, as noted, the use of firewood for fuel constitutes up to half or more of all energy used. In the past, most government forestry departments concentrated their efforts on government owned forest land or acted merely to police a country's forests. Now there is a realization that this approach must change. In some countries, there is a new emphasis on community forestry, in which professional forests help villagers develop woodlots with the goal of achieving some kind of sustainable local harvest to meet local needs. The FAO and the World Bank are supporting these programs. For example, in Malawi, Africa, a World Bank and FAO project sponsors reforestation in which almost 40% of the houses holds have planted trees. In South Korea, villagers have been reforesting the country at the rate of 40,000 ha/year (89,840 acres/year).

In community forestry, good management practices include limiting access; cutting the slower growing and poorer burning species first to promote the growth of the better firewood species; making use of plantations; and supplementing firewood with other, more easily renewable fuels. However, some of these practices are in conflict with local, traditional activities or are difficult to implement for other reasons.

Such community efforts, like other reforestation projects, are impressive. Again, however, in total, they have only a small effect on the problem of the worldwide shortage of firewood. It is not clear whether developing nations can implement a successful management policy in time to prevent serious damage to their forests and the land. If alternative fuels for developing nations cannot be found, the effects will be severe not only for the land, but for the people.

6.3.1 Community participation and joint management

Active community participation is only possible if the communities are organized and given a stake in the use of forests.

- Active community participation in forest management and conservation should be sought;

- A major effort is required to develop laws, partnership protocols, forestry methodologies, etc. to support Joint Forest Management. An over focus on JFM will help to integrate FDs more effectively into the "second wave" of participatory forest projects-but this focus must include mechanisms for learning form past experience.

- Village organizations should be strengthened or if absolutely necessary created for natural resources management. Responsibility for managing natural forests should be developed to these organizations. If possible, the government should legally incorporate these organizations as village governments. However, FDs will need the capacity to support and monitor local organizations.

- Development of capacity for sustainable land use planning at the village level. This is a prerequisite to the sustainable land use strategy that is needed in each province, and which should focus on integrated natural resource management with a particular emphasis on poverty alleviation.

- Government procedures for sharing forest management information with communities, and for efficiently handling royalty payments to communities, need to be improved, to reduce communities' vulnerability to unscrupulous timber contractors.

6.4 Farm Forestry

The contribution of irrigated farmlands to timber and fuel wood production is currently estimated at 80 percent. There is growing emphasis on the farm and agro forestry for meeting the increasing needs of industry and subsistence use. In view of this suggestions for farm forestry are:

- Consultations between important stakeholders including the farmers, the agriculture department, on farm water management and the forestry department.

- Census of tree stocks and growth on farm lands, as part of the agricultural census.

- Integrated research into farm forestry, to optimize commercial tree and food yields.

- Preparation of outreach materials that are specific to different agro-ecological zones.

- Encouragement of farm forestry association as "user group" analogues to village organizations.

6.5 Logging and Forest Industries

The experience of the management of logging operations, through either contractors or state enterprises, has not been very encouraging. Since forestry operations should also generate local employment opportunities, it is suggested that:

- Large scale state logging enterprises should phase out direct harvesting. Instead, they should build the capacity of local communities for co management.

- Development of small scale wood based processing industries should be encouraged alongside the various efforts to encourage community afforestation and forest (co-) management, to serve as a commercial incentive fore forestry; however, communities need also to take full responsibility for forest protection.

6.5.1 Wood product imports

Given high local prices in contrast to international prices, there are still incentives to cut wood from forests in Pakistan. Yet most of Pakistan's natural forests would be better suited to producing the non-wood goods and services that are also scarce and often cannot be substituted by imports.

More research is needed on the overt and covert barriers to imports. Dismantling these barriers would clearly help wood consumers, although it would obviously hurt royalty earners, concessionaries and forest industry. Further, the removal f such barriers would enable a re-analysis of the extent to which Pakistan actually has a comparative advantage in wood production. This in turn should lead to a reassessment of just what types of forestry activities should be promoted. It could be imagined, for example, that this might entail an increased emphases on woodfuel production versus timber production. At the same time, liberalization of markets for fuels that might compete with woodfuel would also serve to alleviate pressure to undertake major changes in forest management. Liberalization may assist in breaching the timber 'mafia' by lowering their implicit profit margin. It is assumed that attempts by the 'mafia' to pass such cuts on the royalty holders would only serve to raise questions about the existing system, questions that they would prefer to leave unasked.

6.6 Need for Sustainable Forest Management Policy

We cannot offer detailed policy recommendations, as these have to be generated by the processes recommenced in section 7.2 nonetheless, from out analysis in Section 4 to 6, we can provide some thoughts on the possible contents of future policies.

6.6.1 Objectives of forest management

The full range of forest benefits has never been assessed and, therefore, forest continue to be managed mainly for revenue from sale of timber and fuel wood. Policy recommendations should refine the objective of forest

management. We cannot be explicit about what these objectives might be, prior to improved information and consultation. But the following is likely:

- Production of timber and fuelwood should not be the primary objective of the natural forests. They should be managed to maximize the ecological benefits of biodiversity conservation, watershed regulation and mitigation of climate change;

- To meet timber needs, emphasis should be on farm forestry and plantations in the irrigated areas, and a limited area of those upland forests that can be managed without environmental damage

Targets such as 25 percent forest cover are totally unrealistic, and irrelevant to real demands for forest products. A consideration of such demands would point to the importance of farm forestry and irrigated plantation for construction timber, participatory forestry (in the context of integrated rural development) for livelihood needs and securing the protection of key biodiversity forests and erosion prone watersheds and other fragile areas. Such a focus on goods and services will result in more sustainable objectives than a focus on forest area alone. Only once these fundamental national and provincial objectives are defined (through processes suggested in section 7.2) can FD procedures and decentralization be effectively decided.

6.7 What Need to Be Done

The first step could be to document and learn from the "best practices" available in the country. For example, documenting and learning from the recent NWFP (Pakistan) experience with policy and institutional reform could be rewarding.

The second step could be the establishment of multi stakeholder forest for a, initially at provincial and federal levels. These would put a premium on open and frank discussion, and in commissioning high quality, independent policy analyses. Institutionalizing the use of forest resource accounting in informing and reviewing policy could be done in parallel with this.

The third parallel step could be to strengthen village organizations that should be entrusted with the responsibility of forest management, and to further the very promising recent developments in enabling legislation and governmental support service for joint forest management in all of this work linking Forest Departments more effectively with local institutions.

All of these steps could be done on a pilot basis, in one region or more provinces but with much provision for monitoring and review. Once the results are made available to a wider audience, the pilot could be replicated in other parts of the province and later, the country. However, replication would require a careful assessment of the conditions especially those concerning use rights and tenure that explain success.

These are interesting times in the recent history of Pakistan's forests. We are beginning to move from an era of deforestation, towards one of investment in forest management and aforestation. Awareness of the forestry problems and potentials is growing, but new regulations and incentives, and more

supportive forestry institutions are needed to ensure stakeholders can make the transition to sustainable forest . management. One thing is now abundantly clear; things have to change. The authors, and a great majority of the many people consulted in the course of this study, believe that the time is "now or never"

6.7.1 Harvesting All Parts of the trees

The technology used in cutting trees greatly affects the ecosystem. Traditional timber harvesting removes only the main stems and largest branches of the trees-those parts with the straightens, most valuable timber, The stem wood is composed mainly of carbon, hydrogen, and oxygen, all readily available to the forest even when the timber is harvested, The remaining parts-leaves, bark, small stems, and roots-stay behind in the forest and contain the gulf of the chemical elements necessary for life.

Modern earth-moving machinery makes it possible to remove all aboveground parts of a tree, much of which are chipped into small fragments for making paper. This practice is called Whole tree harvesting. Other machines remove roots and, thus even more of the valuable nutrients from the forest. This technique can produce more wood fiber per unit technique can produce more wood fiber per unit technique can produce more wood fiver per unit technique can produce more wood fiver per unit areas, but the benefit is short-term. In the long run, these practices are detrimental to the forest. Whole-tree harvesting over long periods requires the addition of considerable amounts of fertilizers to replace the lost chemicals.

The change from primary objective of revenue maximization to multiple objectives ranging from conservation management to development of local organizations for forest management has profound consequences across the forestry sector. The debate about decentralization is by no means confined to the developing world but is live in every country.

6.7.3 Decentralization

The implementation of decentralization process has brought issues of ownership and control to the forefront of debate. In forestry, the historical development of state control over forestlands has meant that the land base held in trust by the institution for the public good is enormous. The following statistics provide an indication of the extent of forestry estates in Asia, In India, Forest Departments control 22% of the national territory in Nepal forests and shrub lands comprise some 4/3% of the total land area. In Indonesia, 74% of the territory is controlled by the Forest Department; and in Thailand, the Royal Forest Department administers some 40% of the nation's land. These extraordinary figures underline the fundamental challenge posed to these departments by the call for devolution of some of this control to the millions of people living in forest areas. The means by which this is being done needs considerably more analysis and the form of the linkages between state and people needs to be critically assessed.

At one extreme of the public to private sector continuum lies the example of New Zealand Forest Department, where probably one of the most for-reaching restructurings of the sector has occurred. Here, the forest service

was abolished and separate organizational structures were established. This deconstruction of a monolithic organization in favour of several discretely functioning units has been one mechanism to cope with the conflicts of multiple objective management engendered within one organization. The major reasons, which led to the restructuring of the New Zealand Forest Service, were an inability to provide the transparent accountability for the mix of function. By identifying and separating out these objectives and forming destine organizations each with primary responsibility for a major objective, conflicts become public (i.e. intra-departmental wrangling is more visible than intra-departmental disputes). Such an approach may also recommended for South Asia. Demarcation of territorial responsibility and therefore also accountability is easier to attribute. As such, the advisor and regulatory functions are the responsibility of a Ministry of Forestry Conservation, a subject which has frequently brought forestry professionals into conflict with environmentalists, and which is considered by many to be irreconcilable with practice of commercial forestry, has been assigned to a Department of conservation (primary responsible for natural forest conservation). The state-owned forestry Corporation was made responsible for commercial, plantation resource-based forestry activities. In addition, the great power base of a forest service – its land- has also been largely privatized.

The strong message that emerges from the New Zealand experience is that there is no blue-print for institutional change; the structure of organizations necessary to meet international, national and local imperatives must emerge from the particular circumstance of each nation. The principle of decentralization, although global, does not necessarily lead to a globally uniform response. These responses are discussed in detail in Chapter 7, where the implies is of the transition for public to private sector operation and the degree to which divestment can and should occur are assessed for Nepal and India.

6.8 The Development Sustainable Forestry Context: South Asia

South Asia has been witness to a series of dramatic experience in the participatory management of forest resources, Since the 1970s social and community forestry programmes in both India and Nepal have attempted to transform the relationship between a powerful state bureaucracy and local people directly dependent on forest resources. These programmes represent the realization that a large proportion of the population depends heavily on forest resources for subsistence, energy, nutrition, income and the maintenance of farming systems. They acknowledge the failure of traditional custodial management of forests by government to halt the loss an degradation of t sub-continent's forests, without the active participation of local communities.

The inadequacy of government based approaches to forest protection and management led to the search for alternatives, and experimentation with a number of approaches. These can generally be classified into social forestry farm forest, community forest, joint forest management and rural development forestry. In this Guide, the umbrella tem used to refer to all these approaches is participatory forestry, accepting the diversity of

interpretations of participatory. Although as some have contended the use of the word participatory is probably more problematic than some of the more clearly focused terms such as collaborative or as Johnson suggests, good forest management it is used here, however, because the breadth of interpretation associated with it is one of the main characteristics that this Study guide explores.

The earliest mention of social in forestry was in India where several States pioneered tree=growing programmes outside the traditional forest boundaries. For example, in India, the State of Gujarat in 1970 set up a community Forestry Wing in the Forest Department and Tamil Nadu Started a tree-planting programme for local employment generation on tank foreshores and village wastelands as clearly as 1956, After 1973 half of the proceeds from these plantations were given to local panchayats (the lowest unit of local government administration) and local people were allowed to collect fodder from the plantation areas. Under some interpretations of social forestry it could be considered that its formal origins lie in government programmes of the late nineteenth century where village forests were demarcated. However under other interpretations this would be considered to have been a programme of removal of local people's rights to manage forests. Indeed many commentators in both India and Nepal would assert that participatory forestry has been implemented, informally and unrecognized, by local people over many decades and generations, and that the so-called new approaches are merely reproducing (often badly) indigenously derived systems of forest management.

Thus, by the early to mid-1980s it is was possible to make some assessments of the social and community forestry programmes dichotomy of understanding the meaning of 'social' in social forestry has interesting and long-running consequences for participatory forestry. In the early years of external funding was given on the basis of poverty alleviation where forestry was seen to e the appropriate entry point to reach the more marginal groups in society. However, as evidence from India indicates this ideal was far from realized through the social forestry programmes and in many instances poorer groups ere dispossessed from the land they had been using, particularly those groups whose livelihoods were dependent on access to grazing lands. The mix of objectives ascribed to social forestry doomed the programme to difficulties form the outset, with a multiplicity of target groups to be reached but only one model – that of woodlots.

Although there is evidence to indicate that farm forestry in certain parts of India proved to be immensely successful in the initial stages, as demonstrated by the demand for seedlings which for outpaced projects or supply private tree growing on a large scale was confined to parts for North-western India, Gujarat and Karnataka, resulting in locdized over-production of poles and a consequent depression in prices, Perhaps because of falling prices and local surpluses, the initial boom in farm forestry has slowed.

Reviews of social forestry programmes, which had objectives of developing the common property resource, have been far less positive, one of the common factors identified in tier failure was the absence of people's participation in planning and management, which led to poor survival rates and the reluctance of community institutions to take over responsibility for the management of plantation. Furthermore, even though both these

programmes shared the common objective of reducing pressure on forest lands through crating alternative sources of fuel, fodder and forest products. degradation still continued. The intense focus of funds and energy on private and common lands in India redirected attention away from investment and management of natural forests. It is this background that led to the emergence of a fundamentally new practice – community forestry in Nepal by local people, or joint forest management, as it is known in India, involving local people actively in the protection and management of state forest lands, While community forests are being managed in Nepal, joint forest management arrangements are being explored in India between local people an State Forest Departments, in the process many self-initiated and indigenous forest management systems are being documented and are gaining recognition. Social forestry and farm forestry were the first new practices in recent history to bring foresters out of the forest and into the villages and farms of the people who are the forests primary users, New community forestry programm3es seek to ago to stop further, recognizing the role of these users in the management of natural forests – bringing the people back into the forests.

In a workshop to exchange experience between practitioners of social and community forestry in India and Nepal the outcome suggested that, although there were many similarities in experiences, there were also some major differences In many cases, failures in one country were mirrored at a later date in the other indicating that although these two notions may have many points of interaction there has been little or no sharing of experiences in the forestry sector. It is estimated that over $2 billion has been invested by donors alone on these programmes over the last 15 years. National and state forest Departments are now allocating or re-directing substantial funds, often with large donor assistance, for community/joint management. Yet these new forestry experiments are still evolving, and their focus on local institutions and equity make them more process-oriented, and less amenable to rigid target-based development planning. People's participation, reorientation and training of forest staff, building local0level institutional participatory micro planning, equitable benefit sharing, and gender-sensitive programming have all become new development imperatives. Community forestry in Nepal and joint forest management in India are beginning to take on these challenges in different ways.

The essence of current changes in forest management in both Nepal and India lies in the attempt to shift control and management of forestland form centralized Forest Departments to decentralized people's organizations. The historical background and legal basis to the two programmes are unique to each country although they do share certain similarities (particularly in recent years with the new hegemony of aid programmes. The types of community institution though they are still evolving and share many features, are distinct and differ between countries and within states in India. The nature and extent of the shift of control from State/national to local/ community level also differs considerably. It is in the implementation at various levels that a greater degree of overlap exists, although the sequence of planning and owner shop of management varies significantly. Ironically, the programmes in both countries have focused more attention on initiating community protection (India) or simple operational plans (Nepal) than on making the more dramatic shift to active co-operative forest managing and to addressing the technical social and economic issues which accompany such

a transition Many of the problems, faced by both countries, are therefore very similar.

Useful Forestry Terms

Forestry calls an area of forest a stand, and they classify stands on the basis of tree composition. The two major kinds of commercial stands are **even-aged stands,** where all live trees began growth from seeds and roots planted in about the same year, and **uneven-aged stands,** which have at least three district age classes.

In even-aged stands, trees differ in height, girth, and vigor. A forest that has never been cut is called a virgin forest; one that has never been cut is and has regrown is called **second growth. Old growth,** a term that has gained popularity in several well-publicized disputes about forests, is not a scientific term and does not yet have an agreed on, precise meaning. In popular usage it often refers to virgin forest. Anoth4r important management term is rotation time, which as applied to forests, is the time between cuts of a stand, Trees are divided into the dominants (tallest, most common, and most vigorous), co dominants (fairly common, sharing the canopy or to part of the forest), intermediate (forming a layer of growth below dominants), and suppressed (growing in the undestroyed).

Unit Summary

The wise management of forests is a major environmental priority. Many new plans and programs have been proposed, especially for tropical forests. As explained in this unit, a major goal of forest management is sustained yield , some forests are managed like mechanized farms.

A single species is planted in straight rows, and the land is fertilized. sometimes, by helicopter. Modern machines make harvesting rapid some remove the entire tree, root and all, intensive management such as this is characteristic of Europe and parts of the northwestern United States. Other forests, such as those of New England, are managed less activity. In these regeneration takes place from seeds from existing trees, an ecological succession follows. What approach is best depends on thetype of forest, the environment, and the characteristics of the commercially valuable species.

The lesson learnt from this unit is that there is no blue-print for institutional change; the structure of organizations necessary to meet national and local imperatives must emerge from the particular circumstance of each nation. The principle of decentralization, although global, does not necessarily lead to a globally uniform response. These responses are the transition from public to private sector operation.

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UNIT 7

WATER RESOURCE MANAGEMENT

Unit Introduction

Water is marvelous substance, flowing, rippling, swirling around obstacles in its path, seeping, dripping, trickling and constantly moving from sea to land and back again. The earth is the only place in the universe where liquid water is present in substantial quantities. Water performs a number of direct and indirect functions in the ecosystem.

The unit deals with the management of major water resources, with greater emphasis on:

- Coastal resources and management
- Wetlands and their conservation
- Integrated aquaculture practices
- Irrigation management

Unit Objectives

After going through this unit students will be able to learn about the:

1. Importance of water resources (coastal, wetland, aquaculture and irrigational) in our life.
2. Major threats to these resources from human activities
3. Integrated Management practices to manage these resources effectively.

7.1 Introduction

Water is absolutely fundamental to life; it is difficult even to imagine a form of life that might exist without water. The earth is the only place in the universe, where liquid water exists in substantial quantities. Ocean lakes, glaciers and other bodies of liquid or solid water cover more than 70% of our world's surface. The total amount of water on our planet is immense.

The distribution of water often is described in terms of interacting compartments in which water resides for short or long times. Human concerns regarding water can be divided into two categories; quantitative and qualitative. Quantitative refers to such issues as, is there enough water to meet our needs? What are the impacts of diverting water from one point of the cycle to another? Qualitative refers to such issue as; is the water of sufficient purity so as not to harm human or environmental health?

Now lets take a glance on the resources associated with major water compartments, their problems and management.

7.2 Coastal Resources

Together the oceans contain roughly 97% of all the liquid water in the world. The ocean basins form a continuous reservoir, shallow and narrows between them reduce water exchange, so they have different compositions, climatic effects, and even different surface elevations. Some 60% of the world's population lives within 60km of the sea and the social, economic and environmental significance of the boundary between the land and the ocean is now widely recognized. The ecology of coastal lands and coastal waters provides numerous livelihood opportunities, encouraging concentrations of population and development activities in the coastal zone.

Over the last decade the management of coastal resource for their sustainable use has become a critically important issue for the South Asian region. Included among these resources are some of the most extensive mangrove areas in the Indian Ocean and also some of the world's least disturbed coral reefs. These coastal ecosystems have been subject to increasing exploitation particularly over the last 20 years. For example between 1975 and 1983 the area occupied by the Chakoria Sundarban mangroves in Bangladesh has been reduced by 60% through conversion to shrimp ponds. In the Maldives, over the same period, more than 200,000 m^3 of live coral was extracted for construction purposes and tourism increased by almost ten fold from 8,000 to 75,000. Such pressures in the tropical coastal zone are not unique and the decline in status of coastal ecosystems worldwide, as a result of non-sustainable use, has become an issue of major international concern.

A regional meeting of South Asian was held in November 1985 in the Maldives to identify options for a regional policy and action framework. In particular the meeting served to reinforce the South Asian Seas Action Plan in which delegates from member states outlined the following key activities needed in the region:

- Promotion of research and monitoring, and exchange and sharing of data and information among member States.
- Promotion of methods and practice for the management of human activities that safeguard environmental quality and utilize resources rationally and on a sustainable basis.
- Assessment and evaluation of causes, magnitude and consequences of environmental degradation

At the regional meeting, country delegates recognized four major anthropogenic influences affecting the coastal zone in South Asia. These were:

- sedimentation (from dredging, land derived run off and land reclamation);
- marine resource exploitation (sand, coral, mangrove, fisheries);
- pollution; and tourism.

The relative significance of each factor varies from country to country as shown in Table 1:

Table 1. Major anthropogenic influences (listed in order of importance) in the coastal zone of South Asian countries: as agreed at the 1995 ICRI meeting.

Sri Lanka	Maldives	India	Bangladesh	Pakistan
1. Sedimentation (land development and mangrove clearance)	1. Marine resource exploitation	1. Sedimentation (Poor land practice)	1. Marine resource exploitation	1. Marine resource exploitation
2. Marine resource exploitation	2.Sedimentation (from dredging)	2. Marine resource exploitation	2.Sedimentation (Mangrove clearance)	2. Pollution
3. Pollution	3. Tourism	3. Pollution	3. Pollution	3.Sedimentation (Mangrove clearance)
4. Tourism	4. Pollution	4. Tourism	4. Tourism	

7.2.1 Coastal Resource Management theory

South Asian countries apart from all having the coastlines bathed form Indian Oceans, these countries also share the problems of increasing population pressures and resultant increasing demands on the coastal zone, at a level which is almost unprecedented elsewhere in the world. These problems are further aggravated by the fact that coastal populations in South Asia include some of the poorest members of the community - artisanal fishermen, the landless and nomadic pastoralists. Because of the accessibility of the coast and its aquatic resources the coastal zone becomes a focus for settlement by poor people whose lot is not improved by non-sustainable use of resources. Population increases and the attraction of the coast for settlement by the poorest members of the community represent

considerable challenges to the countries of South Asia and to the sustainable exploitation of resources in the coastal zone. These challenges may be met, at least in part, by an **integrated management approach** to the use of coastal resource. Conventional sectoral management is not effective in addressing the complex management issues of the coastal zone. These issues are **cross-sectoral** in nature with the activity of one sector often adversely affecting the development of the others.

> The term integrated coastal management (ICM) is used to describe a continuous and dynamic process that unites government and the community, science and management, sectoral and public interests in preparing and implementing an integrated plan for the protection and development of coastal systems and resources (after GESAMP 1996).

ICM is a framework, which involves comprehensive assessment, setting of objectives, planning and management of coastal systems and resources, while taking into account traditional, cultural, and historical perspectives and conflicting interests and uses. It is an interactive and evolutionary process for achieving sustainable development and implementing a continuous management capability that can respond to changing conditions. ICM includes the following:

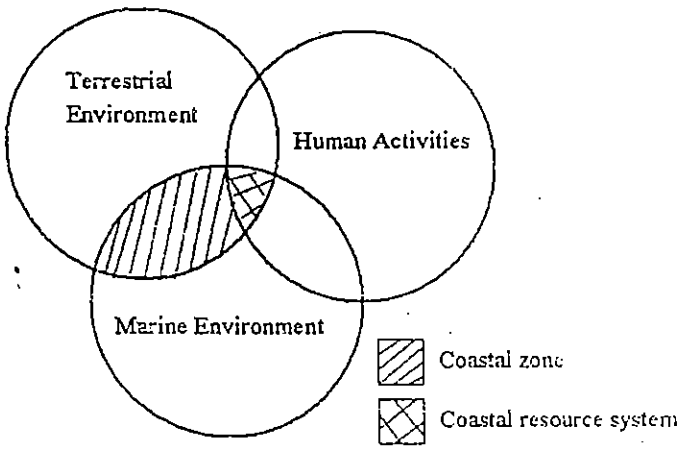
- Integration of programmes and plans for economic development, environmental quality management and land use
- Integration of programs for sectors such as food production (including agriculture and fishing), energy, transportation, water resources, waste disposal and tourism.
- Integration of all the tasks of coastal management from planning through to implementation, operation and maintenance, monitoring and evaluation performed continuously over time.
- Integration of responsibilities for various tasks of management among levels of government - local, state/provincial, regional, national, international and between the public and private sectors.
- Integration of available resources for management (i.e. personnel, funds, materials, equipment).
- Integration among disciplines (e.g. geomorphology, geochemistry, marine biology, economics, engineering, political sciences and law).

An in depth understanding of the functions of the coastal resource systems and their characteristics is fundamental to a better appreciation and application of ICM. Before describing such characteristics we should first attempt to define the coastal zone. They include the functional definition of 'that space in which terrestrial environments influence marine environments and vice versa'; the international legal definition of the 200 nautical mile limit from land over which coastal nations exert sovereignty (economic exclusive zone) and scientific definitions which depend on the nature and scale of the processes that characterize the land ocean boundary. For most

purposes the coastal zone represents an area of transition where terrestrial and marine environments interact to form unique environmental conditions. the coastal zone embraces inshore waters. intertidal areas and extensive tracts of land.

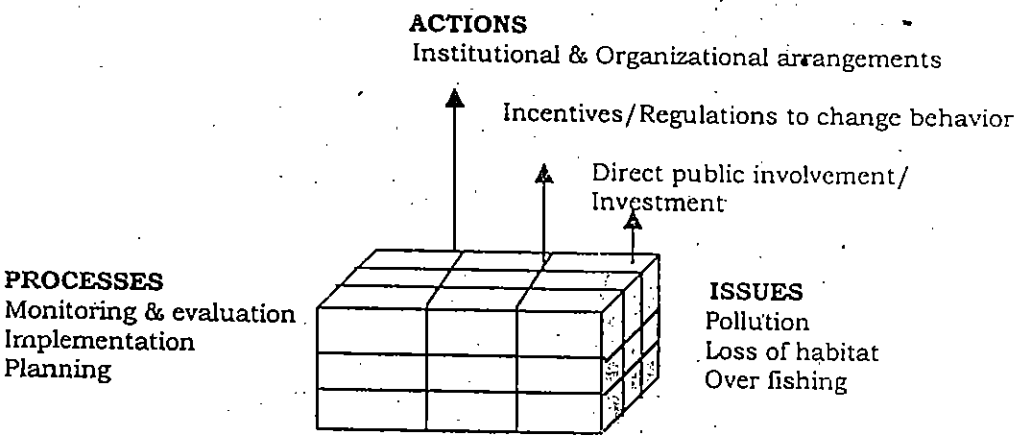
The definition will vary depending on the purpose for which it is used and we should view the concept of the 'Coastal Zone' as a means of focusing attention of the emergence of an innovative framework for planning and management to help make wise and sustainable use of resources. For example, the management boundaries for dealing with lowland flooding will be different from those considered for coral mining thus management boundaries need to be issue/problem-based rather than be rigidly defined. Although the coastal zone is an interface between land and sea. the area of real concern is that region where human activities are interlinked with both land and marine environments. This area has been defined as the coastal resource system in Figure 1.

Figure 1. Relationship between the coastal zone and the coastal resource system (after Chua 1993).



The essential elements of integrated coastal management are **integration** and **co-ordination**. Any policy and management action which has been designed to address coastal development conflicts must be founded on a sound understanding of natural processes and ways in which these may be disturbed; on political socio cultural and economic conditions; on present and future demands, as well as social costs involved. The management of the coastal resources system has been likened to a cube consisting of three mutually supporting dimensions. These are **processes, issues** and**actions** and each forms an axis of the cube (figure 2). The three dimensions are closely intertwined and to consider only one may lead to collapse of the whole management system. This approach to integrated coastal management follows closely that adopted for the countries of South East Asia as discussed by Chua Thia-Eng (1993).

Figure 2: A coastal area management system (after Chua 1993).



Management **processes** identify and analyze management issues and develop the necessary policy and management options. In this model management processes consist of four essential sequential components, namely planning, implementation, and monitoring and evaluation. The planning component constitutes the basic layer of the cube. The management **issues** embrace the conflicts resulting from resource exploitation (e.g. ever fishing, coral mining) and use (habitat loss, pollution) and form a second dimension to the cube. Management **actions** constitute the third dimension and include direct public investment (e.g. restocking, fisheries enhancement, education and public awareness): incentives and regulation, which might change behavior (e.g. permits, quotas, rights monitoring and enforcement). Unlike sectoral management, which i represented by only one sector of the cube (e.g. over fishing), the spell-over effects of one form of development on all others can be addressed in this integrated approach.

7.2.1.1 Management process:

The management processes consist of integrated planning, implementation, monitoring and evaluation:

- Integrated planning involves inception, research/analysis, programme formulation, adoption and execution. While the detail and level of planning may vary according to the conditions at the site and the experience of the planning team, the fundamental steps are essentially the same. They are:

    a. Establishing a multidisciplinary planning team to provide a framework for the management programme, initiate the planning process and identify the key participating agencies. Core staff might include a coastal management expert, a regional planner, a resource economist, an ecologist, a sociologist and an environmental engineer. Obviously the composition of the team will vary depending on the type of project in hand or the management challenge.

b. Adopting a planning process, which should take on longer than 1-2 year to execute. In principle the planning process involves the evaluation of secondary data and also any formal targeted research with a view to the production of a strategic management plan and an area profile.

c. Collection of research data. Such data will include secondary information but may also involve instigation of focused research needed for a specific coastal management programme.

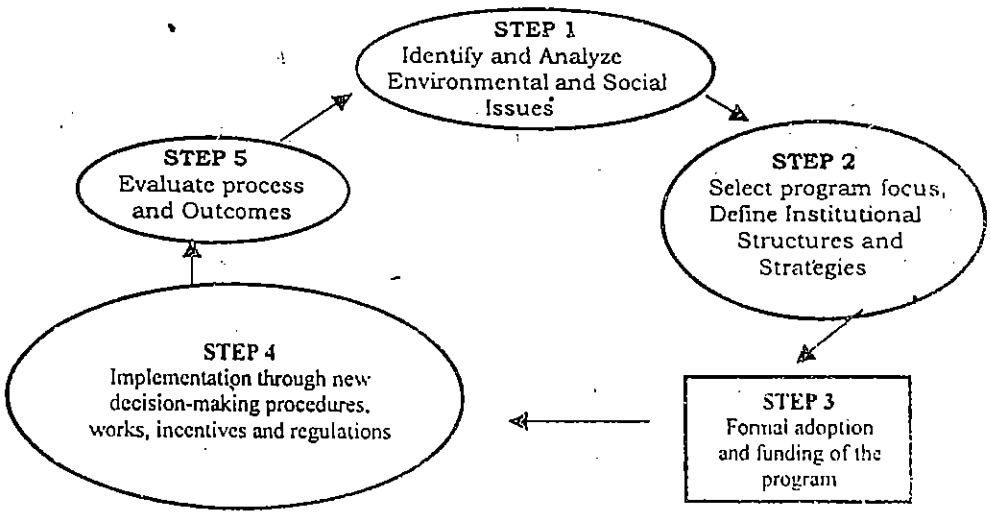
- Implementation requires funds and human resources and primarily depends upon project design and the capability of the implementing agencies.

- Monitoring is an important component of the management process aim to see how the projects are progressing; to explore opportunities that could be developed and to assess the impacts and the lessons learned.

- Evaluation is critical since it enables corrective action to be taken where management plans are not producing the desired results. As a result of evaluation changes in plans and management strategies may be initiated and mistakes corrected at an early stage of the management process.

The most difficult transition occurs between planning and implementation. Each cycle of the policy process for a coastal management programme can be considered a generation. The procedures adopted in many mature coastal management programmes are substantially redesigned in subsequent generations as a result of earlier experiences and such exercises have been termed 'adaptive management'. In this way constructive use is made of lessons learned from successes and failures in the management process. Because the planning, implementation and monitoring and evaluation are sequential they can be depicted as a cycle, often described as the policy cycle:

Figure 3. Steps in the evolution of each generation of a coastal management programme (after Oslen 1993)



7.2.1.2 *Management issues*

Management issues include resource use (over fishing, tourism potential, destruction of habitats etc.); environmental quality (population. coastal erosion) and institutional concerns (conflicts in legislation, intersectoral conflicts, ineffective law enforcement etc.). While depicted in the cube modal as individual issues, many clearly overlap and serve usefully at this point to highlight another aspect of coastal management that of multiple use of costal environments. At the heart of this concept lies a recurrent problem in coastal management described as a sectoral approach to resource use. This approach favours a single purpose and exclusive use of land and water resources. However share coastal systems generate a wide variety of 'goods' and 'services' it has been argued that we should be looking for the optimal mix of uses that generates the greatest economic benefit to society. That optimal mix is hard to achieve and demands an effective and integrated coastal management policy if resource conflict is not to occur. In Sri Lanka coastal lagoon areas are frequently sites, which suffer from multiple resource conflict (fishing, mining and tourism). Such locations have been considered under the heading of special area management sites where collaborative management plans have been set up to resolve conflicts. Diverse range of 'goods' and 'services' cannot be managed adequately through private ownership or control by sectoral agencies.

7.2.1.3 *Management actions*

Management actions provide the most important dimension of a coastal management programme since they involve the application of measures directed towards achieving the desired changes e.g. maintaining the functional integrity of the ecosystem, improving water quality and changing human behavior. They include:

- International and organizational arrangements, which clarify legal rights and obligations, strengthening enforcement capability and undertaking monitoring and evaluation.
- Incentives and regulations to change human behavior which might involve establishment of subsidies, fishing permits or quotas, taxes, fishing and mining bans, regulations of vessels and fishing activities.
- Direct public involvement which would involve investment by a government into increasing public awareness, conducting appropriate research, providing basic infrastructure (e.g. waste disposal systems) and technical assistance where needed.

7.2.2 *Putting Theory into Practice*

The example of Integrated Coastal Management practice can be better illustrated by the Coastal zone planning in Indus Delta of Pakistan. The Indus delta is one of the largest areas of arid climate mangroves in the world. There is evidence that the extent of mangrove coverage in the Indus Delta has decreased significantly in recent time. These changes have been attributed to altered environmental conditions (increased salinity and

decreased silt load), pollution from industry, port development and pressures from human use of mangrove wood for fuel and fodder.

The development of a coastal zone management plan for the Indus Delta has been a major goal from the outset. The project proposal for Korangi/Phitti Creek had the following long term and short-term goals:

Long-term goals:

1. To develop environmentally sound management policies, institutional capability and action, and in particular the improved coordination scientific, technical, economic and industrial aspects in the development planning process.

2. To demonstrate the economic value of conservation and sustainable use of natural resource both at the local and national level.

3. To promote improved management of the Indus Delta mangrove ecosystem as a natural resource with multiple functions and benefits including, but not restricted to, immediately quantifiable economic benefits such as fish nurseries, fuel, fodder, construction materials, storm protection and siltation protection.

Short-term goals:

1. To support a productive, profitable and expanding fisheries programme based on environmentally sound management of a renewable natural resource base.

2. To initiate projects, which will bring measurable benefits of conservation and sustainable development of natural resources to poor people in terms of economic welfare, income-generating activities during the closed fishing season, living conditions and public health.

3. To make proposals on improving economic returns through mariculture, improvement of export earnings, development of improved closed season fishing regulations more attuned to ecosystem realities and the development of the specialized tourism potential of the mangrove wetlands.

4. To determine the sources of polluting and devise means for its monitoring and control.

5. To determine the effects of pollution and the indirect effects of human activities on the ecosystems of the delta.

6. To improve, through training, the environmental capacity of individuals and institutions concerned with management.

The goals here are clearly defined and embrace the need for solutions to management issues to be both interdisciplinary and well integrated.

Due to lack of funding at initial stages, as a number of proposed project on fisheries and analysis of freshwater flow delta were not been taken up by donors and as a result the practical initiatives focused on a single sector (forestry) rather than a broader multi sectoral approach. The effectiveness of the programme was therefore significantly restricted.

The management issues of the area include; Habitat loss, Pollution, Overfishing and resource exploitation, Ineffective law enforcement (both environmental legislation and fishery bans), Institutional issues.

Management actions taken include:

- *Rehabilitation of mangroves* by replantation of mangroves, capacity building of a number of graduate forestry officers in mangrove rehabilitation and management.

- *Control of pollution:* An environmental evaluation of port Qasim was carried out with recommendations to set up an environment and safety, together with training for oil spill clean up procedures. A series of workshop was also held with tanners and other polluting industries and as a result the Pakistan Tanners Association have been taking steps to recover chrome compounds and also design a combined treatment plant for effluents.

Over fishing and resource exploitation: A ban has been operational since 1983 for a two-month closed season during June and July for catching shrimp in Sindh province. Coastal community initiatives have been taken to provide alternative income sources but these have generally been small-scale operations. They have included the promotion of handicraft skills, mangrove honey production and possibilities for ecotourism. Another initiative included the introduction of improved efficiency cooking stoves, which would reduce the demand for mangrove wood as fuel.

At this point it is worth reiterating what constitutes good coastal management practice. Essentially there is no generalized prescriptive recipe for the management of coastal resources; each case, each site brings with it its own unique set of issues for consideration. There is however a general framework within which coastal resources can be sustainably exploited through appropriate policymaking, management, and technological intervention - this framework is integrated coastal management (ICM). It is most effective when it is pro-active and the process of developing ICM can be described as a series of steps. These are

1. Awareness

- Developing awareness of the value of coastal resources within national economic and social development programmes.

- Developing awareness of the ability of coastal ecosystems to sustain more than one economic activity.

- Developing awareness of the common dependence of different groups of people on the availability of goods and services generated by coastal systems.

2. Cooperation

- Promoting cooperation among different sectoral agencies, the private sector and community groups, to achieve common objectives.

3. Coordination

- Developing coordinated policies, investment strategies, administrative arrangements and harmonized standard by which performance can be measured.

4. Integration

- Implementing and monitoring policies, investment strategies, administrative arrangements and harmonized standards as part of a unified programme, and making adjustments where necessary to ensure stated objective are being met.

ICM can operate at all levels of governance. It is not always necessary to wait until national guidelines are in place before attempting to use the ICM principles. Key elements of good practice in ICM, which apply to all coastal management situation, include the following:

- The adoption of a systematic, incremental approach to developing and implementing ICM projects and programmes.
- The involvement of local communities in the ICM process.
- The establishment of mechanisms for integration and coordination.
- The establishment of a sustainable financing mechanism.
- The development of ICM capacity at all levels.
- The monitoring of the effectiveness of ICM projects and programmes.
- Integrating environmental, economic and social information from the very beginning of the ICM process.

7.3 Wetland resources

Wetland is a comprehensive term used for landforms such as swamps, marshes and bogs and saltwater marshes. There common feature is that they are wet at least part of the year and as a result have a particular type of vegetation and soil. Standing water created a special soil environment with very little oxygen, so decay takes place very slowly and only plants with specialized roots can survive.

Wetlands may be defined as the areas that are inundated by water or where the land is saturated to a depth of few centimeters for at least a few days per year. Three major components used to determine the presence of wetlands are hydrology or wetness, type of vegetation, and type of soil. Of these

hydrology is often the most difficult to define, because some fresh water wetlands may be wet only a few days a year. The duration of inundation of saturation or saturation must be sufficient for the development of wetland soils, which are characterized by poor drainage and lack of oxygen, and for growth of specially adapted vegetation.

Although wetlands occupy only a small portion of earth's land area, they are very important in the biosphere. In the oxygen less soils, bacteria survive that cannot live in high oxygen atmospheres. These bacteria carry out chemical reactions, such as the production of methane and hydrogen sulfide that have important effects in the biosphere. Over geologic time, wetlands environments produced the vegetation that today is coal. Saltwater marshes are important breeding areas for many oceanic animals and contain many invertebrates. The dominant animals include crabs and shellfish, such as clams. Saltwater marshes are therefore an important economic resource. Beside this wetlands perform a variety of natural services for other ecosystems and for people, including the following:

- Freshwater wetlands are natural sponge for water. During high river flow they store water, reducing down stream flooding. Following a flood they slowly release the stored water, nourishing low flows.
- Many freshwater wetlands are important as areas of groundwater recharge (water seeps into the ground from a prairie pothole, for instance) or discharge (water seeps out of the ground in a marsh that is fed by springs).
- Wetlands are one of the primary nursery ground for fish, shellfish, aquatic birds and other animals. It has been estimated that as many as 45% of endangered animals and 26% of endangered plants either live in wetlands or depend on them for their continued existence.
- Wetlands are natural filters that help purify water; plants in wetlands trap sediments and toxins.
- Wetlands are often highly productive and are a place where many nutrients and chemicals are naturally cycled.
- Coastal wetlands provide a buffer for inland areas from storms and high waves.
- Wetlands are an important storage site for organic carbon; storage is in living plants, animals and rich organic soils.
- Wetlands are aesthetically pleasing places for people. (Holloway, 1991).

7.3.1 Reasons of wetland loss

Almost 70% of the world's population lives on seacoasts, and over much of the world river valleys and lakeshores have been settled since earliest. The communities established in these regions have often been attracted by the wetland system's easy access by land and/or water, level terrain, and high productivity. Exploitation of these features, even when leading the total conversion of wetland, has often brought social benefits, in both the short and long term.

Nevertheless, unacceptably high wetland loss had led to a net social cost. Many of these losses have been deliberate, but others are the result of decision taken in ignorance of the full value of the wetland in their natural

state. Some are the result of inefficient management systems and others are unintentional byproducts of other actions.

- *Limited information:* some of the products and services of wetlands are sold; commercial fisheries, meat and skins from grazing herds, crops etc. but many wetland values do not have markets-water purification, storm surge protection for example. Because these values are free goods they tend to be ignored in the economic calculations that decide whether wetlands should be conserved or developed. The result is a systematic bias favoring development and hence the degradation of wetlands.
- *Distribution of Cost and benefits:* improving the quality and quantity of information on the distribution and values of wetlands is an important prerequisite for improving management. But even when sufficient information is available on the public benefits of conservation, wetlands are often lost because these benefits are not shared by the individual who owns the property. Private landowners frequently decide to drain their wetlands because they expect to earn more from growing crops than from leaving them in their natural condition.
- *Deficient Planning Concept:* point and nonpoint pollution are a frequent cause of wetland degradation. External factors such as runoff of agricultural chemicals and soil erosion, together with point source pollution from waste treatment plants, have resulted in the severe degradation of estuaries wetlands.
- *Policy Deficiencies:* despite increasing efforts to conserve wetlands, many are still lost because of competing government priorities. The most common example of this is where, despite an explicit government commitment to wetland conservation, national agricultural policy favors wetland drainage.
- *Institutional weakness:* most countries have institutional responsible for managing wetlands, though few pursue this mandate effectively. Among the many reasons for this, the ultimate cause is poor understanding of the true economic importance of wetlands and misperceptions of the nature of management problems.

7.3.2 Integrated wetland management:

The 3rd Conference of Contracting Parties to the Ramsar Convention recommended in July 1987 that each country should develop a national policy for wise use of the country's wetland resources and provided following guidelines for the establishment of the national policies:

Guidelines for the establishment of wetland policies

Wise use involves the promotion of wetland policies containing the following elements:

a. A national inventory of wetlands;
b. Identification of the benefits and values of these wetlands;
c. Definition of the priorities for each site in accordance with the needs of, and socioeconomic conditions in, each country;
d. Proper assessment of environmental impact before development projects are approved, continuing evaluation during the execution of projects, and full implementation of environmental conservation measures which take full account of the recommendations of this process of environmental assessment and evaluation.

e. Use of development funds for projects which permit conservation and sustainable utilization of wetland resources;
f. Regulated utilization of wild fauna and flora, such that these components of the wetland ecosystem are not over-exploited;

While detailed polices are being established, immediate action should be taken on:

a. Interchange of experience and information between countries seeking to elaborate national wetland policies;
b. Training of staff in the discipline which will assist in the elaboration of such policies;
c. Pursuit of legislation and policies which will stimulate wetland conservation action, including the amendments as appropriate of existing legislation;
d. Review of traditional techniques of sustainable wetland use, and elaboration of pilot projects, which demonstrate wise use of representative national and regional wetland types (Ramsar, 1988).

To mange the wetlands following steps should be taken:

- Improving information: until people understand why they should conserve wetland ecosystem and species and are aware of the actions required to do so, the conservation would not take place. The quantity and quality of information on wetlands and their values must be increased and communicated more effectively to the critical audiences. A information programme to aware people will consist following four components;
    a. Assembling of national wetland inventory and classification
    b. Assessing wetland values
    c. Assessing the management potential of wetland systems
    d. Wetland research
- Improving awareness: understandings of wetlands values need to be built at all levels of Society. Three-audience merit particular attention: the general public; local communities dependent upon wetland resources and the government departments and development assistance community, which make decision on investment in wetland conservation and development.
- Change in agriculture policy: include agricultural price support to reduce conversion of wetlands,
- Change in Water Policy: including reducing impacts of water resources projects on wetlands.
- Tax Policy: tax laws may provide partial incentive to wetland drainage. By changing these laws wetlands could be conserved.
- Wetland intervention/conservation policy: the absence of specific national legislation limiting use of wetlands outside protected areas has been as obvious factor contributing to wetland loss. In recent years a number of countries have moved to correct this situation.
- Development Assistance Policy; a great deal of wetland degradation and loss is supported by development assistance funds whether grants or soft loans. To reverse this pattern, development assistance institutions need to pay more attention to the importance of wetlands and pursue

polices which promote a more environmentally sensitive approach to wetland management.

- Enhancing cross-sectional management; the greatest obstacle to integrated management of wetlands in most countries is division of responsibility for wetland resource among several different agencies. The effectiveness of national wetland management efforts will be enhanced greatly by the establishment and effective operation of cross sectoral structures. These may include specific ministries or department and interministrial comities and commissions. The success of such efforts will depend upon the capacity of the coordinating mechanism to bring together the widest possible range of institutions concerned with wetlands and to assist them in including wetlands concerns in their work, rather than by replacing their existing functions.
- Improving human capacity to manage wetland: substantial investment in training is required if wetlands are to be management effectively.

Beside these regional and international cooperation is prerequisite for effective wetland management.

7.4 Aquaculture Resources

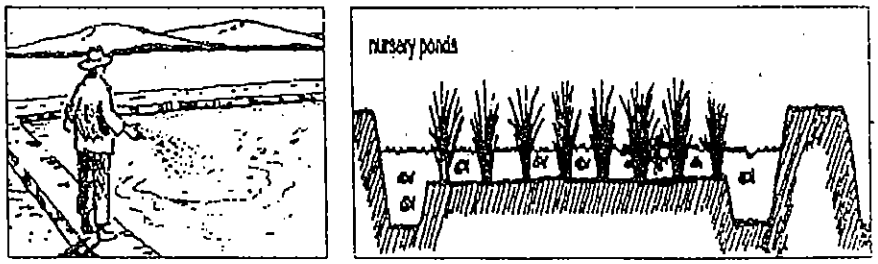
Aquaculture is the production of food from aquatic habitat- marine and freshwater. Although aquaculture provides only a small amount of the world's food at present, it is important as a source of protein for many nations, especially in Asia and Europe, and offers a potentially important cash crop in other parts of the world.

Some fish growers grow several species of fish in the same pond, exploiting their different ecological niches. E.g. pond developed mainly for carp, a bottom feeding fish, also contain minnows, which feed at the surface on plant leaves that are added to the pond.

Like agriculture, aquaculture has also various dimension and scales of operation. Rural aquaculture is basically a rural food farming activity, which is highly compatible with other food farming components of the family level farming system. On the other hand, highly commercialized, high input based intensive culture of high valued finfish and shellfish is another dimension of aquaculture. Besides there are also several intermediate levels and scales of operation

7.4.1 Types of Aquaculture System

Extensive culture system depends largely on single input, the seed. No other extraneous material inputs are used and consequently such system heavily depend upon the natural feed produced in the system or brought by water in-flow. Extensive rice fish culture, culture based fisheries in ox-bow lakes and small seasonal reservoirs, shrimp/fish culture in rice field of Kerala and beheries (large impounded shallow water areas with facilities for drawing tidal water) of West Bengal, India and fish culture in seasonal tanks of Sri Lanka are common Examples of such system.



Fish farming in rice paddies

Semi intensive culture system, on the other hand, also depends on the natural food produced *in-situ*. However, the production of natural food is enhanced by application of organic or inorganic manure or combination of both. At this level, the practices are known as low-cost semi intensive system. Further intensification in this system are attained by increasingthe stocking density and application of commercially available or farm made or locally available agricultural byproducts like bran of rice, wheat, maize etc. and various types of vegetables deoiled cakes as supplementary feed.

Intensive culture systems are high inputs-high outputs based systems, which require infrastructure facilities, large investment and adequate managerial skill. Such system depends largely on complete and commercially available feed, oxygenation of the system, exchange or circulation of water etc. these culture system are followed by corporate sector or commercial scale farmers and entrepreneurs.

Depending upon the level of intensification and extent of inputs used aquaculture practices are summarized in the table below.

Intensification levels	Major inputs	Some common examples
Extensive culture systems	Seed from adjoining natural source or hatchery produced or from both	Shrimp culture in paddy fields of Kerala Shrimp culture in "bheries" of West Bengal Shrimp culture in "ghers" of Bangladesh Fish culture/culture based capture fisheries in ox-bow lakes in Bangladesh Fish culture in seasonal and perennial tanks of Sri Lanka
Semi-intensive culture systems	Seed manure Lime Piscicide (once in several years for	Carp polyculture in undrainable community and small family ponds

• Low-input based systems • High-input based systems	perennial ponds and only when drying is not possible) Seed Organic and inorganic manures Feed (mostly farm made / compounded) Lime Fuel or electricity for dewatering perennial ponds or Piscicide when drying is not possible Common therapeutants	and small family ponds Family level integrated fish culture in homestead ponds (VAC system of Vietnam) Integrated fish culture in larger ponds Tilapia culture in family ponds Puntius culture Oyster culture Composite carp culture in India Fish culture in family ponds Catfish culture in family ponds Tilapia culture Shrimp culture in community pond complex Carp / prawn polyculture Sea bass culture
Intensive culture systems	Seed Feed (mostly pelleted and commercially available) Lime / dolomite Piscicide Energy (electricity / gasoline) Water (exchange / recirculation) Oxygen (aeration) Therapeutant High level of management	Shrimp aquaculture Freshwater prawn culture Eel culture Culture of salmon and trout and other high valued species Culture in raceways Culture in high-tech indoor facilities

7.4.3 Integrated aquaculture management practices

Although many aquaculture projects have been developed that have provided significant economic and social benefits with a negligible environmental impact there are several aquaculture industries, most notably the shrimp farming in certain Asian countries, that have significantly damaged the local ecosystems. These ventures have significantly damaged aquaculture's public image.

The main trend in aquaculture is towards sustainability. This issue of sustainability is likely to change, in many cases, how aquaculture is practiced and what forms are desirable. One of the important realizations of this trend is that to achieve full market potential the environment must be protected, as environmental damage results in a decrease in production and possibly the collapse of the industry.

There are a number of issues that must be addressed for sustainability to be achieved. Among these are:

- *The development of an integrated infrastructure and appropriate management:* This system must encourage positive development of aquaculture, administrative and legal framework, institutional linkages, development policies, allocation of resources, zoning, and increased public awareness among other things.

- *More efficient resource usage* Improved water management involving decreased usage better usage, better feeding practices and less polluting feeds, improved health management, increased integration with agriculture and perhaps genetically improved stocks with specific pathogen resistance are important side issues of more efficient resource usage. Disease control and the development of vaccines is important to establish efficient resource usage.

- *Avoiding permanent damages:* Negative environmental impacts that result in permanent damage must be avoided at all costs. If some environmental damage must occur it must not exceed the rate at which the environment can recover. This involves better site selection, planning, risk assessment, farm design, treatment of wastes, and the development of new more environmentally efficient technologies and techniques.

- *Establishing a database of aquaculture practices and effective management systems:* An adequate working knowledge of the impacts of aquaculture must be developed and a means of communication so that all aquaculture farms can benefit from the information and avoid mistakes made by other farms.

- *Positive environmental practices should be maximized:* Some aquaculture practices such as moliusk and seaweed culture can provide a positive effect on the environment by removing pollution from the local water systems. Systems that reduce pollution and are successfully integrated into the local ecosystem must be maximized.

Development of aquaculture is expected through increase in area and intensifying production in existing aquaculture areas. Majority of the small and medium scale Asian farmers are primarily engaged in agriculture and aquaculture is the secondary or subsidiary farming activity. There is growing feeling among them that there is limited scope for their development exclusively through agriculture. Main reason being the marginalization of profit from crop farming due to increasing cost of inputs, erratic power supply, supply of sub-standard seed, fertilizers and pesticides. Aquaculture, on the other hand, even at the subsistence level, assures substantial cash income from the sale of domestic surplus. Further, due to large number of native species of different feeding and living habits, aquaculture has great potential for its expansion in areas like saline soils, swamps, and flood plains etc., which are not suitable for agriculture. Farmers, although still keen to ensure food security for their families, are looking increasingly towards cash crops, trade and complementary activities to supplement their income and improve their living standards. Aquaculture is also viewed as one of the alternative farming activity.

A systematic approach to integrate the plant and animal material in aquaculture farming will be the suitable one which assure use of waste from fields and livestock as nutrients for fisheries.

7.4.3.1 Using animal waste in fishponds:

Direct feeding value of pure wastes is known to be poor. Wastes act by:

- Stimulating phytoplankton production; and
- Acting as substrate for bacterial production (detritus) and as feed for zooplankton.

These two processes are strongly interlinked, since phytoplankton is a major source of detritus for bacterial production. Also, phytoplankton, through photosynthesis, is the chief producer of dissolved oxygen in the pond used by all organisms including fish.

However following factors should be considered before using animal waste in the fishponds:

1. Are wastes available on-farm? If so, are the wastes already used? Should they be diverted for use in fish culture? Livestock wastes are often important as crop fertilizers and fuel. Consider the opportunity costs
2. Is it worth raising livestock, especially to generate wastes for aquaculture? Consider:

    - Costs/difficulties of doing so (e.g. feed availability and cost, marketing difficulties, technical abilities and interest of farmers); and
    - Inorganic are now cheaper to use than livestock manure in many places.

Before management following factors are considered:

1. Are all wastes to be used in fish culture? If wastes are to be used elsewhere, they should be collectible prior to entering the pond (e.g. use a sump). Also, wastes should be available in larger quantities at certain periods when their use should be reduced for fish culture (e.g. during the cool season).

2. Can all wastes be collected? Feedlot livestock are kept confined at all times so all the wastes can be collected and used. Small-scale farmers often allow livestock to graze or scavenge during the day and only confine these at night. This reduces feed costs considerably, often allowing only on-farm or low-cost, supplementary feeds to be given. However, collectible wastes will be less.

3. Livestock may be penned at the farmer's house for security or traditional reason; this may limit potential advantages of integration. Labour is required to collect or prepare livestock feed.

4. Ponds may be multifunctional. Large animals are usually denied access to the pond because entry to and wallowing in it can destroy the dikes and cause turbidity, which reduces natural food production.

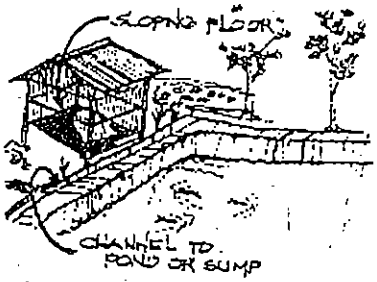
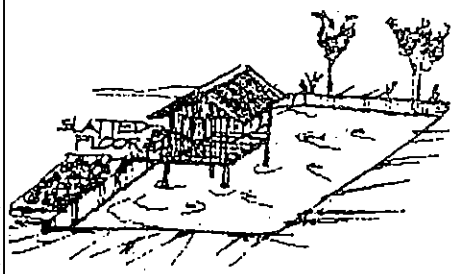
   Livestock wastes vary in terms of both quantity and quality, which are affected by the following:

   - Food quality of livestock
   - species (monogastrics and ruminants) and size
   - stage in life cycle (breeder, grower, etc.)
   - Solids only or mixed with urine
   - amount of waste feed
   - contamination with bedding materials, rainwater, soil, etc.
   - method and period of storage

The following facts should be considered while designing an animal waste based fishpond

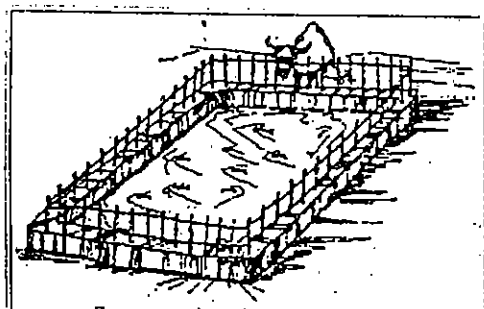
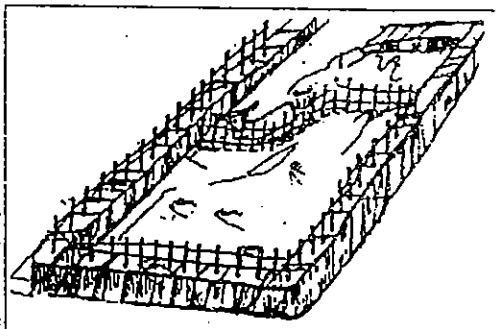
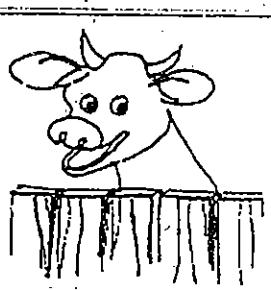
- Young livestock tend to feed on diets higher in protein so their waste has more nitrogen and is better as a pond input
- Ruminants' faeces contain high levels of carbon relative to nitrogenand discolor the water. Generally used alone, they give low-fish yields. Consider use of ruminants' urine as it contains a better balance of nutrients.
- Laying hens are fed different diets than broiler

- **Layout/design options**

On the pond dike	Over the pond
	
Pens close to the pond to reduce labour cost of loading waste	Pens are cooler and more humid

In the layout/design aspect, consider:
- size and number of livestock;
- space availability/land cost; and
- relative cost of materials

Design the pond to allow limited access.

 Fence around pond keeps buffalo out.	 Fence across pond lets buffalo in water.
 Pigs and chickens are monogastrics. They are fed a high-quality diet and their waste is high in nutrients.	 Buffalos and cows are ruminants. They are given a diet low in nutrients and their waste is low in nutrients. However, they are cheap to feed.

Source: (www.fao.org/DOCREP/005)

7.4.3.2 Using plant material in fishponds:

The use of plant material for fishponds can be better-illustrated adaptation of this practice in India.

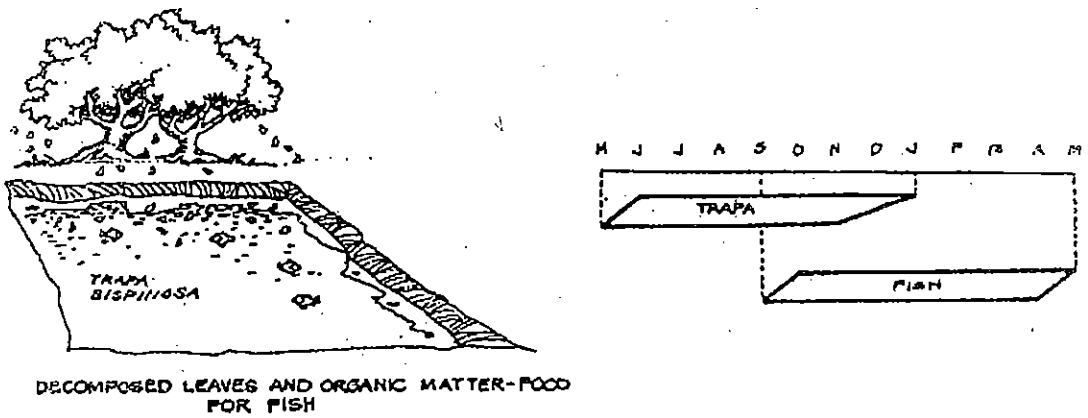
There are two concepts to feed the fish from plant material as practiced in India;

1. The cultivation of aquatic macrophytes concurrently (*Trapa*) or in rotation (*Euryale*) with fish and

2. The cultivation of terrestrial grass (*Napier*) on the banks of a pond and its feeding to fish.

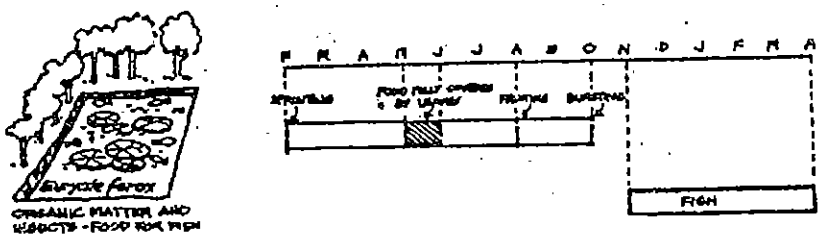
In India, trapa (*Trapa bispinosa*) and makhana (*Euryale ferox*) are two seasonal, aquatic cash crops, which are grown extensively in Madhya Pradesh and Bihar, respectively. While the environment is not congenial for Indian carps, common carp goes well with trapa and air-breathing fish with makhana.

To use trapa, it is grown in perennial pond in season of May/June. These plants make use of the organic matter available there for their growth. In the same pond, in September –October, carp fingerlings are stocked. The layout for this type of pond is given in the figure below;



Source; (www.fao.org/DOCREP/005)

To use *Euryale,* the seeds of Euryale ferox sprout in February and the leaves cover the pond fully in May/June. The plants start fruiting in August and burst in October, scattering the seeds at the pond bottom which are collected by scanning the bottom mud. The air breathing fish is stocked in November and harvested in April. The layout of the fishpond for using *Euryale* is given below:



Source: (www.fao.org/DOCREP/005)

Green grass has an important role in feeding fish besides *Hydrilla, Ottelia, Potamogeton,* etc: Hybrid Napier, once sown on pond banks, can be cropped continuously for five years, needing little irrigation during summer. A new system utilizing aquatic vegetation/green grass alone for fish production gives high yields at very low costs. It is labour-intensive and highly suitable for small, shallow ponds. To use Napier grass, the pond is prepared by draining in May/June. Seven to ten days later pond is stocked with grass carp, which is feeded by *Hydrilla,* within about a week, the pond is also stocked with thala, rohu, mrigal, silver carp and common carp. Grass carp is gradually weaned from *Hydrilla* to Napier grass. Feeding is done regularly to satiation. Silver carp, thala and common carp will be the first to attain a weight of 1 kg each. From the fifth or sixth month onward, these are harvested one after another. Replenish the harvested fish with an equal number of fingerlings. Hybrid Napier is planted and manured and irrigated at interval of 10-15 days. The pond can be designed as shown in the figure below:

Source;(www.fao.org/DOCREP/005)

7.4. Integrated Irrigation Management

Plants require water. Much of modern agriculture is dependent on irrigation, artificial addition of water. The importance of water is indicated by the fact that soil moisture in the spring is the present major detriment for agricultural production in the corn and what belts of the United States.

Sources of irrigation water include ground water; nearby watercourses, such as rivers and streams, natural lakes and rivers and artificial reservoirs. Large-scale irrigational project cause environmental problems such as construction of reservoirs changes the local environment. Some habitats may disappear; stream pattern changes and erosion rates increase in the watershed of the reservoir.

The performance of irrigation and drainage is critical to the food supply and to farmers' incomes, as well as to the environment. The ultimate goals in managing irrigation water are efficiency, equity and sustainability. Efficiency has been achieved if every drop of water has been properly allocated and used, without any waste. The goal of equity means that water is fairly distributed among users. Some farmers may have an advantage over others. Those at the head of a canal have an advantage over those living downstream, as they have first access to water. Influential farmers may have

better access to water than poor farmers. In some cases, ideals of efficiency and equity may be in conflict. The goal of sustainability means that the users of today should maintain the quality and quantity of water resources for the use of future generations.

7.5.1 Problems in Irrigation Managment

Managing irrigation so as to achieve efficiency, equity and sustainability is very difficult. Market mechanisms are not enough. High prices for water when it is scarcest mean that low-income users may lose their access to water. Unrestricted use if prices are low may lead to pollution, waterlogging and over- use of groundwater.

Given the special characteristics of irrigation water, there is good reason for governments to intervene, and even directly manage irrigation systems. However, when a centralized agency is in charge of planning and operating an irrigation system, the result is often too much bureaucracy. Too much money is spent on staff salaries. As a result, the cost of water is high, and yet the irrigation service is poor. Users are unwilling to pay their irrigation fees. The result is a vicious circle of high costs, poor services and low payment of fees, leading to inadequate funding and further deterioration of services.

One way out of this difficult situation is the participatory approach to irrigation management.Users are involved at all levels, including construction and operations. It seems to give greater efficiency at a lower cost.

7.4.2 Irrigation Management

The irrigation sector provides a rich source of experiences and lessons in user participation. Participation by farmers in system design and management helps to ensure the sustainability of the system, reduce the public expenditure burden, and improve efficiency, equity, and standards of service. Mobilizing support at all levels and establishing the participatory process, however, involves costs; it also demands knowledge of the incentives facing each group of stakeholders and of the essential elements in building effective user organizations.

Participatory Irrigation Management (PIM) covers a variety of different ways in which water users can be involved in the planning, construction, operation and maintenance of irrigation systems. Participation ranges from being informed and able to express views to situations where users and their representatives jointly or solely hold authority to govern irrigation systems and determine the irrigation services to be provided.

Benefits

Efforts to increase user participation have been spurred by poor performance in efficiency, equity, cost recovery, and accountability of many large irrigation systems managed by government agencies. Greater participation by farmers through water users associations has helped overcome many of these problems.

System performance The overriding reason for increasing participation in irrigation is to improve system performance. Clear gains in efficiency and standards of service are achieved when design and management of the irrigation system are transferred to farmers. System design benefits from local knowledge, and farmers have the means and incentives to minimize costs and improve services. For example, irrigation user associations can reduce labor costs by paying lower wages than government agencies; local farmers can provide closer supervision of staff than distant agency supervisors; and breakages are reduced when farmers feel a greater sense of ownership.

Public Expenditure :One of the most noted effects (although this has nothing to do with farmers' motives for participation) is the reduction in government staff and expenditure requirements caused by farmer management and contributions of cash, labor, and materials. Farmer associations have proved more effective collectors of user fees than government agencies. It is not unusual for farmers to be willing to pay more than the original user rates after transfer of the system to their control. Increased collection of fees, however, does not motivate farmer participation. Participation must also result in direct benefits to participants.

Sustainability: Building irrigation systems that are wanted, supported, and owned by users themselves provides the best assurance of sustainability. Physical and fiscal sustainability of the irrigation system beyond the project is enhanced when operation and maintenance costs are met from user fees rather than high levels of government subsidy.

Equity: More equitable organizational arrangements and water delivery have been noted when participatory approaches are followed. A contributing factor is the socioeconomic status of the leadership, which tends to be closer to that of the ordinary member, involving more tenants and small farmers than in non-participatory systems.

Spillover Effects: The transformation of water users from beneficiaries to partners in irrigation development can have a widespread impact as farmers become trained and organized. It can increase local ability to coordinate input supplies, for example, and to deal with other government agencies involved in rural development

Building participation in Irrigation

Nepal Example

Nepal has a long tradition of direct farmer participation and cooperation in irrigation development. About 70,000 farmer-managed irrigation schemes, ranging in size from very small to thousands of hectares, account for 70-80 percent of the country's irrigation. In general these systems achieve high levels of performance over long periods of time without government cost or involvement. Such systems, however, are frequently damaged by landslides and floods beyond the capability of farmers to repair alone; most can be improved substantially with modern materials and construction techniques.

The Bank's irrigation line of credit was designed to assist these schemes by building on the farmers' traditional capability to organize and cooperate together. To participate under the irrigation line of credit, farmers had to form legal farmer irrigation associations, agree ahead of time to contribute to capital costs, pay full O&M costs, and maintain full control and responsibility for all decisions regarding their irrigation schemes. Such stringent requirements had never been attempted before under a Bank-supported project in Nepal. But in practice these requirements simply formalized the farmers' traditional mode of irrigation development and provided an avenue for Bank assistance that would strengthen rather than destroy the traditional farmer institutions. The irrigation line of credit approach proved highly successful, has become strongly demand driven, and is now being expanded to government-managed projects.

Stone-built irrigation channel

Irrigation canal in village

Unit Summary

The water is essential for life of human being and other organisms. Although water exist in substantial quantities on earth however human activities are continuously affecting this resource both quantitatively and qualitatively. Effective use of water and associated resources is essential.

Coastal resources are one of the important resources of water and continuously affected by human activities at coasts. An integrated coastal management programme involves integration of government and community, science and management and policy and legislative framework.

Wetlands are destroyed and converted to agricultural due to lack of information for immediate benefits. The wetland conservation should include information and awareness raising programme for public and decision maker, change in agricultural, tax and water policy, enhancing institutional effectiveness and community participation.

Aquaculture although given less importance however it can gives substantial income generation to farmers. Use of farm and livestock refusal in fishponds is effective technique to be adapted.

South Asian countries are agricultural countries where agricultural land is predominantly irrigated. Irrigation management require efficiency, equity and sustainability which is only possible by participation of community in development of irrigation plans.

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UNIT 8

INDUSTRIAL WASTE MANAGEMENT

Unit Introduction

Enormous quantities of waste are generated during industrial activities for collection of raw material till the end product and there is an increasing concern over the disposal of those wastes in environmentally safe manner. Over the last decade there is a shift in dealing with waste from disposing towards waste minimization strategies.

This unit investigates industrial waste management strategies with focus on:

- Waste disposal practices
- Waste treatment from hazardous to less hazardous waste
- Source reduction
- Industrial waste management policy
- Regulatory framework for waste management
- Motivation and barriers in dealing with source reduction method of waste management.

Unit Objectives

After reading this unit, you should be able to learn:

1. What is meant by waste and industrial waste,
2. How waste is disposed off and treated around the world?
3. Benefits and risks associated with different methods of disposal and treatment of waste,
4. Methods of waste minimization,
5. Use of effluent standards and emission standards for waste minimization.

8.1 Introduction

Waste is everyone's business, we all produce waste in nearly everything we do. What do mean by the word waste? So wastes can be virtually anything and can be of any consistency, whether solid, liquid or sludge. Industrial waste, which could be solid liquid or gas, is divided in to hazardous and non hazardous waste.

8.1.1. Hazardous waste

Hazardous wastes are those, which cause or have the potential to cause harm to human beings or to other organisms because the wastes are toxic, corrosive, flammable, explosive, reactive, or pathological. Some of the properties of hazardous wastes are self-explanatory, but others deserve further discussion. Toxic wastes can lead to death or serious injury when inhaled, ingested, or absorbed. The chemical properties of corrosive wastes can cause deterioration of materials and body tissues, at point of contact. Pathological wastes are hazardous because of their potential for spreading disease. By definition, radioactive wastes are hazardous wastes, but they are usually classified in a category of their own because of their unique handling characteristics and slow deterioration rates.

8.1.2 Non-hazardous industrial waste

Non-hazardous industrial wastes are those that are neither hazardous in nature such as corrosive, toxic, reactive, pathological, flammable, explosive, radioactive nor municipal waste. It includes containers, chemically inert chemicals produced during manufacturing processes, glasses.

8.1.3 Waste generation in industries

The production of industrial goods involves the extraction of natural resources, their utilization in the manufacturing process of industrial products and the disposal of unwanted waste. Waste is produced at every level in the industry from Raw material to consumption of the product. The following cycle illustrates waste generation at different levels in industry.

8.1.4 Concern about industrial waste

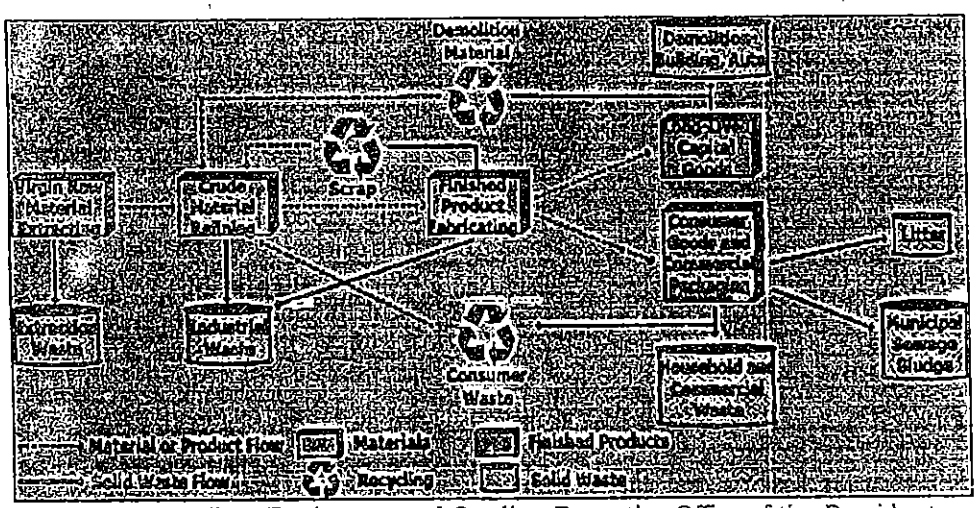
Although there are plenty of places to put this industrial waste, none of the management or disposal alternatives is fail-safe. Among state officials and the public, serious concerns about both commercial management of industrial waste and on-site industrial management of wastes remain:

- Hazardous and many "nonhazardous" industrial wastes are inherently dangerous to human health and the environment no matter how they are managed.
- Spills and leaks at hazardous and industrial land disposal units.
- Underground storage tanks results in ground water contamination.
- Abandoned oil, gas, and water wells located near hazardous waste injection wells could be possible avenues for the underground-injected

hazardous waste to seep up to the surface or into underground drinking water supplies.

- The continued disposal of "nonhazardous" industrial waste at both municipal solid waste landfills and industrial solid waste facilities and at oil and gas exploration and production sites is not as highly regulated as hazardous waste disposal. In fact, municipal solid waste landfills are more highly regulated than nonhazardous industrial solid waste disposal sites, which often do not require permits, groundwater monitoring, liners, or leachate collection systems despite the dangerous wastes they may contain.
- The specific health effects of many toxic substances are not well understood, including their impact on birth defects.

(http://www.texasep.ep.org/html/wst/wst.html.)



Source: Council on Environmental Quality, Executive Office of the President, Environmental Trends (Washington, D.C.: Government Printing Office, July 1981)

8.2 Industrial Waste Management

According to Balkau (1990), modern environmental management methods have now given us the ability more than ever before to avoid many of the problems which were earlier accepted as inevitable, but which are now seen to impede national development. Such models emphasize:

- Low-waste production processes;
- The use of safer processing chemicals;
- Maximum recovery of residues;
- Cost effective treatment of residues;
- Preventive maintenance;
- Good housekeeping; and
- Competent operation

What to do with the waste is everyone's concern these days.

Industrial solid waste can be managed either on site—at the facility where it is generated—or transported off site to commercial facilities.

EPA have created a hierarchy or a set of priorities for how best to manage industrial solid waste, whether non-hazardous or hazardous. In decreasing order of preference, these priorities are:

1. Source Reduction;
2. Reuse or Recycling of Waste;
3. Treatment to Neutralize Hazardous Characteristics;
4. Treatment to Reduce Hazardous Characteristics;
5. Underground Injection; and
6. Land Disposal.

8.2.1 Land Disposal

At the bottom of the EPA's hierarchy of hazardous waste management methods is land disposal, be it landfills, surface impoundment, land treatment units or waste piles. Landfills are controversial for a simple reason: past and present experience has shown that such facilities can eventually leak hazardous materials, which can contaminate both the nearby soil and surface and groundwater.

8.2.1.1 Types of land disposal include

a) Landfills are disposal facilities where hazardous and other solid wastes are placed into the land. Landfills designed according to RCRA rules must contain systems to collect contaminated surface water run-off as well as synthetic liners below and around the landfill.

b) Surface Impoundments are depressions or diged areas where solid waste can be stored, disposed of or treated. Pits, ponds, lagoons and basins are all forms of surface impoundments.

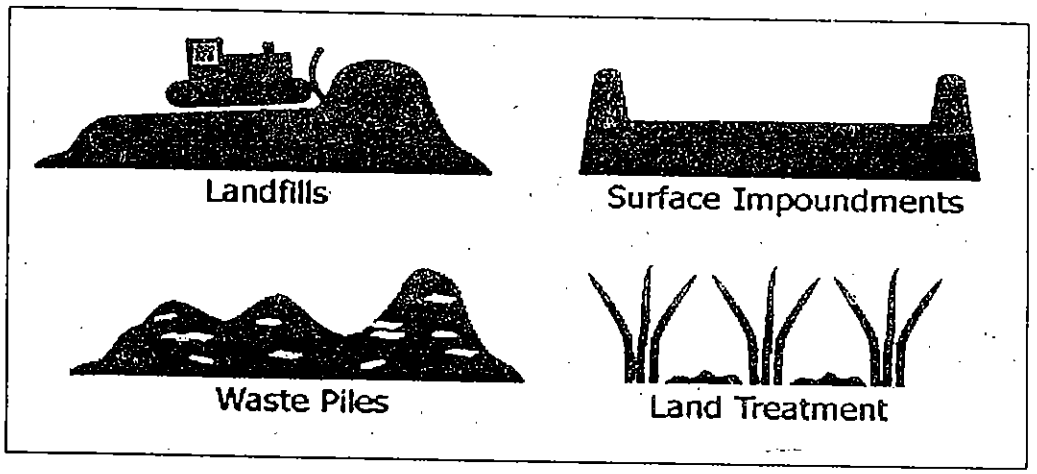
c) Waste Piles are accumulations of solid waste, sometimes used as disposal sites and sometimes as storage facilities.

d) Land Treatment is a disposal process in which solid waste is applied on top of or mixed into soil. Land application or lands farming facilities are examples of land treatment.

Problems with land disposal:

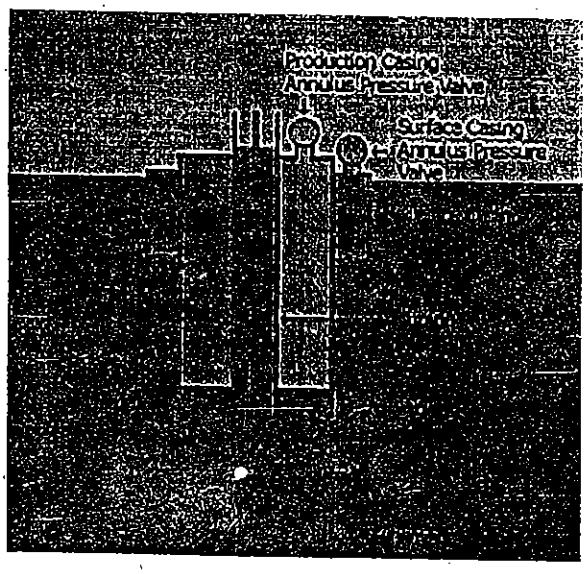
Disposal at land undergoes physical and biological changes, which may be desirable or undesirable.

- Leachate generation and groundwater contamination
- Methane production
- Incomplete decomposition
- Open dumping Aesthetically undesirable
- Settling and compacting of waste.



8.2.2 Groundwater injection

Underground injection wells are on the fifth rank in the hierarchy of waste management in the EPA industrial waste management methods list. The disposal of waste in deep geological formations is controversial. Some people believe that injection wells, when operated correctly, are safe; however, many environmental groups are concerned about the heavy reliance on this technology, particularly the commercial facilities which must manage a wide variety of hazardous waste. Hazardous waste must be in liquid form before it can be injected underground.



(*Source: General Accounting Office,* Hazardous Waste: Controls Over Injection Well Disposal Operations *Washington, DC: U.S. General Printing Office, 1987)*

It is agreed that waste disposal through properly constructed and operated injection wells is safer and less likely to contaminate surface water or potable groundwater than are landfills and other forms of land treatment. For example, injection of hazardous waste into aquifers that serve or could serve as groundwater supplies for communities is not allowed. However,

there are several pathways by which waste injected underground could contaminate water resources:

- Injection of waste above aquifers containing drinkable water;
- Leakage of waste through inadequate confining beds;
- Leakage of waste through confining beds due to hydraulic fracture or faults;
- Displacement of saline water into a potable aquifer;
- Upward migration of waste liquid from the injection zone along the outside of well casing;
- Escape into potable aquifers due to well-bore failures; and
- Vertical migration and leakage to land and aquifers through abandoned oil, gas and other wells.

To avoid these problems ground water monitoring in the area of injection well is recommended. However some environmental groups argue that waste could migrate beyond the zone of injection well over the long term.

8.2.3 Burning to reduce hazardous characteristics of waste

In waste management hierarchy burning or incineration is preferred than land disposal and underground injection of waste as it reduce or sometimes may eliminate hazardous characteristics of waste. The other benefits of incineration include:

- Reduction of weight and volume of waste, which can than be land filled and thus can increase the life of landfill.
- Practically all modern incineration facilities are designed to generate electricity, which could be sold to offset some of the costs of disposal.
- In case of waste to energy facility it also provide energy for the production process.

However incineration have some drawbacks also:

- Thrash does not burn cleanly. Despite being equipped with air pollution control devices, exhaust stacks emit toxic fumes into the air as burning oxidizes and vaporizes the assortment of metals, plastics, and hazardous materials that inevitably end up as municipal waste.

- Combustion facilities are expensive to build, and their sitting has to same problem as the landfills: No one wants to live near one.
- Combustion ash is often loaded with metals and other hazardous substances and must be disposed of in secure landfills.

- To justify the cost of its operation, the combustion facility must have a continuing supply of waste, for that reason, the facility enters into long term agreements with municipalities, and these agreements can lessen the flexibility of the community's solid waste management options.

- Even if the combustion facility generates electricity, the process wastes both energy and materials, unless it is augmented with recycling and recovery. A number of combustion facilities compete directly with

recycling for burnable materials such as newspapers and represent a major impediment to recycling in some municipalities.

8.2.4 *Neutralizing and destroying hazardous characteristics of waste*

A variety of new and emerging technologies can neutralize and, in some cases, even destroy the hazardous characteristics of industrial waste. One new encouraging technology is known as supercritical water oxidation. The process is simple, but expensive. Water is heated, pressurized and mixed with organic compounds, which dissolve. Later, oxygen gas is added to the mix and harmful substances are burned away. What's left is harmless. This gigantic pressure cooker, unfortunately, is very expensive, although a team at the University of Texas at Austin has developed a working water oxidizer

Other technologies currently being used in the market include:

- Bio-remediation. This process uses microorganisms bred to have an appetite for hydrocarbons to "eat" oil spills.
- Carbon adsorption. This is a process in which toxic substances adhere to a specially treated carbon surface.
- Dechlorination. This process chemically replaces chlorine with hydrogen or hydroxide ions, leaving chlorinated substances non-toxic.
- Neutralization. This process either makes an acid substance less so by adding alkaline substances, or makes a basic substance more acidic by adding acid.
- Oxidation. This process adds oxygen to substances such as sulfurs, phenols or cyanides, rendering them non-hazardous.
- Precipitation. This process separates solids from a liquid waste so that the solid portion can be managed more safely.
- Vitrification. This refers to any process, which uses electricity to encase products in glass. For example, electric currents can be introduced into contaminated soils at such high voltages that the soil "turns" to glass.

8.2.5 *Recycling and reuse of waste*

A variety of industrial waste can be recycled for use as products. There are three ways in which industrial waste recycling occurs:

- At the facility itself (on-site recycling),
- At commercial facilities which gather waste streams from several companies (off-site recycling), and
- When the waste products from one company are used as inputs in the production process of another company.

Benefits of Recycling include:

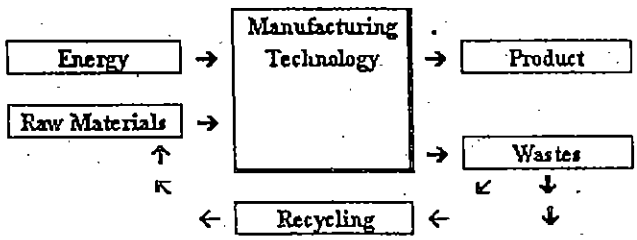
- Less hazards to human health from the generation of toxic waste.
- Prevent environmental degradation caused by unnecessary release of waste materials;
- Promotion of more efficient use of scarce natural resource.

- Reduced need for waste disposal facilities and reduction in waste disposal cost.
- Cost savings to industry by adoption of processes with reduced waste disposal and raw material costs.

The conventional approach of industry in the past has been to take raw materials and energy to produce some form of product (with value) and ancillary wastes (without value). In the past, these wastes have been disposed of as cheaply as possible.

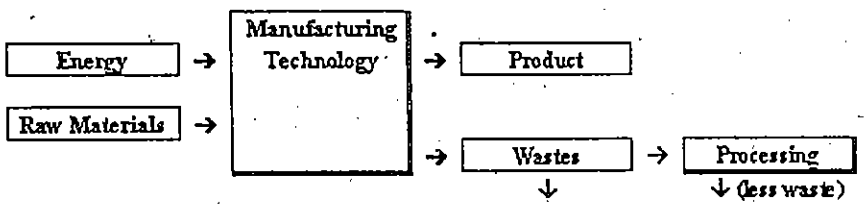
(i) Conventional Model of Manufacture

With significant attention focusing on industrial processes, some industries have recognised that waste costs can be reduced through recycling and re-use.



(ii) Manufacture with Recycling

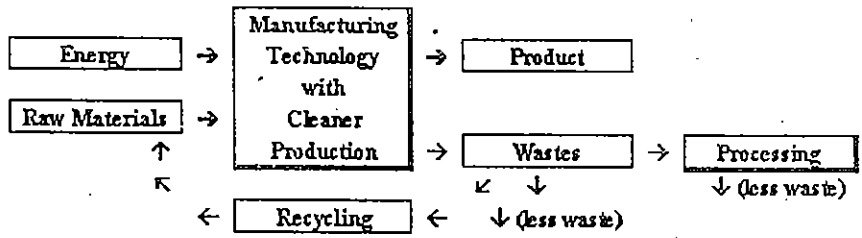
Further, the quality of wastes can be reduced through treatment of wastes to reduce its hazards. However, these "end of pipe" solutions can be expensive, and they do not deal with the manufacturing processes that generate the waste in the first place.



(iii) Manufacture with "End of Pipe" Processing

Therefore, more recently, the term "cleaner production" has been given to manufacturing processes which look at the whole manufacturing cycle, from

selection of raw materials, selection of less polluting technology through to pollution control and waste minimisation.



(iv) Manufacture with Cleaner Production
(which automatically includes recycling and end of pipe waste treatment)

Source: (http://www.safesci.unsw.edu.au/gens8005/module. 9)

8.2.6 Source reduction

The best means to get rid of waste is to reduce the amount generated at the source, a process known as source reduction. The source reduction and waste minimization approach - often called pollution prevention - has become popular in recent years.

The pollution prevention approaches emphasize reducing the environmental and financial costs associated with managing hazardous waste. Pollution prevention is based on two concepts:

1. The production of waste results in both loss of energy from the production process and loss of valuable resources; and
2. Once the waste is produced, money, manpower, and additional materials must be spent to manage the waste.

Approaches to Waste Reduction include;

a) Source reduction as applied by Texas law means reducing the amount of any hazardous or non-hazardous substance entering any waste stream or released into the environment prior to recycling, treatment and/or disposal.

b) Waste minimization means a practice that reduces the environmental or health hazards associated with hazardous waste, pollutants or contaminants. Examples may include reuse, recycling, neutralization and detoxification.

c) Source separation keeps hazardous waste from non-hazardous waste, preventing all the waste from being managed as hazardous waste. It does not necessarily reduce the total volume of waste, only its hazardous components.

d) Recycling and re-use is the process of removing a substance from a waste and returning it to productive use. Recycling can happen at a plant.

where the waste is re-used within the production process itself. Waste can also be recovered off-site.

e) **Substitution of raw materials** replaces a raw material that results in hazardous waste with one that results in less hazardous waste or none at all.

f) **Manufacturing process changes** consist of either eliminating a process that produces waste or changing the process so that a waste is no longer produced.

g) **Substitution of products** means eliminating the use of a hazardous material. For example, by substituting creosote-preserved wood posts with concrete posts, no hazardous waste will leach from the posts.

Source reduction techniques can be better illustrated by this table:

Table 8.1 Industrial Source Reduction Measures

TYPE OF SOURCE REDUCTION MEASURE		DESCRIPTION/EXAMPLE
Product Changes		Reduce waste/toxicity associated with a product's use
Product Substitution		Substitute water-based paints for solvent-based paints
Product Concentration		Concentrate powder detergents, thus requiring less packaging
Source Control		Reduce waste/toxicity associated with a product's manufacture
Input Material Changes		Reduce waste/toxicity of materials used in the production process
	Material Purification	Use a higher grade of crude oil during refining, thus reducing the amount of impurities that must be removed
	Material Substitution	Substitute water-based cleansers for solvent-based cleansers
Technology Changes		Reduce waste through process and equipment modifications
	Process Changes	Improve the efficiency of chemical reactions

	Equipment Changes	Use mechanical scraping systems for cleaning rather than solvents
	Process Automation	Automation can optimize product yields by automatically adjusting process parameters
Good Housekeeping Practices		Reduce waste by means of procedural and administrative measures
	Management and Personnel Practices	Offer employee education programs, bonuses and awards to encourage employees to reduce waste
	Waste Stream Segregation	Facilitate recycling by preventing mixing of different waste types, particularly hazardous and non-hazardous wastes
	Inventory Control	Use input materials before expiry dates
	Loss Prevention	Check for spills and fix leaks from equipment
	Cost Accounting	Allocate waste treatment and disposal costs directly to the departments or groups that generate the waste

Source: United States Environmental Protection Agency (1988)

8.4 Waste Management Policy at Enterprise Level

As virtually everything could become a waste and consequently a pollutant, only general guidelines on how to manage a waste problem can be given;

A waste policy at the enterprise level should comprise the following steps.

1. Identification and Control: know waste streams and classify then according to their harmfulness and their possibilities of reuse and recycling as the basis for further actions.

2. Prevent and Reduce; Search for al possibilities to eliminate or reduce waste at their source.

3. Recycle and Reuse: make best use of the existing wastes; use them for resource saving.

4. Dispose: develop safe methods of disposal.

Management strategy should follow the four steps explained above in order to deal effectively with wastes and pollution to improve environmental performance in a cost effective way.

8.5 Regulatory framework for Waste Management:

The legal and regulatory framework within particular countries affects decisions and actions taken for waste management. In countries where environmental agencies and policies have been established for the protection and enhancement of the environment, standards may well be available against which environmental management decisions can be judged or tested. A well developed system of regulatory emissions standards or objectives may place constraints on the environmental management of an organization, but will also provide a basis for measuring performance.

Environmental regulations are a means towards three basic objectives:

- To protect and conserve the environment as well as maintain environmental quality (air, water and land quality).
- To protect human health.
- To regulate resource consumption on the national level we may differentiate between three categories.
- Basic and enabling regulations: define objectives and powers of legislative and executive bodies.
- Environmental quality and anti pollution regulations.
- Resource conservation or resource management.

Environmental quality and anti pollution regulations are further divides between air quality, water quality, solid waste and toxic material regulations, they establish the criteria, define pollutants, set permissible limits and regulate control methods. These limits or standards set by the government agencies ideally reflect the current state of art and technology available for pollution monitoring and abatement. These standards not only ensure safety and health, but also become a main concern to managers to comply with these standards.

The regulatory approach for management of waste is most effective if the sanctions (e.g. jail terms, fines) associated with contravening those regulations are sufficient to counter industry's perceived avoided cost of continuing with its current, wasteful practices.

Beside command and control approach of managing waste the second approach is Polluter pays which imply charging of waste generated by the industry. This principle is widely implied as the waste is increasing day by day so it become expensive for the larger industrial units to pay for the effluents. Effluent charge is the most effective tool for compliance with standards. This charge is calculated on the basis of pollution load i.e. the kilograms of pollution carried in industrial effluent and heavy enough to exceed the cost of installing and operating cleaner production methods.

8.6 Motivation and Barriers

There are a number of factors that can motivate industry to reduce, reuse and recycle its wastes. Implementing a waste minimization program has been shown to help reduce production and waste disposal costs. It may also improve a company's corporate image or facilitate compliance with existing or future pollution regulations. Finally, it can be beneficial for the environment in a number of ways, such as through the reduction of pollution on-site, the reduction of pollution at waste disposal sites, and the reduction in energy and raw material inputs used.

There are also a number of important barriers that can hinder the implementation of waste minimization programs. The general types of barriers can be classified into six categories:

1. Economic,
2. Information,
3. Technological,
4. Regulatory,
5. Attitudinal
6. Physical.

The first four barriers are more serious problems in developing countries while the last two are encountered as frequently in developing countries as they are in developed countries.

A significant economic barrier is the cost of purchasing, maintaining and operating waste minimization equipment. Other economic barriers include lack of a market for recycled or reusable materials, and the low cost of waste disposal.

Information barriers can include lack of awareness about waste minimization incentive programs, technologies, markets, and the amount and type of waste generated by a company. A technological barrier may exist if technologies for recycling a specific waste stream do not exist or if product specifications are too stringent to allow the use of recycled or reused products and materials. Finally, lack of pollution control regulations and their enforcement can also act as a barrier to waste minimization initiatives.

An attitudinal barrier can exist if management is reluctant to take risks and is unwilling to consider changes in existing manufacturing processes or procedures for fear of affecting product quality. Another reason why firms may be reluctant to undertake a waste minimization program is simply because of organizational inertia.

There are two main types of physical barriers to the implementation of waste minimization programs. The first one is the problem of having insufficient quantities of waste to justify internal use or external collection. This barrier is particularly significant for small or very small industrial firms that generate lower volumes of waste than medium or large firms. Another physical barrier can arise from lack of sufficient storage space to accumulate wastes for collection. Again, this tends to be a more significant problem for small and very small firms.

The effect of waste minimization barriers can vary in their influence depending not only on the size of a firm but also on its type of industrial activity and on its ownership. Variation by industry group may exist because of differences in raw material inputs, differences in the types of waste materials generated, differences in production processes, and differences in product specifications.

There are several ways in which government can attempt to overcome the above-mentioned barriers and actively encourage industrial waste minimization activities. These include the provision of technical assistance programs, the creation and enforcement of pollution control regulations, the dissemination of information about waste minimization programs and opportunities, the establishment of financial incentives, and the foundation of award programs recognizing significant achievements in waste minimization. In developing countries, the implementation of many of these types of waste minimization incentive programs can only be made possible with the backing of foreign aid.

The dissemination of waste minimization information can be undertaken directly by government authorities, or governments can provide funding to universities, non-government organizations, or business associations for such programs. A wide range of activities could be supported in an information dissemination program, including education and training activities, the creation of a waste exchange, and the distribution of technical information bulletins.

Unit Summary

Waste generated form industries is heterogeneous in nature include solids. liquids, sludges and gases. In the start of environmental concern about waste generated by industry, end of pipe approach to manage waste is adopted which let production processes to generate as much waste as they wanted and then concentrate on safe disposal or treatment of waste. This approach besides being expensive is also have no benefit for environment.

The new approach is called cleaner production approach, which attacks the environmental problem at its roots. It requires reduction of waste at source; reuse and recycling thus reduce waste, conserve natural resources and energy.

To overcome the problem of waste industry should take volunteer action before time that it would be enforced to do so by government. The waste policy of industry should emphasize on prevention and reduction of waste, recycling and reuse.

Many countries, which have environmental agencies, have set standards for the discharge of waste and for effective compliance adopted market-based approach of effluent charging. However their some barriers in management of industrial waste which can be overcome by effective government policies.

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Uttar Pradesh
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PGD-ESD-01
INTEGRATED ENVIRONMENTAL
MANAGEMENT: RURAL AND URBAN

Block

3

Dimensional Approaches

UNIT 9

ECONOMIC DIMENSIONS

Unit Introduction

The idea of integration of economic concepts in environmental management is not very old. Economical instruments are now considered as best approach to control pollution and resource exploitation. This unit will introduce you with basic concepts of environmental economics and shows how these how these could be applied in the analysis of environmental issues. The unit includes:

- Causes of environmental degradation
- Use of desirable resources and minimization of pollution
- How resources could be used
- Economic dimensions of environmental management are:
  - Internalization of externalities
  - Discount factor
  - Cost benefit analysis
  - Cost effectiveness analysis
  - Market based incentives and disincentives

Unit Objectives

After reading this unit student will be able to learn:

1. Reasons for environmental degradation.
2. How internalization of external cost could prevent resource exploitation.
3. Role of discount factor in limiting the growth and sustainable development.
4. Cost benefit analysis and how it could be applied
5. Cost effectiveness analysis and its limitation and drawbacks
6. Market based approaches to control pollution

9.1 Introduction

Not long ago, the idea of environmental economics seemed to many a superficial concern, something not related to the everyday world of commerce, industry or most of people's lives. This idea has changed now. A look at the number tells us that the total costs of dealing with environmental issues are very large. By accepting the importance of environmental issues, we have agreed to bear these costs and therefore we cannot ignore the issue of the economics of environment.

Our economic analysis involves two different kinds of environmental issues: the use of desirable resources, such as fish in the ocean, oil in the ground, or forests on the land; and minimization of undesirable pollution. Environmental decision-making often involves analysis of both economic factors and intangibles, such as aesthetic factors. Of the two, the intangibles are more difficult to deal with because they are hard to measure and to value. Nonetheless, evaluation of the intangibles is becoming more important in local, regional and national land use planning and environmental economics is to develop a method of aesthetic evaluation that provide good guidelines, is easy to understand, and is quantitatively credible.

As discussed earlier that our economic analysis of environment involves use of desirable resources and the minimization of undesirable pollution.

9.1.1 Use of desirable resources

Some biological resources, such as much of the forestland are on the publicly owned lands that are accessible to everyone. A society that controls resources such as public lands and waters has a number of social mechanisms to achieve its environmental goals. Laws and regulations are one method; use of resources by individuals or companies can be limited by setting quotas or by regulating use through licenses. Or a society may simply rely on individual motivation, on the assumption that what people find themselves will also be best for society. This approach leaves the individual complete freedom of action.

Those who are concerned about the environment often wonder why individuals don't choose to act in away that always protects the environment and maintains biological resources in a renewable state. When individuals benefit from the resource, it would seem to be in their best interests not to damage or destroy it. One explanation is provided by the economic analysis, which shows that he profit motive, by itself, will not always lead a person to act in the best interest of the environment. When a resource is shared, an individual's personal share of profit from exploitation of the resource is usually greater than the individual's share of the resulting loss. This is called 'tragedy of the commons." There are many example of commons, both past and present, an important one today is deep oceanic sea beds, where there areas are a true commons. Since the high seas have always been considered as areas open to all and not ht property of any single nation. Another example is Antarctica. Although there are some nation territorial claims on this continent, most of the continent is a common. Without some management t or control, all natural resources treated like commons will inevitably be destroyed.

Another reason individual tend to over exploit natural resources held in common, is low growth rate of resources. It is quite reasonable and in fact quite practical if one considers only direct profit and harvest resources as much as he can. The problem of commons and of profit be made, make several points clear.

1. If we want to conserve resources, we must think beyond the immediate, direct economic advantages.

2. Policies that seem ethically good may not be the most profitable for an individual.(Botkin and Keller, 1995)

9.2 How resource can be used?

Most economists look resources as means to an end, rather than having value in them. Resources have to be used to be of value e.g. if you bury your saving in a jar in the ground it will last longer but may not be worth much when you dog it up. If this saving is invested productively, it will have much more in the future than now. Furthermore, a window of opportunity for investment may be pen now but not later. How do we determine the value (or price) of environmental goods and services? Some of the most crucial environmental factors that may shape our future are not represented by monetary values in the marketplace. Certain resource allocation decisions are political or social. Other resources are simply ignored. Groundwater, sunlight, clean air, biological diversity, and other assets that we all share in common often are treated as public goods (benefits) that anyone can use freely. Our economic system typically has not charged for using the absorptive capacity of the environment to dispose of wastes despite ample evidence that this capacity can be exhausted.

In theory, these resources are self-renewing, but many vital environmental assets are threatened by human activities. If we damage basic life support systems of the biosphere, we cannot simple substitute another material or service for the ones that have become limited. The crux of this question is how we should manage resources in a market system. Let's look now at how our economic system handles internal and external costs and discount factor.

9.3 Internalizing the Externalities

Internal costs are the expenses (monetary or otherwise) that are borne by those who use a resource. Often, internal costs are limited to the direct out of pocket expenses involved with gaining access to the resource and turning it into a useful product or service.

External costs are the expenses (monetary or otherwise) that are borne by someone other than the individuals or groups who use a resource. External costs often are related to public goods and services derived from nature. Some examples of external costs are the environmental or human health effects of using air or water to dispose of wastes. Since these effects usually are diffuse and difficult to quantify, they do not show on the ledgers of the

responsible parties. They are likely to be ignored in private decisions about the costs and benefits of a purchase or a project. One way to use the market system to optimize resource use is to make sure that those who reap the benefits of resource use also bear all the external costs. This is referred to as internalizing costs.

An externality is an effect not normally accounted for in the cost revenue analysis of producers. Air and water pollution provide good example of externalities. Consider the production of nickel from ore at the smelters, which has serious environmental effects. Traditionally the economic costs associated with the production of commercially useable nickel from an ore are the direct costs those borne by the producers and passed directly on to the user or purchaser. In this case direct cost include the costs of purchasing the ore, of energy to run the smelter, of building the plant and of paying employees.

On the other hand, costs associated with the degradation of the environment from the emissions from the plant are traditionally considered externalities and are called indirect costs. Some environmentalists suggest that indirect cost should be included in the cost of production through taxes or fees. In this way expense would be borne by the corporation that benefits directly from the sale or would be passed to the users. Other suggests that these costs should be shared by the entire society and therefore paid for by general taxation of citizens.

9.4 Discount factor

"A bird in hand is worth two in the bush." All of us are familiar with the saying that suggest it is better to have something now than in the distant future. This economic concept, the future value compared with the present value, is another important idea for environmental studies. Economist refers this concept as discount factor. The discount factor is the ratio of future worth to present worth. Economists observe that market determines a discount factor that is often, but not always, less than 1. A discount factor less than 1 means that something promised in the future has less value than some thing given today. The market determined discount factor is the result of the interaction of the consumer's preferences for present and future consumption to future consumption.

As an example, suppose that you have are dying of thirst in a desert and meet two people; one offers to sell you a glass of water now, and the other offers to sell you a glass of water if you can be at the well tomorrow. How much is each glass worth? If you believe you will die today without water, the glass of water today is worth all your money and the glass tomorrow is worth nothing. This is an extreme example of a discount factor.

In practice, things are rarely so simple and distinct, but we all know that we are mortal, so we tend to value personal wealth and goods more if they are available now than if they are in future. Modern concerns with the environment have placed a new emphasis on the discount factor. Conservationists often argue that we have a debt to future generations and must leave environment in at least as good condition as we found it. They argue that future environment is not to be valued less than the present.

Different attitudes towards the discount factor pose a dilemma for environmental studies. First economists argue that it is difficult, if not impossible, to make a sound economic analysis when the discount factor is greater than one. Secondly many people argue that humans really do place a higher value on a possession in hand today than on one promised tomorrow when he might be dead. The concept of discount factor however important as we seek the environment we desire.

Activity 9.1

What discount factor (approximately does each of the following people assume for fish?

Fisherman: if you don't get it now some one else will.

Fisheries Manager: by sacrificing now, we can do something to protect fish stocks.

9.5 Cost Benefit analysis

One way to evaluate the outcomes of large-scale public projects is to analyze the costs and benefits that accrue from them in a cost benefit analysis. A cost benefit analysis compares the estimated costs of a project with the benefits that will be achieved. Such an analysis is often used as a means of rationally deciding whether to proceed with a given project. All costs and benefits are given monetary values and compared by means of what is commonly referred to as a benefit cost (or cost benefit) ratio. A favorable ratio for a project means that the benefits out weight the costs. Such a project is said to be cost effective, and there is thus an economic justification for proceeding with it. The analysis usually involves considering several options for accomplishing the project and selecting the option with the best benefit cost ratio. If costs are projected to out weight benefits, the project may be revised, dropped, or shelved for later consideration.

This process assumes that values can be assigned to present and future resources, given proper criteria and procedures. It is one of the main conceptual frameworks of resource economics. This process is controversial, however, because it deals with vague and uncertain values and compares costs and benefits that are as different as apples and oranges. As shown in the figure 9.1, several different tributary paths come together to determine the final outcome of this process. The easiest parts of the equation to quantify are the direct costs and benefits to the developer or investor who has proposed the project; i.e., the out of pocket expenses and the immediate profits that will result from this investment. These direct monetary costs and benefits are usually the most concrete and accurate components in the analysis. It is important that they not outweigh other factors more difficult to ascertain but of equal importance.

The other branch of the flowchart involves analysis of more diffuse, non monetary factors such as environmental quality, ecosystem stability, human health impacts, historic importance of the area to be affected, scenic and

recreational values, and potential future uses. These are difficult values to quantify. It is even more difficult to express them in monetary terms.

How much are beauty or tranquility worth? What are the benefits of ethical behavior? How much would you pay for good health?

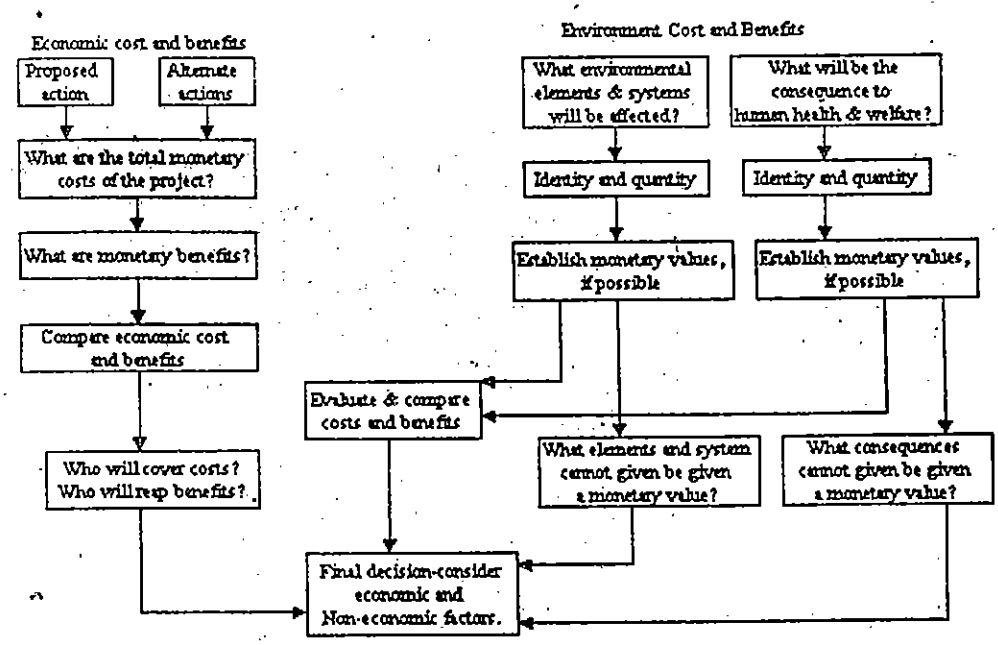

Figure: 9.1 A Flow-chart for a cost benefit analysis
(after Cunningham& Saigo, 1995)

Some costs and benefits simply cannot be expressed in monetary terms. These invaluable (in a positive sense) factors bypass the mathematical stages of comparison and are considered, we hope, in the final decision making process, which in more political then mechanical. Also factored in at this stage are distributional considerations; i.e., who will bear the costs of the project and who will reap the benefits? If these are two different groups of people, as they usually are, questions of justice arise that must be resolved, perhaps in some other venue.

Criticisms and complications of this process include the following:

- *Absence of standards.* Each person assesses costs and benefits by his or her own criteria, often leading to conflicting conclusions about the comparative values of a project. It has been suggested that an agency or influential groups set specifications for how factor should be evaluated.

- *Inadequate attention to alternatives.*To really understand the true costs of a project, including possible loss of benefits from other uses, it is essential to evaluate alternative uses for a resource and alternative ways to provide the same services. These steps are often slighted.

- *Assigning monetary values to intangibles and diffuse or future costs and benefits.* Some critics of this process claim that we should not even try. They believe that attempting to express all value in monetary terms suggests that only monetary gains and losses are important. This can lead to the "slippery slope" argument that everything has a price and that any behavior is acceptable as long as we can pay for it.

- *Acknowledging the degree of effectiveness and certainty of alternatives.* Sometimes speculative or even hypothetical results are given specific numerical values and treated as if they were hard facts. We should use risk assessment techniques to evaluate and compare uncertainties in the process.

- *Justification of the status quo.* Agencies may make decisions to go ahead with a project for political reasons and then manipulated the data to correspond to preconceived conclusions.

Cost benefit analysis however intend to build efficiency into policy so that society does not have to pay more than is necessary for a given level of environmental quality. If the analysis is done properly, it will take in to consideration all of the cost and benefits associated with a regulatory option. In so doing, it must address the problems of externalities.

Cost and benefit analysis works well only if the all of the costs and benefits of a polluting activity are included in the calculations. Let us assume this is possible. What would happen if every one had to pay the true costs of their use of environment as they used resources or degraded the air or water? Such charges are often called green fees. Oddly enough, two groups that frequently are at each other's throats, economist and environmentalists, both agree that such a policy would go a long way toward solving many of our environmental problems.

Economist point out that in a free-market economy, the market will guarantee that in resources will be used in the most efficient way. This means that business and people who use, say, 100 gallons of gasoline and have to pay a levy that reflects the true costs of that gasoline will be highly motivated to keep their use of gasoline to an absolute minimum. They will adopt alternative modes of transportation and more efficient vehicles. The green fee could be impose as a tax on gasoline, and to ease its impact on the economy, the fee could be implemented gradually until it brings the price of gasoline to its true level. Group of environmentalists say that the people who do the damage pay for their environmental impact, something environmental groups have been calling for all along. They insist that some of the revenues collected should be used to mitigate the impacts of pollution and resource use, but if this were to be accomplished, the outcome would move over society in the direction of sustainability.

The question is, would such a policy be politically feasible? Proponents think that it may be. If people are asked if they like higher taxes the answer is highly predictable no. But if asked whether they would rather be taxed on their energy use, chases of high-impact good than be they might well choose the former, especially if they can appreciate for environmental benefits that accrue from such a policy.

9.6 Cost Effectiveness Analysis

We know that with modest degree of clean up, benefits of a project can outweigh the costs. In the clean up efforts, at some point, cost of controlling pollution could exceed the benefits. Consequently while it is argued that we should strive for 100% control, demanding more than 90% control may involve enormous costs with little or no added benefits. At the point when control of a particular pollutant reaches 90%, it make more sense to allocate dollars and efforts to other projects where greater benefits may be achieved for the money spent. Optimum cost-effectiveness that meets the efficiency criterion for public policy is achieved at the point where benefits outweigh the cost. Cost effective analysis provides an economic justification for proceeding the project or activity.

In reaching the goal of cost effective analysis, problem arises in comparing the cost and benefits. Even after valid cost and benefits estimates are obtained, the comparison is often complicated as during the initial stages of control, costs are high and observable benefits are usually few or none. As time passes, however, costs generally level off, while benefits increase and accumulate. Consequently, whether benefits outweigh cost or vice versa depend on whether one takes a long term or short term view. A situation that seems cost ineffective in short term may be extremely cost effective in long term. This is particularly true for the problem such as acid rain or ground-water contamination from toxic wastes. In these instances, the consequences of delaying control may seriously affect large geographic areas and many millions of people, and they may be irreversible.

Those who bear the cost of pollution control and those who receive most of the benefits are frequently different groups of people. For example, industry and it stakeholders may bear the costs of curtailing effluents into a river, while people who enjoy sport fishing gain the benefits. Obviously, the two parties are more than likely to reach different conclusions regarding the cost effectiveness of a particular action.

9.7 Market based incentives and disincentives

What is the most efficient and economical way to eliminate pollution? Some people argue that we should simple say to polluters, "Stop it! You can't dump garbage into the air or water anymore" while this approach has a certain moral appeal; it tends to force all businesses to adopt uniform standards and methods of pollution control regardless of cost or effectiveness. This approach also can lead to an adversarial climate in which resources are used in litigation rather than pollution control.

Furthermore, the "command and control" approach tends to freeze technology by eliminating incentives for continued research and development. Industry is discouraged even prohibited from trying new technologies or alternative production methods. These problems can be overcome, many economists believe, by using market mechanisms to reduce pollution rather than rigid rules and regulations. Since there may be a one hundred fold variations in the cost of eliminating a specific pollutant from different sources due to age of the equipment use, environmental factors and

other considerations, market based incentives such as pollution charges or tradable permits can be more cost effective and flexible than simply saying "Thou shalt not."

Economic incentives and disincentives are the two major categories of instruments that can be harnessed in support of environmental policies. Each in turn can influence the environment in two ways:

- Through stimulating adjustment to the allocation of scarce economic resource between sectors; and
- Through encouraging the adoption of improved resource management practices.

Self Answering question 9.1

What are the advantages and disadvantages of regulatory approach vs. a market based approach to control pollution.

9.7.1 Economic incentives

Economic incentives can be one of the major engines for development. Economic incentives include;

9.7.1.1 Grants

These can be used to promote resources uses that are both environmentally and economically sound. This also applies in the case of management practices. Such incentive could be targeted either towards meeting physical requirements in pursuit of efficiency (for the purchase of equipment) or towards making an investment in human capital (perhaps for the training of extension workers). In the past positive environmental results have been achieved through the use of grants and allocations for specific projects.

9.7.1.2 Subsidies

Subsidies in support of commodities and inputs are a common form of incentive through which the government seeks to benefit a specified usually private, sector of the economy. The government of Pakistan spends more than 9.5 billion on subsidies, approximately 1.3% of the gross domestic product, a sum slightly larger than the total expenditure on health. As temporary vehicle for speeding the adoption of desirable practices, subsidies undoubtedly have a useful role to play.

On the other hand, certain subsidies have undoubtedly had an adverse impact. Price control on agricultural commodities and the subsidized distribution of food imports over the past few decades in Pakistan appears to

have contributes to poor agricultural practices, leading to poor soil conditions. In short the benefits accruing from a subsidy are linked to the particular resource uses and management practices that are promoted, either directly or indirectly. In designing a subsidy programme, particular care clearly needs to be taken so as to avoid any possible adverse indirect effects.

9.7.1.3 Fiscal Relief and Concessions

Whilst fiscal relief and concessions represent a third avenue for resource use and sustainable development programmes, it should be noted that the direct tax base in Pakistan is very low. Thus scope for tax incentives is restricted to the formal and organized sectors, which constitute a relatively small part of the national economy. To encourage he demand for products government could provide indirect tax exemption; a sales or excise tax could be waived, for instance, to assist particular resource use practitioners.

9.7.1.4 Tariffs or Quotas

A fourth type incentive is the imposition of tariffs or quotas in order to protect environmental benign producers. In an economy that is in process of being gradually liberalized, these instruments could pay a marginal role at best. It may however, be worth considering whether export incentives for environmentally recommended produce could be incorporated into current programmes for infrastructural investments. Such an opportunity could be provide by the fruit and vegetable sector.

9.7.1.5 Prizes

A highly visible form of incentive is the institution of much publicized prize, awarded to those judged the most successful in undertaking environmentally progressive measures. Rules for award schemes need to be carefully drawn up. A panel of adjudicators also needs to be established and briefed before such a high profile incentive could become effective.

9.7.2 Disincentives

Economic disincentives are almost exact opposite of the incentives, namely levies, taxes, restricted tariffs/quotas and penalties or fines. Better resource use is sought through negative and punitive measures. The same net effect is achieved by rescinding subsidies that have outlived their usefulness or become subject to abuse.

Table 9.1 Categories of economic incentives and disincentives

Types of instruments	Type of application	
	Sectoral resource allocations	Resource management practices
Incentives		
Grants	*	*
Subsidies	*	*
Fiscal Relief/Concessions	*	*
Tariffs and quotas	*	
Prizes		*
Disincentives		
Levies	*	*
Taxes	*	*
Restrictive tariffs	*	*
Penalties or fines		*

Unit Summary

Although scientific solution of environmental issues are part of the over all environmental management, however market based approaches and economic analysis of environmental issues are very effective tool for managing environment. Economic analysis of environmental issues tell us that resources should be utilized in effective manner rather than conserving them. Resources may be common property or privately owned. The kind of ownership affects the method available to achieve an environmental goal. To avoid overexploitation of the common resources, internalization of external cost in product is good strategy. Discount factor is another method to affect our willingness to pay for an environmental good.

If costs of all the resources used could be estimated, cost benefit analysis of a project could tell us that whether a project is feasible for environment or not. Problem with this approach is that some of the costs and benefits could not be expressed in monetary terms more over there are no set standards for estimating the costs and benefits. If a project has more benefits than its cost, the project is said to be cost effective. This analysis is very complicated and complex as involve comparison of costs and benefits however it is proved to be beneficial for some projects. Market based approach of giving incentives and disincentives for pollution control is proved as very effective tool for changing the behavior of individual and industry to control pollution.

Answer to Self Answering Question 9.1

The regulatory approach such as command and control tends to force all business to adopt uniform methods and standards of pollution control regardless of cost or effectiveness. This approach can also lead to adverse climate in which resources are used in litigation rather than pollution control. Further more the command and control approach tends to freeze technology by eliminating incentives for continued research and development. Industry is discouraged from trying new technologies or alternative production method.

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UNIT 10

TECHNOLOGICAL DIMENSIONS

Unit Introduction

With science and technology have come great benefits and also great harm. The dominant patterns of production and consumption are altering climate, degrading the environment, depleting resources, and causing a massive extinction of species. Dramatic rises in population has increased the pressure on ecological systems and have overburdened social systems. To meet the demands of increasing population technology has come forward. There are two opinions about technology: one is that the technology is the main cause of environmental deterioration and other is that the technology is the solution to environmental problems. In this unit we will explore the both point of view.

It is well recognized that three types of technologies may contribute to economic development.

1. Technologies that contribute to deterioration of the environment and use significant natural resources.
2. Technologies that have little or no effect on the environment.
3. Technologies that restore or improve the environment and draw upon natural resources without significant long-term depletion.

Unit Objectives

After completing this unit, the students should be able to learn about:

1. How do we create greater economic and social well-being for more people around the world without deteriorating the environment and depleting the resources that future generations will need for their well being?
2. Technology need not be a detriment. It can in fact make a sustainable future possible.

10.1 Technology and Environment

Since the early 1970s, the challenge for a sustainable future has been seen in the following relationship:

Environmental impact (negative) = Population x Standard of living x Technology

The above equation for environmental impact is incomplete. Technology need not be a detriment. It can in fact make a sustainable future possible. It is well recognized that three types of technologies may contribute to economic development.

1. Technologies that contribute to deterioration of the environment and use significant natural resources (T1).

2. Technologies that have little or no effect on the environment (T2).

3. Technologies that restore or improve the environment and draw upon natural resources without significant long-term depletion (T3).

How do we create greater economic and social well being for more people around the world without deteriorating the environment and depleting the resources, which future generations will need for their well-being?

Hence,

Environmental impact = Population x Affluence x Technology

Our challenge, therefore, is to address the what(s) and the how(s) of the T2 and T3 technologies and the underlying sciences upon which these technologies are built.

What

- What are the technologies that we want to encourage and develop?
- What are the technologies that can bring true benefits to society while meeting mankind's needs?
- What kind of research do we want to fund?
- What are the technologies that can be developed locally?
- What are the technologies that can be transferred readily to the regions of the worked where they can be used best?
- What are the sciences that we want to explore?
- What are the technologies that show the most promise for the future?

How

- How do we [illegible] the value of these technologies?
- How can we get the technologies to the most good?

- How can technology be transferred around the worked and perfected locally?
- How do we overcome the many barriers to such transfer of technology?

10.2 Perspectives

Some perspectives towards arriving at solutions to the above challenges are listed below:

- To make sustainable d3evelopment a reality, industry must lead and innovate. The industry as society's producer has a special role in sustainable development. It cannot view environment and business as two different topics or competing issues. It is the industry that can turn technical solution sand opportunities into realities.

- Sustainable development requires step-by-step changes in the way we do things, and these changes must be built from the ground up, sustainable development is not a direct process; rather it needs to be built up and is derived from a myriad of often independent actions.

> ***Case of DuPont***
>
> In DuPont, sustainable development has required a rethinking of virtually every single industrial process and product. A step-by-step change is required in the way we think about every aspect of environmental protection in every individual new product and process development, and in every way that we integrate business, growth with environmental objectives. This calls for attention to many of these independent actions, and has led us to challenge the mindsets, the thinking and the actions of all DuPonters. The challenge is to strive for the goal of Zero for all injuries, illnesses, incidents, an emissions, - or zero wasted resources, whether natural, human, or capital, in every individual activity undertaken. This challenge will work because we have learnt over the past few years that sustainable development can happen only one household at a time, and, one manufacturing plant, one chemical process, one industrial product, one community, one region at a time.

- Economic vitality is required for long-term environmental protection and sustainable development. Long-term environmental protection will only take place in the context of economic growth and vitality. Economic vitality is part of local sustainability. A community has to be competitive educationally, economically, and in other ways to attract investments, which provides jobs and income, Economic growth, environmental protection, and strong social systems must be addressed together as part of a vision of sustainability.

- There are many science and technology options that will lead to economic growth and be compatible with sustainable development, but it will take a commitment on the part of the industry, an understanding on the part of society for these to be pursued.

  Energy from renewable resources, sustainable agriculture with low use-rate herbicides or with biotechnology; advanced materials making communications faster and easier based on recyclable resources, inherently safe and non-polluting manufacturing processes (zero waste) are some of these options.

  We are moving into an era where knowledge not labours, raw materials, or capital is a key resource. As it reduce the need for raw materials, labour, space, capital, and other inputs, knowledge becomes the ultimate substitute – the central and continually renewable resource of an advanced economy – in an economy committed to sustainable development. The software industry in India is an excellent example. Communicating the knowledge in the most effective way becomes an important challenge. Here materials such as fused silica optical fibers, optical switches, and wave-guides will play an ever-increasing role in communications tools increasing the ease, power, portability, and ability to store and manipulate information, while decreasing the weight, mass, and total resources used.

- Expenditures on environment-related technologies will change. Near-term investments in remediation and restoration will be for cleaning up target sites. Intensified expenditures in technologies to avoid environmental harm will reap rewards. By 2024, many industries will approach a zero-discharge goal, but some control technologies may still be required to deal with residual discharges. Well into the 21st century, we will have moved from a mindset of clean up and control to one based on anticipation, avoidance, and assessment.

- There are many options for transferring environmentally related technologies and technologies that support sustainable technologies that support sustainable development. Public policy and possibly some new business models will be required to deliver the benefits of these technologies around the world.

  Some options include donations (nylon for water purification to combat the guinea worm disease, intellectual property to universities of government based research); exchanges (natural products or microbes as the basis for pharmaceuticals); a low-royalty or joint venture technology transfers is a way that builds the local economy.

These and a number of difficult issues related to the what and the how of science and technology need to be addressed to further sustainable development.

10.3 Relationship of Technology with socio-economic Factors

The supply of a particular natural resource available for human use is not determined so much by the absolute amount present on the earth as by economic, social, and technological factors. Let's look more closely at there *relationship.*

Supply depends on:

1) which raw materials can supply a service using present technology,
2) the availability of those materials in various quantities,
3) the costs of extracting, shipping, and processing them,
4) competition for those materials by other uses and processes,
5) feasibility and cost of recycling already used material, and
6) social and institutional arrangements in forces.

In a market system, most of the considerations previously mentioned are expressed in terms of market previously mentioned are expressed in terms of market price for good or service – the amount it sells for. The available quantity of a resource or opportunity usually increases as the price rises For example 1978; the Congressional Office of Technology Assessment estimated that at $ 11 per barrel some 21 billion barrels of oil were available in the United States if the price were to double to 42 billion barrels. The reason for this increase was not that new oil was being created but that it became worthwhile to drill into lower quality and more remote oil fields as prices rise, If the price were to go even higher, furthermore, substitute fuels such as oil shales and tar sands that are not now economical to extract might become competitive with oil. The effect would be as if a whole new resource has been created.

In economic terms, the relationship between available supply of a commodity or service and its price are described by supply/demand curves. Demand is the amount of a product that consumers are willing and able to bury at various possible prices assuming they are free to express their preferences. Supply is the quantity of that product being offered for sale at various prices, other things being equal. The inverse relationship between supply and demand is shown in the supply/demand graph in figure 8.9. As the price rises, the supply increases and the demand falls. The reverse holds as the price decreases.

In a mature market of willing and informed buyers and sellers, supply and demand should come into market equilibrium, represented in figure 8.9 by the intersection of the two curves. Ideally, if all parties in the market act independently, competition should result in high efficiency and the best possible products at the lowest possible price. Adam Smith, in his 1776 economic classic The Wealth of Nations, described this as an "invisible hand" that leads buyers and sellers who intend only their own gain to promote the public good more effectively than they know or intend. Not all buying and selling decisions follow classic supply and demand curves,

however. Some choices depend on other factors. When sellers increase the Quantity available faster than prices increase, or if buyers increase their purchases more rapidly than prices are falling, we say that the product has price elasticity.

10.3.1 Market Efficiencies and Technological Development

In a frontier economy, procedures for gaining access to resources and turning them into useful gods and services tend to be primitive and inefficient. As markets develop, however, experience accumulates in obtaining and working with a particular resource. Specialization and experimentation lead to discovery of new, more efficient technology, making it possible to produce larger quantities of goods at lower prices. At each successive stage in this development process, a larger quantity of product is available at a lower price. The effect is that the standard of living increases at lest in economic terms.

10.3.2 Population Effects

Growing populations can offset advances in science and technology. As the number of workers increases, a point may be reached at which there are not enough jobs to employ everyone efficiently. As a result, the productivity per person will decline and wages will fall. The pressure on resources created by more mouths to feed and more bodies to clothe intensifies this predicament. As more people use more resources, we must look to less accessible or desirable supplies. The prices of raw materials increase, as do the prices of goods and services provided by those resources; thus, the cost of living goes up and the standard of living declines. This "iron law of diminishing returns" led Thomas Malthus to predict that unrestrained population growth would inevitably cause the standard of living to decrease to a subsistence level where poverty, vice, and starvation would make life permanently drab and miserable. This dreary prophecy has led economics to be called "the dismal science."

Growing populations also place a strain on economic development by diverting the capital necessary for growth. In a rapidly growing country, a large proportion of the population is made up of children who require social overhead expenditure, such as new housing, schools, and roads that contribute little to development. Creating new jobs needed to employ a growing population can trap capital in conventional industries, lessening investments in new technology that might provide a real improvement in the standard of living. This diversion of investment capital is called the population hurdle.

On the other hand, growing populations also can create markets that encourage specialization, innovation, and capital investment that result in efficiency. They can bring young, energetic, and better trained workers into the workforce and make changes possible in traditional ways of doing things. Some demographers argue that while growing populations cause problems, they also result in more human ingenuity, energy, and cooperation to solve those problems. Where are we now in the process of economic development and population growth? Are we on a curve of

diminishing returns, or are we benefiting from economy of scale in terms of human populations and environmental problems?

10.3.3 Factors that Mitigate Scarcity

Human social systems can adapt to resource scarcity (a shortage or deficit in some resource) in a number of ways. Some economists point out that scarcity provides the catalyst for innovation and change (Fig. 10.1). As materials become more expensive and difficult to obtain, it becomes cost efficient to try to discover new supplies or to use the ones we have more carefully; thus, we may be better off in the long run because of these developments.

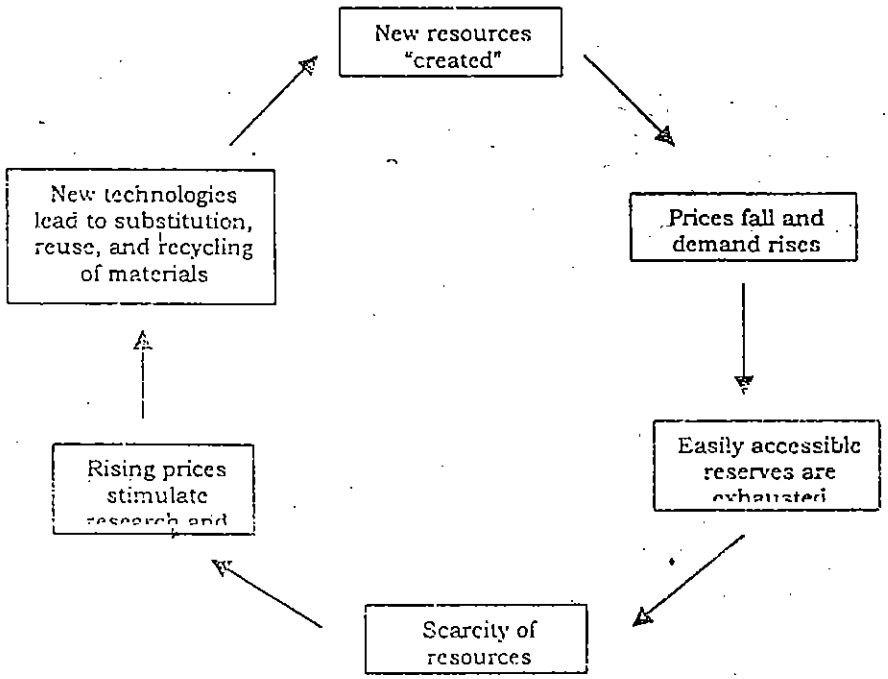

Figure 10.1

Scarcity/development cycle. Paradoxically, resource use and depletion of reserves can stimulate research and development, substitution of new materials, and the effective creation of new resources.

Several factors can alleviate the effects of scarcity:

- Technological inventions can increase efficiency of extraction, processing, use, and recovery of materials.
- Substitution of new materials or commodities for scarce ones can extend existing supplies or create new ones. For instance, substitution of aluminum for copper, concrete for structural steel, grain for meat, and synthetic fibers for natural ones all remove certain limits to growth.

- Trade makes remote supplies of resource available and may also bring unintended benefits in information exchange and cultural awakening.
- Discovery of new reserves through better exploration techniques, more investment, and looking in new areas becomes rewarding as supplies become limited and prices rise.
- Recycling becomes feasible and accepted as resources become more valuable. Recycling now provides about 37 percent of the iron and lead; 20 percent of the copper, 10 percent of the aluminum, and 60 percent of the antimony that we consume each year in the united States.

10.3.4 Increasing Environmental Carrying Capacity

Economist Julian Simon says that in spite of recurring fears of natural resource scarcity, the mitigating factors listed above have made every commodity cheaper in real terms as far back as we can find records. In fact, responding to the growing scarcity of resources actually enables us to increase the carrying capacity of the environment for humans. There has been about a 500 percent increase in real per capita GNP during this century even though average working hours have declined, population has tripled, and the easily accessible local resources largely have been used up.

Will this economic progress be sustained, however? Ecologist Paul Ehrlich contends that increasing levels of population and consumption will inevitably head to scarcity and rising prices as more of us try to share le and less. In 1980, Ehrlich made a wager with Simon. They bet on a package of five metals chrome, copper, nickel, tin, and tungsten—priced at $1,000 in 1980. If the 1990 combined prices, corrected for inflation, were higher than $1,000, Simon would pay the difference. If prices had fallen, Ehrlich would pay. In 1990, Ehrlich sent Simon a check for $576.07; prices of these five metals had fallen 47.6 percent. In fact, prices for most metals have fallen substantially over the past century. Would you care to bet on whether this pattern would hold for the next century? Most countries have not shared in the rapid increase wealth enjoyed by the United States in the past century.

10.4 Environmental Technology

The concept of sustainable development is a human invention, or better still, a formulated rediscovery of the 20th century. Nature itself has always been sustainable, *i.e.* it has been self-regulating and balance –oriented. Humans have increasingly intervened in this self-regulation, largely through the technological advances equated with progress. The result is an absolutely unnatural, exponential expansion of the human species (exponential growth, longer lifespan, etc,). In future attempts at sustainable development, one is trying to reduce the human effects on natural systems and interactions while at the same time striving to make the western standard of life available to people. How realistic and wise this approach is, is debatable.

When referring to environmental technology, one usually talks about the natural sciences, - the basis of many discoveries and realizations that has led to the steady downfall of the environment. Natural sciences have guided us down a path through the industrial revolution to where we now stand with our all-governing economy and no sense of direction. At this point, we depend on this pathway the natural sciences again to mend the damage. We believe that modern, environmentally- just technologies concrete sustainable standards of life, i.e. satisfy needs of growth, - oriented populations only through the renewable resources. Environmental technology founded on science and engineering plays an integral role in the necessary change to a so-called sustainable, human balance. Questioning the conditions of our technological progress now would have unthinkable effects on our current way of life, with associated complex economic and material interconnections.

A critical question that needs to be addressed is whether following this path narrow-mindedly is sufficient and whether it makes sense to continue such unadapted ways of life. Even if we make use of the currently known environmental and resource-saving techniques with the greatest possible financial stake, it would at best be enough to control increasing growth. The effort would place us at a status quo, *i.e.* we would still be living off our capital instead of our interest. Technological possibilities have limits, even with factors of 3,4, or 10 in, for example, the energy sector, since our current way of life rests on material flow, However, the most important question in this context deals with the social readiness to invest all available powers and funds in a technological revolution. A look at our daily political and economic happenings reveals an incapability to think beyond the constraints of the system and act – instead of just react on what environmentalists know and can do today. How reliable is it then to bet on the technological and scientific path in solving our problems? Is it not just an illusion when we speak of improving our own standard of life thanks to these techniques, while at the same time – due to an inner uneasiness – proclaiming that all people in the future will no only be provided for, but will also be taking part in the so-defined wealth?

Is there only one path to the technological revolution or are there plausible alternatives? Where do the social sciences remain in this discourse on the future? Where are the voices of philosophy, ethics, and theology in the planning of the sustainable society? Was it not these areas that influenced the evolution of humans over centuries and that actually acted as the higher authorities over the natural sciences and life in general? How do you reconcile technocracy with democracy and rationality with emotional aspects? How do you reconcile the rapidly increasing dependence on technological systems and constraints with ideals of freedom, independence, happiness, and joy?

Energy

Let us consider the example of energy. According to the German physicist, H P Durr, untamed human hunger for energy is a danger far greater than that posed by population growth. Even if it were possible to provide food and water to 6 billion people today and may be even 10 billion or more by 2050, there still is the question of what these people would do, this question surely cannot be solved on a purely technological basis. In Durr's opinion, the current worldwide energy turnover of 13 terawatts corresponds to a performance equivalent of 130 billion energy slaves. One energy slave corresponds to one quart3er of a horsepower or an average human performance of 100 W in a 12-hour working day. The population of 6 billion people – of which approximately one-third has no, and another one-third has little; access to commercial energy implicitly requires 22 times more energy slaves.

How many energy slaves can our biosystem endure in the future? How can we crate democratic conditions when on an average an American requires 110, a western European 60, a Chinese a modest 8, and a Bangladeshi only 1 such energy slave. And to thin that each European's 60 energy slaves continue to work for them while they are in bed! Approximately 250 energy slaves are needed to operate a medium-range car; an total of 700 for a model of the S-class seems a bit extravagant.

Can we get this situation under control with a technology revolution even if ti is run at full speed? Is a switch to renewable energy sources conceivable with what we know? We know that the world energy consumption rose by a factor of 80 in the 20th century with a relatively small six fold increase in world population, and that in 1999 alone we burnt the same amount of fossil fuels as was produced in a million years. How much of fossil energy would we need just to perform the switch to renewable resources and what type of economic system would allow such action?

10.5 Role of Environmental Sociology

The above example illustrates that the future of humankind on this planet will not be possible through technological innovation alone. Behavioural change and cuts in material and resource consumption is necessary, and this is where social sciences can play a major part. Social sciences deal more with emotions and social attitudes than with matter and material functions, as opposed to natural sciences. Economics is also a subject that cannot be ignored for it influences our lives today like no other area of science. While economics has made itself fairly independent and risen to a rank above even technological and industrial development, the remaining social sciences have been degraded primarily to adjustment helpers in a materialistic world. They are no longer leading agents in the questions of

ethics, morals, or human consciousness. Instead, they exist to standardize people in this world, correct deviant behaviour, and to create tame citizens and good consumers with increasing needs. It is necessary that social scientists constructively begin dealing with plans for the future. Here, like for the natural sciences, the conversion of accumulated knowledge to practice is needed. The difficulties for the social sciences lie in the fact that there is no industry supporting them for knowledge or access to any concrete goods. They lack the economic lobbies, which have long since replaced political hegemony. This makes the knowledge that social scientists produce limited in its economic value and results in little financial support for research.

However, social sciences can fire crucial impulses that can lead to a quasi non-material, sustainable future. It will not cost the environment anything, whether material or energy, to change humankind. The sustainable path of the future will consist of adapting humans to the environment and not vice versa. Based on findings from psychology and from Behavioural and social research, all subjects that seem to be over—looked in concrete future planning –alternatives to theories based solely on technological innovation – do exist. Cognitive knowledge is not enough to change human behaviour. Behavioural change is only possible when an emotional, close-to-home component is added to cognitive realization. Theory without practice is insufficient if learning processes have to be transferred. The fact that we often do not react until we are immediately confronted with catastrophe is a truism that needs to be abolished. Crating space for new behaviours to be tested in realistic, everyday situations can do this. Social research in practice requires room for experimentation within the setting of the leisure industry where new environmentally friendly lifestyles – less energy- and material –intensive – can be tested. In the process, factors such as social complexity and entanglement of individual's in society stand to be considered.

The results of a question in a recently concluded socio-psychological study by the OECD (Organization of Economic Cooperation and Development) in 19 developed and developing nations show that we have already hove past the point where economic growth and technological progress equate to better living standards in the so-called highly developed nations. That this point has not been reached in the studied developing countries is comprehensible. However, it is surprising those certain developing nations such as Chile that still have high levels of poverty with an economic growth rate of seven per cent, have already passed this turning point. This shows that well-meaning technological development is hand with economic growth is not enough. In this case, demands need to be made of the economic sector, which should finally illustrate practicable alternatives to this one-sided growth model.

10.6 Cooperation between the Socio-environmental Sciences and Technology

Planning for a sustainable future has to be observed from more than just the rather short-term perspectives of natural and engineering sciences. These areas of study exist mainly to convert and use innovations in a corrective manner in cases where damage due to overuse of resources is

evident. It is the responsibility of the social sciences to deal with the long-term work of forming new social attitudes that take our past mistakes into consideration. Cooperation is thus the key. However, this does not mean that this process has to fulfill the high demands of so-called Trans disciplinarily. People can simultaneously work on socially relevant discipline-oriented questions within the individual disciplines and find optimal solutions synergistically. A common junction for the sciences could be found in the use of system – theoretical approaches in finding new individual or institutional steering processes. It is interesting that the systems theory came out of the respective perspectives and methodologies of both natural and social sciences almost simultaneously and independent of each other. It is thus quite surprising and disappointing that his theory has become rather overlooked, especially since it focused strongly on converting theory into social practice.

10.6.1 The time factor

Speed and the rapid transfer of knowledge into technology and products have defined our era. Now we are adding the factor of our endangered futures as humans. The resources we have used so far are running out. The environmental analyses of the economic sector call for quick action and for reorganizations. Haste seems necessary. However, some provocative counterarguments on this topic can be made. The OECD study mentioned earlier shows that we are moving towards increased progress without increasing the quality of life, which is tightly linked to the amount of so-called free time, of which we have less and less. Another social study in Switzerland showed that between 1900 and 1990, we gained only three minutes of so-called free time and this in junction with increasingly less work time; this is not a big win. People today are extremely challenged and overtaxed. The pace is fast; content and more time are necessary. We lack the time to digest what we are hit with daily to take part in the rapid process of knowledge transfer. We live in democracies but rarely find time to participate in dem9cratic decision processes – even of the scientific or futuristic kind. Everything needs to slow down. This statement seems to contradict the threats that come our way and the science and technology that they incite. But even here, it would be better to move slower if it is possible. We want to avoid technological blunders like the ones we are faced with today. Losses of time and reparation costs are too high. We have not only committed ourselves to science and technology but also to social contracts such as the playing rules of democracy. These demand learning processes and this means time – time which can then be used by scientists to find stronger support for the results of their research. One does not believe that the speed of scientific, technological, and economic progress will lead to the goal of a sustainable society faster; on the contrary, one feels that slowing down all our lives will be an integral component of a future sustainable humanity.

10.6.2 The responsibility factor

The analyses have been made, the facts for the most part are known, and alternatives in the technological sectors found. What we are missing is the transfer of all the knowledge and realization into plans of action. The sciences need to deal more with the question of how and with this the

question of global responsibility. Scientists have to themselves find ways to bring their results to decision makers, to affect, politicians and economists, and to reach the citizens of this world. Research results must be integrated in education in languages that the various audiences can comprehend. What we see done in product commercialization can also be realized with different content in scientific outreach if the funding is available and all aspects of human nature are taken into consideration. For this we not only need more time but also circumspection and willingness to cooperate. Science has to take on a leading role in communicating results and then integrate signals from the public in its research plans. There is an enormous gap between knowledge and action that should be approached as a research topic by science as a whole, if we want social and behavioural changes to occur. Appeals to our morals have insufficient effects.

10.6.3 The Human angle

Science and technology are necessary but not sufficient for a sustainable future. When the products of a perfect technology must interact with humans and the nature of this interaction so often unexpected. For example, a grocery bag made of plastic produced by a factory using perfect technology, can be used in one of three ways. In a society used to recycling, a consumer uses the plastic bag to bring groceries home and then places it in the bin for recycling. On the second group, the bag is thrown away after use. The wind picks it up and disperses it over the landscape and as the bag is not biodegradable, it harms the environment. In the third case, the society is so po9or that a plastic bag fetches some money and now I is picked from the streets or the countryside and taken to a collection booth for recycling. This example illustrates the complexity of sustainable development. We cannot, therefore, project ahead how society will respond to a particular technology. For sustainability to succeed we must all become sensitized to its value, i.e. we must view it as a virtue.

10.6.4 Education is the key

Sustainable is a virtue and, like any virtue, it has to be encouraged, perhaps taught, and assimilated at all levels, Hence, education is the key. Thus the government, the universities, industry, and the society at large, including families, play a role. Information technology can play a key, but not an exclusive role, in education. It is often stated that the developing world needs technology and not science. It is also assumed that the developed part of the world knows what is good technology for the rest of the world knows what is good technology for the rest of the world. Some aspects both assumptions are dubious. Given the complexity sketched above and the diverse levels of economic development.

The decision on what and how of a technology has to be made by the local community, city, country, or a continent. Knowing what stuff and how to make it is based on scientific and technological information that leads to knowledge and perhaps to wisdom to make the right decision.

10.7 Encouragement of Regional-level Development

Over 80% of the world's output by scientists and engineers come from countries that represent only 20% of the world's population. In order for there to be sustained development in a region, local scientists and engineers have to develop culture of pushing the envelope rather that duplicating what has already been done elsewhere. If this culture does not evolve, then thee region lives from cycle to cycle of importing technical know-how. It is frequently in the interest of the industry in developing countries to keep the country closed to overseas competition. This approach, through profitable to the local industry, prevents or slows the industrial development of a nation. It is the indust5ry that can produce wealth, and in a competitive world, that requires R&D in industry. The industrial funding of R&D in developing countries is at best a small percentage of the total funding. This is in contrast to a country like the US or Japan where more than half of the R&D is funded by the industry. Countries in which the industry has taken the initiative to compete with world standards with government help have developed rapidly. Korea is one such example in t he area of information technology.

The problems of sustainable development in the developed and, particularly, in the developing world are more often rooted in local economic, political, and social issues than in what makes sense of r the world. Thus a worldview is important but local institutions that develop, promote, and implement policies at all levels, are the key. International organizations, whether public, private, profit, or not-for=profit, have an important role in flattening the knowledge level across the world. However, this will only happen if there is a tangible material benefit to both sides in the transaction. Idealistic pronunciations are good, for they set the standard to rise, to, but they rarely are, in reality, a basis for action.

The growth in population and development of the world are on the rise and will continue to do so in the foreseeable future. Material development has to increase at a much faster rate than the population. The population growth and demand for food, energy, or material wealth is non-linear. Thus science and technology can be the catalysts for accelerated growth but, ultimately, only good governance can provide for a constructive driving force.

10.8 Six perspectives: a response

The following arguments can be made in response to the six perspectives raised in the beginning of this unit:

1. To make sustainable development a reality, the industry must lead and must innovate. Industry can play an important role. Driven by competition and responsibility to shareholders, industries are relatively efficient and, increasingly, socially responsible and accountable. However, in the absence of societal pressure, few companies deviate from optimizing their profit margins, thus societal expectations and corporate behaviour are inextricable tied together.

2. Sustainable development requires step by-step changes in the way we do things and must be built from the ground up. This is a succinct summary of responsible and effective corporate thinking, and DuPont is setting a good example.

3. Economic vitality is required for long-term environmental protection and sustainable development. Humans appreciate the wonders of this world only when their hunger pangs are gone, their diseases under control, and their shivering due to lack of shelters in a cold world ameliorated. Sustained development is about the future if the present is not a crisis in existence. This is often a source of conundrum for leaders of the developing world.

4. There are many science and technology options that will lead to economic growth and be compatible with sustainable development. Good information is a precursor to knowledge. Information is cheap and mostly free. With the advent of the Internet, information, though not always useful, is widely and easily available.

5. Expenditures on environmentally related technologies will change as we move into the future. This is a good believable scenario.

6. There are many options for transferring environmentally related technologies and technologies that support sustainable development. There are indeed many ways of providing this transfer. For promoting sustainable development, international organizations can also help set up or strengthen local institutions that provide advice geared for local conditions.

10.9 The Context

In this unit the arguments were made to convince of the positive role of environmentally sensitive technology for a sustainable future, but a further discussion is needed on those technologies that need to be developed, and how their impact can be beneficial to a wide segment of society both rich and poor alike. It is at the same time heartening and worrying to discuss these issues. Heartening because only a few years ago it was rare to find business people discussing matters of concern for sustainable futures, and worrying because of the tremendously important challenges the author raises.

One key question in this context is what would happen if the burying power of the world's poor were to increase even to five dollars a day. And how would businesses be able to cope with the temptation of this new wealth while wishing to protect the environment. This is perhaps the most difficult problem to address; how can businesses avoid the temptation to use this new during power to simple pollute and waste m ore in order to sell more The major challenge is the way in which businesses can find a healthy equilibrium between what they think is there shareholders desire and what the needs of the planet's stakeholders are, when most of these own no stocks.

Corporate support for the further development of biotechnology will be applauded by scientists and technologists, but this development must take into consideration the need felt by society at large to be fully informed about the benefits and risks of biotechnology. Thus, those involved in the biotechnology will have to go beyond R&D into the arena of providing the public with transparent and easy-to-understand information in a timely and constant manner. The growing chasm between the rich and the poor and the challenge that the reduction of this chasm provides to all is another issue of grave concern.

10.9.1 Finding solution

We owe it to future generations to work together on all these issues to find solutions that are compatible with the requirements of sustainable development. The business community should increase its efforts to organize itself so that more than just individual businesses with the courage to act on behalf of future generation (such as the excellent example of DuPont) are involved. However, this is insufficient. Businesses, once organized and involving a critical mass, must forge partnerships with others; with those involved in R&D and with those making policy. Only through collaboration and the full support and participation of a wider segment of society can all of the goodwill expressed in this issues paper be realized.

Partnerships of organizations and concerns around a common goal can be effective. The effort that the international scientific community undertook a year before the 1992 Earth Summit in the conference on An Agenda of science for Environment and Development into the 21st century; AGEND 21 is one such example. This was the first time that scientists physical, chemical, biological, medical, and social and engineers came together to contribute their knowledge to the issues of grave common concern. The outcomes provided important inputs to the Rio Conference including the chapter on Sciences for Environment and Development in Agenda 21, it also resulted in a solemn commitment on the part of the international scientific community as a whole to work together so that improved and expanded scientific research and the systematic assessment of scientific results, combined with a prediction of impacts, would enable policy options in environment and development to be evaluated on the basis of sound scientific facts.

This relatively new commitment on the part of scientists arose in response to the growing realization of the extent to which human activities on our planet increasingly threaten the earth's environment, and the growing recognition by governments that scientific knowledge of the earth system is a necessary ingredient for wise policy-making. Changes in the earth system extend across national boundaries and scientific disciplines. Thus, the scientific programmes put in place have, by scientific programmes put in place have, by necessity, become international and interdisciplinary. However, a systematic investigation on a global scale has only recently become feasible. Given the high cost and the lack of adequate human resources in any national programme to carry out these investigations, the coordination and cohesion of the international research programmes and observations systems have been vital, as they will benefit all. All of the

mega; science and technology projects that are in place today, have included networking, sharing of facilities, information, and ideas.

What characterized all of these activities is that they involve thousands of scientists throughout the globe driven by the common language of science, a shard curiosity to understand our planet, and the belief that science is a truly international endeavor. A major effort still remains to be undertaken in the way that scientists and technologists communicate the process and results of their work to the public at large. Although the scientific model cited above is not perfect, it is a step in the right direction. Other organizations are also moving in this way. The world Resources Institute, for example, has gone a long way in involving business and other communities to look at sustainable futures.

Self-Answering Question 10.1

How would you develop nexus between affluence, technology and environmental pollution?

10.10 Conclusion

The six perspectives provided set out the broad parameters within which the technological support for sustainable development would occur. These perspectives lead to industries like DuPont, Shell, British Petroleum, Tata Chemicals, etc. to view sustainable development both as along-term vision and goal, as well as a business opportunity to be exploited. These companies, and many other large enterprises like them, are beginning to provide, leadership in competitive markets – they are the champions of sustainable development A part from the business opportunities that sustainable development provides to these companies, public expectation of responsible corporate behaviour is another major driver in their move towards commitment to unsustainable development. In the absence of any other accepted tem, they are labeled as brand –equity conscious enterprises in this paper. However, for every brand0-equity conscious enterprise that exists, particularly in the developing world, there are a thousand other smaller enterprises which lack both vision as well as th3 need to live up to public expectation. These organizations are mainly SMEs (small and medium enterprises). They are constrained in both technological and managerial capabilities, and often their financial surplus is far less than the kinds of investments required in adopting technologies that help them move towards sustainable development. Therefore, they face a lack of appropriate technological products and packages in the market.

The assessement in many small-scale sectors, including foundry, glass, brick, and silk reeling sectors, reveals the complete lack of scientific and engineering inputs in the development of technologies being used in these sectors. Consequently, these sectors are inefficient in the use of energy, labour, and capital, and are heavily polluting as well, in recent years, judicial interventions by the Supreme Court of India forced these enterprises to face a stark choice; upgrade or shutdown. This is really a Hobson's choice since the absence of technological products and packages provide them with no real option. Under such circumstance's the scientific,

engineering, and technological support required by these low-capacity users is immense, yet current mechanisms are completely unable to provide this support.

10.10.1 A long road ahead

There is a strong commitment to adopt processes and methodologies that help in sustainable development among many of the industrial and business houses of the world, whether they be DU Pont, IBM or Tata Chemicals. Over a period of time, driven by competition as well as b the public expectation of corporate responsibility, technological improvements are leading to more sustainable development oriented technology, Technologies today use less resources and are more productive in terms of capital or labour inputs, and, in general, a vast number of these processes would also move towards zero output. Yet, if this trend promotes sustainable development, why is one still talking about it?

The first reason is that the time frame for response has changed dramatically. The speed with which the ozone treaty was negotiated and then the implementation schedule was put into lace is one such example, the implementation schedule was hurried time and again in response to scientific measurements, this indicates that eh time for responses is shrinking, and creates particular problems as the entire product cycle from identification of technology and concepts to development of pilot plants demonstrations, marketing, and up gradation of technology new needs to be shrunk to fit into a much shorter timescale. It is the same case with climate change. Technologies new need to be shrunk to fit into a much shorter timescale. It is the same case with climate change. Technologies promoting sustainable development would b e ultimately adopted by industries the world over. Yet, conscious efbrts of global politics must speed up the process.

Perhaps a more crucial issue for sustainable development is that the efforts of large brand equity conscious enterprises, who because of competition and public expectation invest in sustainable development, are not enough there is a huge world outside these enterprises, which technology and science that can help in sustainable development have not even touched. This is the field of low-capacity units like SMEs, which continue to use archaic technologies. Judicial interventions have occurred in India and Pakistan. One of the most significant interventions was ion Agra, where the Taj Mahal is located. A whole set of enterprises, including small-scale foundries, have been asked to upgrade, relocate, or close down. These foundries have no technological packages available in the market suitable to their scale that they can adopt. Even if such packages are available, whether it is for the low capacity users, or for the brand-equity conscious users, adopting new technologies is difficult.

Knowledge diffusion is constrained by capacities and capabilities. /the adoption of new technologies requires new capacities and capabilities. The adoption of new technologies requires new capacities and new capabilities. To take the example of the phase out process of ozone-depleting substances a whole set of operating principles ere developed for using substitutes for chlorofluorocarbons, however, it took users time to

understand the implications. There are examples, even in India, of users, who adopted one particular substitute, only to find a year or tow later that this did not meet their needs, that they were not able to use it efficiently, and that they had to make a second switchover. It is not must the availability of information that is importantly knowledge about these technologies and about how to adopt, use, and upgrade them needs to be disseminated. That is the key not only to adopting technological change but also to generating technological change, but also to generating technological change.

10.10.2 What need to be done?

The first thing to do is to develop a series of 'needs assessments' in the context of the issue of sustainable development and to promote technological diversity. The project for the phase out of ozone depleting substances and many others, while developing national programmes that looked at the needs of the various users, also identified the kinds of financing and credit requirements. The need of the hour is to put into place appropriate policy interventions, both at the public and the corporate governance levels, in order to create and expand markets for new technologies. In doing so, the development strong linkages between scientists, technologists, users, and the industry need to be ensured. The types of delivery mechanisms which would need to be put into place must also be studied so that the knowledge about the technologies can be disseminated, their installation and adoption aided, the required credit and technical service provided, and the up gradation of those technologies assisted.

In other instances, particularly with low capacity users, public support for product development is essential. In SMEs, for example, where wood is burnt directly to get heat, using biomass gasifies that convert the wood into gas, and, therefore, reduced fuelwood consumption is economical and also makes sense from the point of view of sustainable development. Yet, time and again, specific products had to be created for these users and time, effort, and managerial input were required before these small-scale industries could adopt these new products. Such situations call for public support. Whether it is low capacity users or public infrastructure services like water supply, while the delivery mechanisms can and should be based in the private sector, the development of products needs direct public intervention.

In this perspective, one, therefore, needs to examine the measures that need to be adopted to enable technological cooperation, which would be extremely essential for promoting sustainable development the world over. In the case of the phase out of ozone depleting substances, an international cooperative called the Industry Cooperative for Ozone Layer protection was formed. It comprised a number of large industries the brand equity conscious enterprises. These industries, which would otherwise compete in the marketplace, not only shared experiences about the adoption of new technologies, but they also provided help and expertise to other users globally, including India. This, therefore, helped prevent the mistakes caused by people making the wrong choices because

industry partnerships are essential as they help to upgrade the capacity and the capability of the users.

Finally, it is possible to create perfect technologies but the main issue is what would happen when these technologies reach the actual end users. And, as far as sustainable development is concerned, it is extremely essential to move the focus of scientific and technological processes to meet the needs of low capacity users, as technology is for people, not the other way around.

Unit Summary

The unit lays out a framework for assessing the role of science and technology in moving towards a sustainable future, and works at the what and the how of accelerating the process. The six perspectives provided set out the broad parameters within which the technological support for sustainable development would occur. These perspectives lead to industries to view sustainable development both as along-term vision and goal, as well as a business opportunity to be exploited. Knowledge diffusion is constrained by capacities and capabilities. There need to be a strong commitment to adopt processes and methodologies that help in sustainable development among many of the industrial and business houses. The adoption of new technologies requires new capacities and capabilities. The adoption of new technologies requires new capacities and new capabilities. This relatively new commitment on the part of scientists arose in response to the growing realization of the extent to which human activities on our planet increasingly threaten the earth's environment, and the growing recognition by governments that scientific knowledge of the earth system is a necessary ingredient for wise policy-making.

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UNIT 11

SOCIO-CULTURAL DIMENSIONS

Unit Introduction

The main focus of this unit will be on explanation of socio-cultural dimensions of integrated environmental management in rural and urban areas, including following:

- Community Mobilization and Participation
- People's involvement and empowerment
- Women development, gender and feminism
- Involvement of male and female communities in integrated environmental management

In this unit you will be introduced to:

- the basic concepts of community and community mobilization, participation, people's involvement, empowerment and women development, gender and feminism;
- the process of community mobilization and participation in the integrated environmental management;
- the status of women, gender and feminism; and
- the mechanism of people's involvement in integrated environmental management through their empowerment.

Unit Objectives

After studying this unit you will have improved your ability to:

1. Understand and define the terms and basic concepts of community, participation, mobilization, empowerment, women development, gender and feminism;
2. Describe the composition and elements of the community and the process of community mobilization, constraints and their solutions;
3. Elaborate the process of participation and the mechanism of people's involvement in the development projects, especially integrated environmental management;
4. Understand the roles of the social organizers and community activists/mobilizers, to launch and accomplish the task of community mobilization;
5. Explain the status of women, impact of gender and feminism on the women development and
6. The ways to involve the male and female community members, in integrated environmental management.

11.1 Community, Participation and Community Mobilization

11.1.1 What is community?

We all live in a community. There are different things that bind us together. Let us try to identify some of these. For example, some of the common factors that bind us to our communities, or that we may have in common with the other people living around us, include:

- Beliefs and values
- Language
- Territory
- Religion
- Culture
- Occupations

Exercise 1:

Let us write about our community

- Name of the _____
- Languages we speak _____
- Festivals we celebrate _____
- Religions _____
- Beliefs and values _____
- Political groups/parties _____
- Surrounding villages/areas _____
- Occupations _____
- Social services available _____
- Demographic and socio-economic features _____
- Issues _____
- Social and Natural Resources _____

The social life people lead is affected by the kind of community in which they live. The community is as old as humanity – or even older. It is defined in different ways by various sociologists and social scientists, but most of these definitions contain a number of common and over lapping characteristics. In order to orient the readers, some of the prominent definitions have been given as bellow:

1. Community means fellowship in Greek language. Reflecting on the meaning of the word:

   Aristotle asserted that people came together in a community setting for the enjoyment of mutual association, to fulfill basic needs, and to find meaning in life.

Thomas Hobbs, on the other hand, saw community as the natural process of people coming together to maximize their self-interest. He felt that self-interests could be best satisfied in a group setting.

2. **G.D. Miitchell**, in *A New Dictionary of Sociology* (1987 edition), defines community as: "Originally the term *community* denoted a collectivity of people who occupied a geographical area; people who were together engaged in economic and political activities and who essentially constituted a self-governing social unit with some common values and experiencing feelings of belonging to one another".

3. **P.B. HORTON and C.L. Hunt** defines it as that "A community is a local grouping within which people carry out a full round of life activities".

4. **Hillary**, 1955; **Jonassen**, 1959, defined community in a greater detail as: "A community includes (1) a grouping of people, (2) within a geographic area, (3) with a division of labor into specialized and inter-dependent functions, (4) with a common culture and social system which organizes their activities, (5) whose members are conscious of their unity and of belonging to the community, and (6) who can act collectively in an organized manner".

5. From our perspective: "A community is defined and best described by the following elements: (1) people, (2) within a geographically bounded area (3) involved in a social interaction and (4) with one or more psychological ties with each other and with the place they live".

There are different **types of communities**, such as primitive, rural, modern, urban, simple, complex, farming, non-farming, settle and mobile, etc.

11.1.2 What roles can the community play?

Our most valuable resource in the community is our own people. They can make decisions about the development of the village. Cooperation among community people is important to develop the community's self-sufficiency and reliance.

The community has an important role to identify and use available resources in the village or urban settlement, and to plan and act accordingly. Where there is a mechanism of local self-government, important decisions are usually made at the local level by the local people themselves.

Exercise 2:
What are the main roles, which your community can play in any participatory development project?

_____
_____
_____
_____
_____

11.1.3 What is participation?

Participation is process of consultation and willingness to share something and to do something collectively. Participation is a process, in which, everything, from the concept through planning, implementation monitoring, evaluation, and operation & maintenance, should be in the ownership of the people/communities.

Participation is the act of being involved and of involving individuals or groups in making choices and decisions, in planning, in taking actions, in controlling and sharing the benefits. Participation reduces dependency by crating confidence, self-sufficiency and trust.

In order to elaborate the concept and process of participation, let us review some of the characteristics of the participation:

- Participation is a way of life.
- Individuals are like the components f machinery.
- Participation demands equality in decision-making.
- Change in the attitude is required for participation.
- Commonality of interest provides basis for participation.
- Combined thinking and struggle promotes participation.
- Participation is need based.
- Two-way learning process leads towards participation.
- Some one has to initiate the process of participation as an activist.

11.1.4 Facilitation of participatory activities

In participatory activities, facilitators keep a low profile after introducing g a task or activity and ultimately they become invisible and withdraw their support at an appropriate time. The tasks should be simple and the need for instructions should be minimal. This necessitates much time preparing the materials and thinking through the process. However, during the actual activity, good facilitators, let the process be controlled and taken over by the group to the greatest extent possible. Tasks that are open ended allow the emergence of local perspectives, beliefs, values, reality rather than eliciting the "one correct answer".

11.1.5 How to empower participants

When the intention is to empower the participants, it is helpful to keep the following questions in mind in designing and conducting activities:

- Is the task open-ended or over structures?
- How much time and instruction is needed to clarify the task?
- Who is controlling the process?
- Who plays the dominant role in managing the task?
- Who is controlling the outcome?
- Does the task search for the correct answer?
- Who is talking the most? (Facilitator or Participants)
- Does the task generate discussion, thinking, energy, excitement and fun?

- Does the activity lead to changing perspective, group spirit or discussion of "what next"?

11.1.6 How to promote participation for mobilizing people

In order to mobilize the people/communities for conducting any participatory development activity/project, focus on the following:

- Involve people's time/money to ensure their interest. *Not only voice but also money.*
- Listen, Do nothing yourself. Learn where to support.
- Consult and take colleetive decision without hierarchy.
- Follow-up in personal life.
- Identify common interests.
- Promote solutions.
- Through leadership but reaching the poor and marginalized.
- Allocate works; promote leadership, and convene meetings.
- Provide appropriate technology to solve and manage collective social and economic problems.
- By giving equal chance of opinion to all the members of the community or group.
- Call meetings, select activities/people by using criteria, given below:
  - Take burning issue to mobilize the people.
  - Organize people around their rights.
  - Form Community Organizations or Development Committees.
  - Mobilize, be punctual, and make no promises (giving false hopes).
  - Set personal examples through actions and deeds.

11.1.7 What is community mobilization?

Community mobilization is a process whereby a group of people has transcended their differences to meet on equal terms in order to facilitate a participatory decision-making process. In other words it can be viewed as a process, which begins a dialogue among members of the community to determine who, what, and how issues are decided, and also to provide an avenue for everyone to participate in decisions that affect their lives. It facilitates the people for participation in the social, human and community development process. To achieve the objective of community mobilization, social organization methods are employed. These methods facilitate the process of organizing the peoples in groups and small community based organizations (CBOs), to achieve or fulfill the community needs.

11.1.8 Why is community mobilization necessary?

Proper management of the resources is the best possible way for the development of the community. We call this "community mobilization", where people plan and do things. They take charge, transforming their community and their lives.

Community mobilization allows people in the community to:

- Identify needs and promote community interests.

- Promote good leadership and democratic decision-making.
- Identify specific groups for undertaking specific problems.
- Identify all the available resources in the community.
- Plan the best use of the available resources.
- Enable the community to better govern itself.

Exercise 3:
List out some of the different reasons for mobilizing any community.

11.1.9 Identification and mobilization of local resources

The resource mapping is a tool, which is used for getting complete information about any village or any other rural or urban site. Such maps are drawn with the help of local people, covering whole area under study. These maps are drawn generally on ground, by using different techniques of PRA and PLA and later transferred to charts. All sorts of local resources and activities like houses, institutions, religious paces, water sources, natural resources and manpower etc., are shown in these maps. These maps also indicate various demographic and socio-economic features and indicators, such as, available physical and social services, number of people living per-household, educational status, available skills, occupational, professional and other significant activities, income, etc., of the mapped area.

What might we find on the resource map of any village or urban area?
There may be:

- The number of houses and the location of ach house in the village/urban area.
- The number of people in cach household.
- The number of children (male and female) going to school and the number of children not going to schools for each house.
- The number of literate and illiterate adults (male and female).
- The occupation and income of each family.
- The skills available in each family.
- The infrastructure of the village/urban area, e.g., preschool centre, school, community centre, places of worship, youth clubs, shops, health centers, roads etc.
- Natural resources, like rain and water bodies, forests and vegetation, mountains, minerals and others.
- Crops and seasons for sowing and harvesting.
- Any other significant geo-physical, cultural and historical features of the village/urban area.

Having completed the resource map, we can sit together with community members and discuss the issues involved. This discussion will help us identify and better understand the issues and resources available in the community.

Exercise 4:
Prepare a resource map of your village / urban area

information about any area. For example, we can use:

- Surveys
- Participatory needs identification
- Focus group discussion
- Interviews
- House-to-house visits
- Secondary data (newsletters, reports, books etc.)
- Observations

11.1.10 *How can we plan from the information obtained?*

With the information obtained, we can then plan, mobilize resources and assign responsibilities for each task. In this way we can find appropriate solutions to the problems. For example, if the village/urban area have a problem with adult literacy, the following actions could be taken:

- Forming a village/urban area education committee
- Establishing a literacy centre after identifying a location
- Identifying local persons who can help in different activities at the centre
- Motivating village/urban area people make contribution in money and kind to repair the literacy centre building
- Conducting various activities to encourage adult learners to come to the centre
- Collecting used books, writing boards and other teaching/learning materials for learners.

11.1.11 *Who can help us mobilize the community?*

For community mobilization, a community support mechanism would be required. We can look for support for any programme in many places and in different ways, including all or some of the following stakeholders:

- Individuals
- Voluntary groups
- Local government
- Corporate sector/ Business groups
- School groups (teachers/students)
- Religious institutions / groups
- Political parties/activists
- Local NGOs
- Identical projects working in the area/neighborhoods.

Exercise 5:
Identify the major stakeholders in your area, who may contribute in developing a support mechanism for community mobilization.

11.2 People's Involvement and Empowerment

11.2.1 People's/Community involvement and empowerment

People's /Community involvement and empowerment is achieved by field workers, commonly known as social organizers and community immobilizers/activists, using participatory methods. A proverb adapted from the words of a great Chinese thinker, **Lao Tsu**, elaborates the process of participation and community mobilization in the words given bellow:

Go to the people!
Love with them,
Live with them,
Learn with them,
Link your knowledge with theirs,
Start with what they have,
When you finish your job,
The people will say!
We did it all by ourselves.
(Lao Tsu, China)

The community members are central to all community based and participatory development programmes. If community members do not take interest and participate in these programmes, then the programmes cannot be successful. The role of the community in ensuring that people participate in the community-based programmes is very important. A favorable environment can help in achieving this objective.

11.2.2 Ways to involve the communities

Let us look at some of the ways adopted and things done by different facilitators (social organizers and community activists) in different places, to involve the local communities in various development programmes:

- Awareness raising campaigns
- Study circles
- Establishing information centers
- Conducting village meetings
- Organizing village fairs
- Organizing field days
- Supports and games
- Electronic and print media

- Person to person discussion
- Peer group meetings
- Songs and jingles
- Rallies and other festivities
- Extension lectures
- Puppet shows
- Film shows
- Use of audio/video aids
- Multimedia
- Debates, speech contests And quizzes
- Posters and banners
- Wall writings and paintings
- Door-to-door campaigns
- Human chains
- Radio talks
- Television programmes
- Processions and walks
- Folk arts, especially dances
- Magic shows
- Street theatre and plays
- Video shows and cassettes
- Interactive learning programmes
- Interactive computer programmes
- Wall newspapers
- Pamphlets and handouts
- Display boards
- Role modeling
- Exhibitions and shows
- Formation of clubs and societies/associations.

Exercise 6:

Can you identify some more ways of involving the people and communities in any community-based Integrated Environment Management Programme in rural/urban areas of your country?

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

11.2.3 Three levels of community involvement and mobilization

The community mobilization could be accomplished at three levels:

I. **By the Individual**

The individual (She/He) decides how to launch the process to protect her/his interests or how to achieve the development objective, when and where to seek consultation and advise for achieving success.

II. **By the Family**

The parents decide on the protection of their children's rights and fulfillment of needs and make the choice of ways and means to be used for achieving objectives.

III. By the Community

The people in the community decide what sort of problem to respond to and what sort of ways and means to be used for achieving the objectives.

11.2.4 Role of facilitators in community mobilization

The facilitators and social organizers play the most important role in the community mobilization; and involvement and empowerment of the people in any community based development programme. Some of the activities, which the facilitators/social organizers can carry out, include:

- helping communities in visualizing the activities
- helping them in needs assessments and resource mapping activities
- facilitating the formation of community organizations
- inviting the local development officials to the community organizations (COs) and community-based projects
- collecting and distributing information/materials about different development schemes that are suitable for the communities
- responding to the community members who want help with projects they are undertaking
- helping the CO members to develop project proposals and accompanying them when they go to various development departments/agencies
- organizing various events fir community involvement (as listed above) with officials of development departments
- organizing field days to highlight the issues and to introduce desired activities and for awarenesss raising among the people
- organizing field and exchange visits to other model projects /centers of different development departments, agencies and projects
- sending community members for skill training conducted by different development departments and agencies
- organizing camps and campaigns for community development
- Enrolling community members in various relevant organizations and institutions to enhance their awareness and orientation level.

The facilitators/social organizers can inform and guide the CO officials and other community members. Their role is that of a link between the community and other development programmes. The community based project office needs to be the place in the village/area where community members come to find answers to development issues.

This is why the facilitators/social organizers have to know about the different development programmes in the community/neighborhoods, such as environment rehabilitation and management, public health, irrigation, agriculture, banking and loans, micro-credit and enterprise development, small scale industry and women's empowerment etc. The knowledge of these will not only help individual community members but will help the whole village/area. Thus, the facilitators/social organizers can become the window through which the community members can get information. So it is important that the facilitators/social organizers have a good network of contacts.

11.2.5 How to involve local representatives and policy makers?

The local representatives of the communities, policy makers and other concerned members of the communities and departments may be involved in the development activities and projects through formation of Community Organizations (COs) or Village Development Committees (VDCs) or Urban Area Development Committees (UADCs).

These COs or Committees can be most representative of the whole village or urban area. Such organizations can be made up of:

- Elected members of different local bodies
- Village head or ward heads in urban area
- Representatives of different communities living in the village or urban area including the marginalized groups
- Representatives of the directly involved stakeholders
- School teachers and other influential/activists
- Facilitators/social organizers
- Policy makers and officials of the development departments and agencies
- Political leaders
- Religious leaders

These community organizations/committees can include 7 – 15 members and take up all the development activities starting from needs identification and project development to the implementation and monitoring and evaluation of the project outputs and impact assessment.

Sometimes, there are a number of pre-existing community groups working in the communities, such as the Social Welfare Societies/Associations, Women's Associations and Mother's Club, Parent-Teachers' Associations, School Management Committees, Student and Workers Associations Consumer Societies, and Church Groups, etc., which can potentially serve as a the basis for such a mobilization strategy. Based on the articulated development goals and objectives of the community there is potential for new groups to be established to formulate strategies to address pressing problems in the community. In this regard some of the central areas to be addressed may be: (1) Education and Health, (2) Employment and Poverty Alleviation (3) Physical Infrastructure Development (4) Land Tenure and Land use (5) Agriculture and Livestock, and (6) Natural Resource Management, etc.

11.2.6 Mobilizing and involving marginalized groups in the participatory development process

In every rural or urban community there are some groups that have been left out of the development process for one reason or he other. These groups have, over the years, been socially, economically and politically sidelined. These groups need special attention so they can be brought into main stream society again. Some of these groups are:

development projects, not only facilitates the management and strengthen the development process, but also helps in achieving better results. Similarly, the male and female communities can play an effective and productive role in integrated environmental management, if they are involved in the development activities, through out the project cycle, starting from visualization and planning to the implementation, monitoring and evaluation and assessment of the impacts of the project interventions.

The male and female communities may be involved in the integrated environmental management projects, following the 7 steps given bellow:

1. Mobilizing community through establishing contacts with the community members;
2. Organizing males and females into Community Organizations (COs) and/or Environment Management Committees (EMCs).
3. Provision of legal status to the COs and EMCs by registering them under appropriate national laws;
4. Capacity building of the COs and EMCs, through awareness raising and training, especially in management and social organization/mobilization skills;
5. Selection and training of community-based, male and female Environment Management Extension Workers (EMCWs), to provide guidelines and services to the communities;
6. Establishing linkages with the local government and other line agencies, projects and NGOs, for learning through experience sharing;
7. Developing record-keeping, documentation, M&E and reporting system.

(2) A lack of expertise amongst the community to facilitate such organization;

(3) A lack of will and interest amongst the community members to enhance the required skills for facilitation of such social organization;

(4) Illiteracy, social problems, especially lack of access to social and economic resources/services and poverty among the majority of people living in rural areas and among the marginalized groups in the urban areas;

(5) The unwillingness of the community as a whole to give up individual interests to form a broader cooperative;

(6) An extreme shortage of available resources to facilitate the community mobilization process.

Exercise 8:

Can you identify some of obstacles, which are serving to prevent a community mobilization process from occurring in your society/country?

a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

11.2.8 Solutions to resolve the problems

The solutions to resolve such problems are rooted within the resource capacities and social organization structures of the communities. The organizing structure presented here to resolve the problems related to the community mobilization is based on the concepts of self-help, encompassing various distinguishing features of community development theory, practice, and ideology. While it is not assumed that all of the problems of the communities can be resolved by community's efforts alone, it is seen as a means of achieving broad community participation and effort. Through this means it is suggested that the living conditions, facilities and services of the community will improve, along with the empowerment of the community.

Exercise 9: Can you add-up some more solutions?

- _____
- _____
- _____
- _____
- _____

11.3 Women Development, Gender and Feminism

11.3.1 Status of women

The majority of the women, especially in the under developed and developing countries, have been treated as a marginalized group. This situation leads to frustration among the women and ultimately resulted in the movements for women liberation and empowerment, equal rights for women and their participation in development process.

Women's movements are those, which arise as conscious, organized efforts of groups of women (often supported by men) to change the system of economic, cultural and political inequality. While, the women individually struggle against their sub-ordinate position under many conditions, such organized movements have only arisen with the development of imperialism and capitalism, as part of the efforts to carry through the democratic evolution. Their efforts often centre on correction and/or replacement of existing social, economic and political institutions in order to serve the needs of their new urgencies and priorities. Thus a movement per se is an effort and the organization in the means used to achieve specific goals.

11.3.2 Gender and its impact on Women Development

Gender refers to the significance a society attaches to biological categories of female and male. Gender is a basic organizing principle of society that shapes how we think about ourselves and guides how we interact with others. But while gender concerns differences, it also involves *hierarchy,* because it affects the opportunities and constraints we face through out our lives.

The inequality inherent in gender is no simple matter of biological differences between the two sexes. Females and males do differ biologically, of course, but the various researches suggest that the physical and mental abilities of men and women are more alike than we may think.

Although, biologically, the sexes differ in limited ways with neither one naturally superior. Nevertheless, the deeply rooted *cultural* notion of male superiority may seem so natural that many assume it is the inevitable consequence of sex itself. But society, much more than biology, is at work here, as the global variability of gender attests.

Global comparisons show us that, by and large, societies do not consistently define most tasks as either feminine or masculine. As societies industrialize, which give peoples more choices and decreases the significance of muscular power, gender discrimination become smaller and smaller. Gender, then, is simply too variable across cultures to be considered a simple expression of biology. Instead, as with many other elements of culture, what it means to be female and male is mostly a creation of society.

11.3.3 Feminism and Feminist Movements

Feminism is *the advocacy of social equality for men and women, in opposition to patriarchy and sexism.*

11.3.4 Feminist Movements

Some social movements have been around for a very long time. Three of them, in particular, appear to be as old as the institutionalized beliefs and practices they oppose. These social movements are:

- Gender equality;
- Labor; and
- Democratic Rights.

The "first wave" of the feminist movement in the United States began in the 1840s as women who opposed slavery, drew parallels between the oppression of African Americans and the oppression of women. Their primary objective was to secure the right to vote, which was finally achieved in 1920. But other disadvantages persisted and a "second wave" of feminism arose in the 1960s, and continues even today.

11.3.5 Basic Feminist Ideas

Feminism views the personal experiences of women and men through the lens of gender. How we think of ourselves (gender identity), how we act (gender roles), and our sex's social standing (gender stratification), are all rooted in the operation of our society.

Although people who consider themselves feminists disagree about many things, most of them support the following five general principles:

1) The Importance of Change

Feminist thinking is decidedly political, linking ideas to action. Feminism is critical of status-quo, devoting change toward social equality for men and women.

2) Expanding Human Choice

Feminists maintain that cultural conceptions of gender divide the full range of human qualities into two opposing and limited spheres: the female world of emotions and cooperation and the male world of rationality and competition. As an alternative, the feminists propose a

"reintegration of humanity" by which each human can develop *all* human traits.

3) Eliminating Gender Stratification

Feminism opposes laws and cultural norms that limit the education, income and job opportunities of women. For this reason, the feminists advocate provision of equal rights to women.

4) Ending Sexual Violence

Today's women's movement seeks to eliminate sexual violence. Feminists argue that patriarchy distorts the relationships between women and men, encouraging violence against women in the form of rape, domestic abuse, sexual harassment, and pornography.

5) Promoting Sexual Autonomy

Finally, the feminism advocates women's control of their sexuality and reproduction. Feminists support the free availability of birth control information. Most feminists also support a woman's right to choose whether to bear children or terminate a pregnancy, rather than allowing men – as husbands, physicians, and legislators – to control women's sexuality. Finally, many feminists support gay people's efforts to overcome the many barriers they face in predominantly heterosexual culture.

11.3.6 Types of Feminism

People pursue the goal of sexual equality in various ways, yielding three general types of feminism, as given below:

1) Liberal Feminism

Liberal feminism is based on classic liberal thinking that individuals should be free to develop their own talents and pursue their own interests. They support the ideas like equal rights for men and women, reproductive freedom for all women, respect for family as a social institution, and removal of legal and cultural barriers rooted in gender by a collective effort of men and women.

2) Socialist Feminism

Socialist feminism evolved from the ideas of Karl Marx and Friedrich Engels, partly as response to Marx's in attention to gender. From this point of view, capitalism increases patriarchy by concentrating wealth and power in the hands of a small number of men. They reject the reforms sought by liberal feminism as inadequate. They believe that only a socialist revolution that creates a state-centered economy to meet the needs of all and a collective pursuit of men and women for their personal liberation are solutions to address the gender disparity.

3) Radical Feminism

Radical feminism, too, finds the reforms of liberal feminism inadequate. Moreover, they claim that even a socialist revolution would not end patriarchy. They think that gender equality can be realized only by eliminating the cultural notion of gender itself. Radical feminists look toward new reproductive technology to separate women's bodies from the process of child bearing, to change the existing family system, which is responsible for gender disparities. They support the idea an egalitarian and gender-free society.

11.3.6 Opposition to Feminism

Feminism provokes criticism and resistance from both men and women who holds conventional ideas about gender. Some of the main reasons for opposition include: maintenance of status-quo to protect male privileges; protection of traditional family institution; and to continue the traditional roles of men and women.

Opposition to feminism is primarily directed its socialist and radical variants; otherwise, there is widespread support for the principles of liberal feminism.

11.3.7 Looking Ahead: Gender in the 21st Century

Remarkable technological, socio-economic and cultural changes have been occurred during the last century, leading to restructuring of the social system and roles of men and women. Many factors have contributed to this transformation. Perhaps, the most important, of them, was the industrialization, which broadened the range of human activity and shifted the nature of work from physically demanding tasks that favored male strength to jobs that require human thought and imagination, putting the talents of women and men on an equal footing. Additionally, medical technology gives us control over reproduction, so women's lives are less constrained by unwanted pregnancies.

Many women and men have also deliberately pursued social equality. And as more women assume positions of power in the corporate and political worlds, social changes in the 21st century may be as great as those we have already witnessed.

Gender is an important part of personal identity and family life, and it is deeply woven into the moral fabric of human society. There, efforts at change will continue to provoke opposition. On balance, however, while changes may be incremental, the movement toward a society in which women and men enjoy equal rights and opportunities seems certain to gain strength.

11.4 Involving male and female communities in integrated environmental management

Since their inception and application, participatory management approaches, have proved that community participation in integrated

development projects, not only facilitates the management and strengthen the development process, but also helps in achieving better results. Similarly, the male and female communities can play an effective and productive role in integrated environmental management, if they are involved in the development activities, through out the project cycle, starting from visualization and planning to the implementation, monitoring and evaluation and assessment of the impacts of the project interventions.

The male and female communities may be involved in the integrated environmental management projects, following the 7 steps given bellow:

1. Mobilizing community through establishing contacts with the community members;
2. Organizing males and females into Community Organizations (COs) and/or Environment Management Committees (EMCs).
3. Provision of legal status to the COs and EMCs by registering them under appropriate national laws;
4. Capacity building of the COs and EMCs, through awareness raising and training, especially in management and social organization/mobilization skills;
5. Selection and training of community-based, male and female Environment Management Extension Workers (EMCWs), to provide guidelines and services to the communities;
6. Establishing linkages with the local government and other line agencies, projects and NGOs, for learning through experience sharing;
7. Developing record-keeping, documentation, M&E and reporting system.

Self-Answering Questions

Q.1. Define and discuss the following terms and concepts:

- Community
- Types of communities
- Participation
- Community mobilization
- Three levels of community involvement and mobilization
- Role of facilitators in community mobilization
- Gender and its impact on Women Development
- Feminism and Feminist Movements
- Basic Feminist Ideas
- Types of Feminism

Q. 2. What roles can the community play?

Q. 3. How participatory activities are facilitation to empower participants?

Q. 4. How participation for mobilizing people can be promoted?

Q. 5. Why is community mobilization necessary?

Q. 6. How local resources can be identified and mobilized?

Q. 7. Who can help us mobilize the community?

Q. 8. How People's/Community are involved in the development process and empowered?

Q. 9. Describe different ways used by the facilitators to involve the communities in the development process?

Q. 10. How local representatives and policy makers can be involved in the community-based activities?

Q.11. Why mobilization and involvement of marginalized groups is necessary in the participatory development process?

Q.12. Discuss the obstacles hampering community mobilization process and also describe the solutions to resolve them?

Q.13. Describe 7 steps for Involving male and female communities in integrated environmental management?

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UNIT 12

ETHICAL AND MORAL DIMENSIONS

Unit Introduction

Many environmental problems are in fact social problems in terms of morai and ethical values we give to environment. Building a just, stable, harmonious world for our children and us should be the central organizing principle for civilization. Our ideas about proper role in nature have varied thorough the whole history of environmentalism.

This unit reviews the:

- environmental ethics;
- our views and beliefs about nature and environment;
- environmental equity issue for dealing with the environmental crisis;
- environmental justice and its principles;
- racial discrimination at policy and public level in managing the environment, and
- teachings about environment in the major religions practiced in South Asia.

Unit Objectives

After going through this unit the students would be able to learn:

1. What are different ethical approaches and attitudes towards nature and environmental management?
2. Why equity is important for environmental management?
3. Why justice is necessary in dealing with environmental crisis?
4. How racial discrimination effects policies and plans for managing environmental management?
5. How different religions teach us about environmental management.

12.1 Ethical Use of Natural Resources

Human activities such as the release of noxious gases into the atmosphere, the destruction of forests and the over exploitation of natural resources have caused irreversible environmental damage throughout the world. In some cases the damage is so severe that life-support systems, both locally and globally, are being threatened. Unless we curb our desire for more and more material possessions and unceasing economic growth, continued ecological damage will be unavoidable.

To solve our environment problems, a change in the way we think about and interact with our environment must occur.

Activity 12.1

Before going through this unit. Stop for a while!

- Think about the words "ethics" and "moral". How could you define these? Write your definition in your notebook and see how we define "ethics" and "moral".
- When use the term "environmental ethics". What comes in your mind? Write your answer separately in your notebook book.

Word ethics, seeks to define what is right and what is wrong on a universal basis. For example stealing, lying, cheating, killing and indifference to the well being of others are considered to be unethical. Preserving human life, concerns for others, honesty and truthfulness are considered to be ethical.

While morals reflect the dominated belief of a particular culture about what is right and what is wrong. For example killing a person is wrong but during the wartime killing a human being is not considered as immoral acts. It is difficult to define what is wrong and what is right because of the differences in cultural and religious beliefs. Some individuals consider it unethical, immoral to unnecessarily waste resources while others argue that maximizing consumption is a moral act because it promotes the economic growth that is a source of jobs and funds for helping the poor and protecting the environment.

When we use the term "Environmental Ethics" we refer it as a discipline that studies the moral relationship of human beings to, and also the value and moral status of, the environment and its nonhuman contents.

Why do we need a new set of ethics for the environment? The answer includes three factors.

1. *New effects on nature.* Because our modern technological civilization affects nature greatly, we must examine the ethical consequences of these new technological actions.
2. *New knowledge about nature.* Modern science demonstrates how we have changed and are changing our environment in ways not previously understood, thus raising new ethical issues. For example, until the past decade, few people believe that human's activities could be changing the

Earth's global environment. Now, however, scientists believe that burning fossil fuels and clearing forests have changed the amount of carbon dioxide in the atmosphere, and that this may change our climate. Hence we have emphasized a global perspective.

3. *Expanding moral concerns.* Some people argue that animals, trees, and even rocks have normal and legal rights and that it is a natural extension of civilization to begin including the environment in ethics. These expanded concerns lead to a new need for a new ethic.

For most of human history, ethics has concentrated on "human rights", the rights of individuals, of families and ethnic groups. However ethics have no begun to define the rights of animals, plants and the environment beyond the human rights to rule and use them (Botkin and Keller, 1995).

12.2 Three Views about Nature

Rive Ravindra, when writing about science and spiritual matters, suggested that there are essentially three views of nature:

1. the Western (European and North American),
2. the Sineatic (Chinese, Korean and Japanese) and
3. the Indian (a combination of Hindu, Buddhist and Jain philosophies).

In the past the western view considered that nature was alien and hostile to human beings; it had to be conquered, and subsumed under human control.

The Sineatic concept of nature is that it is beautiful and perfect, but it has to be transformed to be loved. Nature creates an aesthetic awe. "Rather than being hostile, man is a part of nature, in the Sineatic view, man has his place in nature".

Finally, the Indian spiritual tradition combines perspectives on nature from Hinduism, Buddhism and Jainism. In this case, nature is a mother. She cannot be tamed by her children. She is a Goddess.

Environmental ethics makes the distinction between intrinsic value and instrumental values of things. Instrumental value is the value of things as *means* to further some other ends, while the intrinsic value is the value of things as *ends in them* regardless of whether they are also useful as means to other ends. For example think of a person who is a teacher, beside teaching mean having instrumental value for those who acquire knowledge from them, he also have intrinsic value, value in his or her own right independently of his or her prospects for serving the ends of others. Same is the case when we think of a medicinal plant that have instrumental value because it provides the ingredients for some medicine or as an aesthetic object for human observers. But if the plant also has some value in itself independently of its prospects for furthering some other ends such as human health, or the pleasure from aesthetic experience, then the plant also has intrinsic value. Because the intrinsically valuable is that which is good as an end in itself, it is commonly agreed that something's possession of intrinsic value generates a *prima facie* direct moral duty on the part of moral agents to protect it or at least refrain from damaging it.

12.3 Attitudes Towards Nature

What does the way we treat the environment reveals about our beliefs, about ourselves and the world around us? Some people regard human as merely one of the many species of animals; others view human role as caretaker or stewards of nature. This differing point of view often lead to contradictory environmental polices. Lets see some of the popular point of view towards environment.

12.3.1 Anthropocentrism

The people having an anthropocentric or human centered attitude towards nature either assign more intrinsic value to human beings or they assign significantly greater value to human beings than any other non-human things. According to anthropocentric attitude, protection or promotion of human interests or well being at the expense of nonhuman things turns out to be nearly always justified. Aristotle maintains that 'nature has made all things specifically for the sake of man' and that the value of nonhuman things in nature is merely instrumental. The Bible says:

> "God created man in his own image, in the image of God created he him; male and female created he them. And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over fish of the sea, and over fowl of the air, and over every living thing that moveth upon the earth" (*Genesis* 1: 27- 8).

Although many people trace the roots of domination in these biblical injunctions, however other argue that these verses are misinterpreted and translated. The original they claim meant something more like stewardship than conquest and domination. However in early 1970s, with the emergence of environmental ethics as new discipline, a challenge was posed to anthropocentrism. Environmental ethics questioned the assumed moral superiority of human beings to other animals to other species on earth and

investigate the rationales for assigning intrinsic value to natural environment. However, that some theorists working in the field see no need to develop new, non-anthropocentric theories. Instead, they advocate what may be called *enlightened anthropocentrism* (or, perhaps more appropriately called, *prudential anthropocentrism*). Briefly, this is the view that all the moral duties we have towards the environment are derived from our direct duties to its human inhabitants.

12.3.2 Stewardship

Many tribal or indigenous people both hunters and gatherers and those in traditional agricultural societies, have a strong sense of stewardship or responsibility for a particular part of nature. As custodian of resources, they see their proper role as working together with human and nonhuman forces to sustain life. Humanity and reverence are essential in this worldview, where humans are seen as partner in natural process rather than masters not outside of nature but part of it. Stewardship requires a person to consider the entire universe as his or her extended family, and all living organisms are members of the household. In this humane view, stewardship need not reject science or technology. If we are part of nature, than our intelligence and discoveries are parts of nature too. As stewards of our environment, we have a duty to use the power of science and technology to improve rather than destroy or degrade the world.

12.3.3 Ecofeminism

Many feminists argue that neither anthropocentrism, nor stewardship is sufficient to solve environmental problems or to tell us how we ought to behave as moral agents. They argue that all these philosophies have come out of a patriarchal system based on domination and duality. This worldview assigns prestige and importance to some things but not others. It claims that men are superior to women, minds are better than bodies, and culture is higher than nature. Feminists see important connection between patriarchal domination, exploitation, and mistreatment of woman, children, minorities and nature.

Ecofeminist, a pluralistic, nonhierarchical, relationship oriented philosophy that suggests how humans could reconceived themselves and their relationship to nature in nondominanting ways is proposed as an alternative to patriarchical systems of domination. Ecofeminism is concerned not so much with rights, obligations, ownership and responsibilities as with care, appropriate reciprocity and kinship. It promotes a richly textured understanding or sense of what human life is and how this understanding can shape people's encounters with the natural world.

According to this philosophy, when people see themselves as related to others and to nature, they will see life as bounty rather than scarcity, as a network of personal relationships rather than isolated egos (Cunningham and.

12.3.4 Biocentrism and ecocentrism

Many modern environmentalists criticize stewardship as being too anthropocentric. They instead favor the biocentric attitude that claims that all living organisms have values and rights regardless of whether they are useful to us. Aldo Leopold, in his famous essay on the Land ethic, in which he included the whole biotic community as part of the land, Leopold pointed out that the history of civilization has been accompanied by a gradual extension of inherent values and rights first men, then to women, children and minorities and more recently to nonhumans such as corporations and states. Leopold argues that values should be extended to recognition of inherent worth to other organism as well.

Some philosophers assert that even nonliving components of the landscape such as rocks, rivers, mountains or ecological processes such as succession or the hydrological cycle have a right to exist in their natural state without human interference. This attitude is described as ecocentric because it claims moral values and rights for both organisms and ecological systems. People having anthropocentric approach believes that the environment is in perfect balance until the evolution of modern humans who have disrupted the web of life in their quest to dominate nature; a quest which is leading to their own destruction if they do not relearn to live in harmony with the natural world.

Activity 12.2

Write your attitudes towards nature and differentiate between different attitudes with regard to human importance.

12.4 Environmental Equity

An ideal of equal treatment and protection for various racial, ethnic, and income groups under environmental statutes, regulations, and practices applied in a manner that yields no substantial differential impacts relative to the dominant group--and the conditions so-created. Although environmental equity implies elements of "fairness" and "rights", it does not necessarily address past inequities or view the environment broadly, nor does it incorporate an understanding of the underlying causes and processes.

There are three categories of environmental equity issues:

12.4.1 Procedural inequity

This issue addresses questions of fair treatment: the extent that governing rules, regulations, and evaluation criteria are applied uniformly. Examples of procedural inequity are "stacking" boards and commissions with pro-business interests, holding hearings in remote locations to minimize public participation, and using English-only material to communicate to non-English speaking communities.

12.4.2 Geographical Inequity

Some neighborhoods, communities, and regions receive direct benefits, such as jobs and tax revenues, from industrial production while the costs, such as the burdens of waste disposal, are sent elsewhere. Communities hosting waste-disposal facilities receive fewer economic benefits than communities generating the waste.

12.4.3 Social Inequity

Environmental decisions often mirror the power arrangements of larger society and reflect the still-existing racial bias in the United States. Institutional racism has influenced the siting of noxious facilities and has let many black communities become "sacrifice zones."

12.5 Environmental Justice

The right to a safe, healthy, productive, and sustainable environment for all, where "environment" is considered in its totality to include the ecological (biological), physical (natural and built), social, political, aesthetic, and economic environments. Environmental justice refers to the conditions in which such a right can be freely exercised, whereby individual and group identities, needs, and dignities are preserved, fulfilled, and respected in a way that provides for self-actualization and personal and community empowerment. This term acknowledges environmental "injustice" as the past and present state of affairs and expresses the socio-political objectives needed to address them.

> *"Environmental justice has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, and /or socioeconomic status."*

This concept applies to governmental actions at all levels- local, state/provincial and federal- as well as private industry activities. Providing environmental justice goes beyond the stated definition and includes a guarantee of equal access to relief and meaningful community participation with government and industry decision-makers.

Principle of environmental justice as adopted at the People of Color Environmental Leadership Summit on October, 1991 are:

1. Environmental justice affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.

2. Environmental justice demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.

3. Environmental justice mandates the right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.

4. Environmental justice calls for universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and nuclear testing that threaten the fundamental right to clean air, land, water, and food.

5. Environmental justice affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.

6. Environmental justice demands the cessation of the production of all toxins, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.

7. Environmental justice demands the right to participate as equal partners at every level of decision-making including needs assessment, planning, implementation, enforcement and evaluation.

8. Environmental justice affirms the right of all workers to a safe and healthy work environment, without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.

9. Environmental justice protects the right of victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care.

10. Environmental justice considers governmental acts of environmental injustice a violation of international law, the Universal Declaration On Human Rights, and the United Nations Convention on Genocide.

11. Environmental justice must recognize a special legal and natural relationship of Native Peoples to the U.S. government through treaties, agreements, compacts, and covenants affirming sovereignty and self-determination.

12. Environmental justice affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and providing fair access for all to the full range of resources.

13. Environmental justice calls for the strict enforcement of principles of informed consent, and a halt to the testing of experimental reproductive and medical procedures and vaccinations on people of color.

14. Environmental justice opposes the destructive operations of multi-national corporations.

15. Environmental justice opposes military occupation, repression and exploitation of lands, peoples and cultures, and other life forms.

16. Environmental justice calls for the education of present and future generations, which emphasizes social and environmental issues, based on our experience and an appreciation of our diverse cultural perspectives.

17. Environmental justice requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and reprioritize our lifestyles to insure the health of the natural world for present and future generations.

It is sometimes thought that environmentalism is an elitist movement, for those who have money and leisure, and who can afford to worry about maintaining open spaces for recreation, and preserving economically valueless species as a matter of principle. It is said that from the point of view of the poor, providing jobs and a good standard of living should have higher priority than a clean environment, which is a luxury that comes after other needs are met.

However, others believe that the environmental consequences of our use of natural resources fall disproportionately on certain disadvantaged racial, ethnic, and socioeconomic groups. For instance, a good case could be made that hazardous waste sites are usually located in disadvantaged communities, and in disadvantaged nations, and that the people in these locations bear the consequences of our use of hazardous materials, without reaping the benefits proportionately. The environmental justice movement is concerned with such issues.

Self Answering Question 12.1

Based on the ethical and moral dimension for environmental management as far you have studied describe

How can we preserve, protect and sustain the environment and create an appropriate relationship with nature, while at the same time enjoying the benefits of industry and technology?

Match your answer with the answer given at the end of this unit.

12.6 Environmental Racism

Race, not class or income is the strongest determinant of who is exposed to environmental hazards. Although poor people in general are more likely to be

exposed to pollution as living in polluted neighborhoods than rich people however, middle class blacks will be exposed more than middle class whites. Environmental racism is "Racial discrimination in environmental policy-making, enforcement of regulations and laws, and targeting of communities of color for toxic waste disposal and siting of polluting industries. According to Reverend Benjamin E. Chavis, Jr., Ex-Chairman of the NAACP, racial discrimination can be intentional or unintentional and is often a manifestation of "institutional racism". This term acknowledges the political reality that created and continues to perpetuate environmental inequity and injustice.

People of colour around the world are subjected to disproportionately high levels of environmental health risks in their neighborhoods and on their jobs. Minorities, who tend to be poorer and more disadvantaged than other residents, work in the dirtiest jobs where they are exposed to toxic chemicals and other hazards. More often than live in urban ghettos, barrios, reservations and pockets of rural poverty that have shockingly high pollution levels and are increasingly the site of unpopular industrial facilities such as toxic waste dumps, land fills, smelters, refineries and incinerators.

12.7 Religious Teachings about Environment

World religions and individual spiritual traditions can provide a framework for changing our attitudes. World religions teach us that the land, rivers, mountains, minerals, oceans are held in trust for God, but can be wisely used for the general welfare of the humanity. Put another way, our religion tell us that we should consider ourselves only as trustees of the universe, and as trustees we are authorized by God to use natural resources, but we have no divine power over nature and the elements. From the perspective of many religions, the abuse and exploitation of nature for immediate gain is unjust and unethical.

Religions and culture can awaken that dimension of human mind that is not involved in scientific or technological reasoning. Religion can help humanity to realize that limits must be imposed on our dominance of and control over the animate and inanimate world, and that our arrogant manipulation of nature has backfired. Religion recognizes that our lives cannot be measured by material possession alone, and that the ends of life go beyond conspicuous consumption.

All religions and cultures have something to offer to conservation and environmental protection. From each religion, several injunctions or exhortations can be brought forth to form a code for environmentally sustainable development. No religion says that we have the right to destroy our habitat, and no religion sanctions environmental destruction. On the contrary, penalties and admonitions are mentioned for those who do so. This is amply demonstrated in the codes of all the religions. A brief review of teachings about respect of nature and conservation of natural resources as given by Hinduism, Jainism, Buddhism, Christianity, Islam and Sikhism is given in the following sections.

12.7.1 Hinduism

In Hinduism one finds a most challenging perspective on respect for nature and environmental conservation, and the sanctity of all life on this planet and elsewhere is clearly ingrained in this religion. Only the supreme God has absolute sovereignty over all creatures, including humans. Human beings have no dominion over their own lives or over non-human life. Consequently they cannot act was viceroys of God, nor can they assign degrees of relative worth to other species. The sacredness of God's creation demands that no damage may be inflicted on other species without adequate justification. Therefore all lives, human and non-human, are of equal value, and have the same right to existence.

According to Hindu scriptures people must not demand or take dominion over other creatures. They are forbidden to exploit nature; instead they are advised to seek peace and live in harmony with nature. The Hindu religion demands veneration, respect and obedience to maintain and protect the harmonious unity of God and nature. This is demonstrated by a series of divine incarnations, as enunciated by Dr. Karan Singh in the Assisi Declaration:

> *The evolution of life on this planet is symbolized by a series of divine incarnations beginning with fish, moving through amphibious forms and mammals, and then on into human incarnations. This view clearly holds that man did not spring fully formed to dominate the lesser life forms, but rather evolved out of these forms itself, and is therefore integrally linked to the whole of creation.*

Almost all the Hindu scriptures place strong emphasis on the notion that not killing his creatures or harming his creation can receive God's grace. Many trees and plants were worshipped during the time of Rig Veda (about 1500 BC) because they symbolized the various attributes of God.

Through such exhortations and various writings, the Hindu religion provides moral guidelines for environmental preservation and conservation. From the perspective of the Hindu culture, the abuse and exploitation of nature for selfish gain is considered unjust and sacrilegious.

12.7.2 Jainism

Jainism places great emphasis on the principle on that one should refrain from avoidable acts that are harmful to him or others. According to Jainism violence grows out of passion, and one who has passion causes selfinjury. Preventing injury to oneself and others is accomplished through control of speech, control of thought, regulation of movement, care in taking things up and putting them down, and examining food and drink, and a vow is taken by Janis to do all of these things.

Ahimsa (non-violence), which is the fundamental tenet of the Jain way of life, is a term that is clearly allied with realism, common sense, and personal worth and responsibility. It touches the deepest and noblest aspects of human nature: *'it adheres to the universal law which states that like, order*

comes of order, and peace can only be achieved through peace. It maintains that in all situations the ends and means are one and the same, and that truth, honesty and compassion must be the foundation of any truly civilized community. As enunciated by Amrit Chandra Acharya:

> *One should never think of hunting, victory, defeat, battle, adultery, theft etc., because they only lead to sin. Sinful advice should never be given to persons living upon art, trade, writing, agriculture, arts and rafts, service and industry. One should not without reason dig ground, uproot trees, trample lawns, sprinkle water etc., nor pluck leaves, fruit and flower. One should be careful not to give instrument ofhimsa (violence), such as knife, poison, fire, plough, sword, bowl, etc., one may not listen to, accept, or teach such bad stories as increase attachment etc., and are full of absurdities. Renounce gambling from a distance. It is the first of all evils, the destroyer of contentment, the home of deceit, and abode of theft and falsehood.*

For the Jains, all should pursue environmental harmony through spirituality and adhering to three precepts can do this:

1) the right belief,
2) the right knowledge and
3) the right conduct.

12.7.3 Buddhism

At the very core of the Buddhist religion are compassion, respect, tolerance and ahimsa (non-injury) towards all human beings and all the other creatures that share this planet. A Buddhist prayer exemplifies this:

> *"As the mother protects her child even at the risk of her own life, so there should be mutual protection and goodwill which is limitless among all beings. Let limitless goodwill prevail in the whole world – above, below, all around, untarnished with any feeling of disharmony and discord".*

Buddha also set down rules forbidding the pollution of rivers, ponds and wells. As Buddha says in Sutta-Nipata:

> *Know ye the grasses and the trees.... Then know ye the worms, and the different sorts of ants.... Know ye also the four-footed animals small and great... the serpents ...the fish which range in the water... The birds that are borne along on wings and move through the air...*

Buddhists regard the survival of all species as an undeniable right, because as coin habitants of this planet they have the same rights as humans. In Buddhism the rivers, forests, grass, mountains and night are highly respected and regarded as bliss bestowers. Buddhist thinkers have always had great respect for the sun, moon and other planets, and they recognize grasses, creepers and herbs as bestowers of bliss and objects of adoration.

The teachings of Buddhism have concentrated on the theory of Karma and the theory of cause and effect. They demonstrate that unmindful neglect of these principles of right living may lead to chaos, and thus to environmental crisis. That is why there should be no exploitation of nature beyond what is needed for survival, and if we believe that all life forms are interconnected, our exploitative tendencies towards nature can be controlled. This message that all life is interconnected and should be cared for—is the foundation of the Buddhist ethics of nature. The Dalai Lama expressed this clearly in the following way:

> *Have you ever wondered what a beautiful place this world would be if everyone would treat all animals and life in the same manner? And realize the fact that, whether it is more complex groups like human beings, or simpler groups such as animals, the feeling of pain and appreciation of happiness is common. All want to live and do not wish to die. As a Buddhist, I believe in the interdependence of all things, the interrelationship among the whole spectrum of plant and animal life, including the elements of nature, which express themselves as mountains, valleys, rivers, sky, and sunshine.*

12.7.4 Christianity

There is a common thread in the Old and New Testaments concerning the concept of nature and the rules governing our responsibility to it. Although certain verses in Genesis (1:26 and 1:28) have been interpreted as giving humans dominion and absolute control over nature, there are places where the responsibility of human beings has been clearly delineated. For example *"And the Lord God took the man and put him into the Garden of Eden to dress it and keep it"* (Genesis 2:15).

The word 'dress' has been interpreted as the duty of man to manage, and the word 'keep' has been interpreted as protecting the natural world from harm. Furthermore the scripture clearly establishes God as the sole owner of the natural world, while humanity is actively responsible for the care of the world:

'The earth is the Lord's and everything in it, the world, and all who live in it'. (Psalm 24:1), and
Every animal in the forest is mine, and the cattle on a thousand hills (Psalm 50:10)

Furthermore, we are advised that we have no rightful ownership over the land: 'because the land is mine, and you are but aliens and my tenants'.

The Bible also confirms that the purpose of creation is to proclaim God's glory because it is His handiwork. Divine life is actively manifested in and through the created world. As such the Earth is not to be considered as a lifeless entity or a means to some higher end. To an extent, a harmonious triadic relationship exists between the divine and humanity, among human beings themselves, and between human beings and nature, and failure to maintain this harmony may alienate humanity from its creator and also from nature.

12.7.5 Islam

In Islam the Holy Quran and the divinely inspired words of Prophet Muhammad (Peace be upon him) form the foundation of and rules for the conservation of nature. The Quranic message is one of unity, harmony, balance and order. The Quran stresses that nature's laws must be observed, and that defined limits should not be exceeded. Man was created so that he could become a manifestation of divine attributes and serve as a mirror to reflect the beautiful image of God. The Quran says:

> *"Surely, your Lord is Allaha, who created the heavens and the earth in six days.... His is to create and to govern (Quran 7:54). And there is not a thing, but we have unbounded stores there of and We send it in regulated quantities (Quran 15:21). Indeed, we have created everything in proportion and due measure (Quran 54:49)"*

Thus every one has to observe the balance and acknowledge that certain limits should not be exceeded. In other words humanity has only a guardianship role (the role of vice-regent) in God's heaven and earth, and not a position of outright ownership; this guardianship has obligations. The Islamic ethic holds that we have a choice in our interaction with nature. People have been given the intellect and ability to decide what is just and unjust; what is right and what is wrong.

According to Islam the riches of the earth are a common heritage. Everyone may benefit from them, make them productive, and use them for their own well-being and improvement, but our quest for progress and development must not be detrimental to the environment; instead it should ensure conservation.

In both the Quran and the Shariah, the legal codes of Islam, the rights of the natural world are strongly expressed and the abuse of them by humans is condemned. The Quran says:

> *"He set on the Earth, firmly rooted, mountains rising above it, and blessed the Earth and provided sustenance for all, according to their needs."*

12.7.6 Sikhism

Baba Guru Nanak, the founder of the Sikh religion, assigned divine attributes to nature. According to Sikhism, people should respect God's creations and know the eternal truth regarding their place in the universe. God has not granted any special or absolute power to humans to control and dominate nature. To the contrary, the human race is an integral part of nature and is linked to the rest of creation by indissoluble bounds.

God Himself is the source of the birth, sustenance and eventual destruction of all living organisms. It is he who created the universe through his divine will and with his word. According to the Sikh holy book, the *Guru Granth Sahib*, 'From the Divine Command occurs the creation and the dissolution of the universe. The basis of creation was divine will, and the universe was

produced by His *Hukum* (command). However it should be noted that God is submerged in creation, as stated in the *Adi Guru Granth Sahib* (p.19)

From Primal truth emanated air
From air emanated water
From water emanated three worlds
And Himself the merged with the creaton

Sikhism teaches that the natural environment and the survival of all life forms are closely linked in the rhythm of nature. The history of the gurus contains many stories of their love and special relationship with the natural environment—with animals, birds, vegetation, earth, rivers, mountains and the sky.

Unit Summary

Many environmental problems that we face today are the results of our attitudes and cultural beliefs about environment and its management. Environmental degradation is considered as result of western belief about environment according to which environment is only for human use. For most of human history ethics has concentrated on human rights (anthropocentrism) it is only recently that ethics has formally begun to define the rights of animals, plants and other organism (biocentrism).

Beside our beliefs and attitudes whatever they are some mismanagement is done at policy and planning levels where basic condition of equity is not considered and discrimination on racial and class basis is common. Environmental justice seeks to eliminate those conditions in which communities on racial basis or on the basis of their low-income status are exposed to an inequitable share of pollution.

It is clear from the study of teachings of different religions that every religion give due worth to environment. Religions teach us that we should consider ourselves as trustees not the master of environment. As trustees or stewards of environment we can use the resources but we should not exploit them.

Answer to Self-Answering Question

An appropriate relationship with our environment, in order to be effective, workable and comprehensive, must take at least the following into consideration:

1. Our values and beliefs based on religion and culture.
2. Our scientific and technological capabilities and the consequences thereof.
3. Our pursuit of individual happiness and material progress.
4. The governing institutions, legal mechanisms, political process and ideologies that condition our social, economic and cultural behavior.

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Integrated Environmental Management: Rural and Urban

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INTEGRATED ENVIRONMENTAL MANAGEMENT:
RURAL AND URBAN

Block IV

Governance Approach

Post Graduate Diploma
Environmental Sustainable Development
South Asia Foundation Learning Initiative

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INTEGRATED ENVIRONMENTAL
MANAGEMENT: RURAL AND URBAN

Block

4

Governance Approach

UNIT 13

LEGAL FRAMEWORK

Unit Introduction

To protect public health and the environment, effective laws have been passed and vigorously enforced. Legislative and regulatory instruments are designed to ensure adherence to set rules and regulations for the protection of the environment. Legislation, laws and regulation play important role in modifying human behavior towards consumption of resources and environment.

The unit describes:

- Provisions in constitutions of South Asian countries for environmental management.
- Environmental legislation and their role in environmental management.
- Environmental Laws, their types and characteristics.
- Environmental regulations and their mechanism.
- Environmental tribunals
- Public interest litigations

Unit Objectives

After going through this unit students will be able to understand:

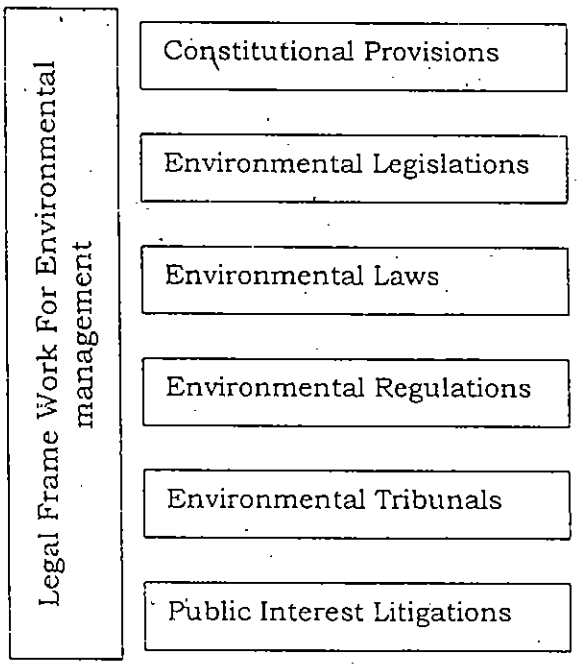
1. Legal framework for environmental management.
2. Components of legal frame works: Constitutional Provisions, Legislations, Laws, Regulation, Tribunals, and public interest litigations.
3. Role of different components of legal framework in managing environment.

13.1 Introduction

Historically in the contemporary literature and scientific endeavor it is the decade of sixties that there emerged an environmental awareness in a large segment of general public. This awareness led to the creation of new laws, regulations and even new government agencies on the international, regional, federal, state and local levels.

The best means to control the pollution and preserve the environment is the study of natural laws and means and their application to correct the man made problems with special consideration of the fact that the method adopted in this respect should be in harmony with nature so as to minimize the secondary effects and reactions.

To manage the environment, legal framework works through different components:



13.2 Constitutional Provisions

Since the 1972 Stockholm Conference on the Human Environment basic principles of environmental management are increasingly being incorporated into political constitutions. Thus, issues such as environmentally sound development, sound use of natural resources, prevention and control of environmental pollution, and the individual's right to a clean environment have found expression in constitutional form. These are often articulated in terms of a State's obligations to its citizens. In addition, however, a duty is often imposed on citizens to safeguard the national environment. This constitutional trend is most manifest in developing countries. In the South Asia region for examples,

The Constitution of India declares:

> " The State shall endeavor to protect and improve the environment and to safeguard the forests and wild life of the country." and again. " it shall be the duty of every citizen to India to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures."

The Sri Lankan Constitution declares in its chapter on Directive Principles of State Policy and Fundamental Duties:

> "The State shall protect, preserve and improve the environment for the benefit of the community".

The Constitution of Bangladesh on the other hand, refers specifically to protecting the cultural heritage when it declares in Article 23,

> " The State shall adopt measures to conserve the cultural heritage of the people and so to foster and improve the national language, literature and the arts that all sections of the people are afforded the opportunity to contribute towards and to participate in the enrichment of the national culture."

And in articles 24;

> "The State shall adopt measures for the protection against disfigurement, damage or removal of all monuments, objects or places of special artistic or historic importance or interest."

Of course the effectiveness of constitutional provisions such as these depends very much on the opportunities for administrative review, which vary from country to country. In Philippines, for example, a successful court challenge to administrative decisions, which threaten the sustainable capacity of the forests, has been brought based on environmental guarantees contained in the Constitution.

On the other hand, the Sri Lankan Constitution expressly states that Article 27 and 28 referred to above;

> "do not confer or impose legal rights or obligations and are not enforceable in any court or tribunal".

Nevertheless, the elevation of environmental concerns to constitutional status is at least a statement of intent, and could enhance the priority to be conferred by Governments on sound national environmental management and sustainable development.

13.3 Environmental Legislations

The function of national legislation is to:

- Reflect the particular policies and schemes considered by the legislature to be most appropriate for achieving the desired goals;
- Establish the institutional machinery for giving effect to those principles and schemes; and
- Empower the related institutions to function efficiently within the framework of the establish policy parameters.

The idea of environmental management has always been a part of legislation in one form or he other under various regulations, laws, rules and statues. The evolution of environmental legislation can be traced from early resource exploitation legislation through later resource management legislation to more recent legislation conceived primarily from the perspective of environmental management. This has resulted in much of the provisions relating to natural resource conservation, pollution control and protection of history, culture and aesthetics being scattered in a wide range of statues and in some instances, the common and customary laws of countries, developed at different times and in vastly different political, economic and social contexts. Achieving the necessary contextual change and harmonizing these provisions is one of the difficult challenges of developing an adequate legal and institutional regime for environmental management in the context of sustainable development.

For development effective legislation following are among the fundamental premises:

- First, the integrative character of environmental highlights the need for a consensus on the underlying policies and procedures. This presupposes the widest participation of and consultation with all interest groups and accommodation of their respective interests and concerns to the best extent possible. This is particularly so in the contemporary environmental legislation which affects such fundamental national interests as national planning and development, control of agricultural and industrial national pollution, conservation of the country's natural resource base and seeks to bring about a fundamental various national, sub national and local institutions. A consultative and participatory approach to policy and legislative development is therefore a sine qua non of effective legislation for environmental management.
- The second has to do with achieving a judicious balance between environment and development in the particular context of developing countries. Many laws prohibit, often subject to well-defined exceptions, various types of activities, which are considered inimical to accepted norms of society. Environmental pollution on the other hand is an inevitable by-product of productive economic activity; something that cannot be entirely prohibited without causing serious economic dislocation. It could, and indeed must, be minimized, controlled and

managed, where necessary by prohibiting or regulating environmentally harmful activities. "It is a necessary evil, one which must be tolerated, at least to some extent, if economic activity we depend on is to continue and to flourish" the pivotal policy issue in the development of environmental legislation is endanger the human environment without restricting or slowing down their economic and social development process. In the final analysis, it is the success of the development process that is the only guarantee against spiraling environmental degradation and unsustainable use of natural resources, poverty, and unemployment as well as social and political dislocation.

- Thirdly, the legislative and institutional strategies must be endogenous and must be firmly set within each country's national milieu. The country specific character of national environmental legislation has been repeatedly stressed in Agenda 21 and reaffirmed in the Rio Declaration on Environment and Development. Principle 11 of the Declaration states, "environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply.

A survey of national environmental legislation reveals an important range of juridical mechanism for environmental management. Apart from the express consecration of environmental policy in constitutional form, the "prototypes" of environmental legislation include anti-pollution laws, the codification of environmental and natural resources laws, and framework of environmental laws. They range from provisions in the Penal Codes relating to nuisance through sectoral legislation on mattes such as land use, agriculture, industry, forestry, wild life habitat, to more organic legislation dealing with principles of and institutional arrangements for environmental management. The choice of a legislative technique largely reflects the historical evolution of a country's environmental policy and the nature of its legal system.

To provide solid and legal foundation for the control of environmental pollution, the most important legislation in the Pakistan is available in the form of Pakistan Environmental Protection Act, 1997. This Act replaces the Pakistan Environmental Protection Ordinance (1983). Under the provisions of the Act, Pakistan Environmental Protection Council (PEPC) has been established to supervise enforcement of the provisions of the Act and approve national environmental policies and ensure their implementation within the framework of the national conservation strategy. In addition, federal and provincial Environmental Protection Agencies (EPAs) have been created for implementation of the provisions of the Act. The Act provides provision for the establishment of standards for the quality of ambient air, water and land. Accordingly, National Environmental Quality Standards (NEQS) have become effective since 1st July 1996. However, these have not largely been complied with. These standards also address the industrial gaseous emissions and automobile exhaust and noise.

India's main environmental law Environmental Protection Act which was passed in 1986 after the Bhopal industrial tragedy. The EPA is supported by two earlier pieces of legislation: the Water Act, 1974 and the Air Act, 1981. There are other laws that deal with environmental issues: the Wildlife Act, 1972, the Forest Act, 1980, liability Insurance Act 1991, and the Water Cess

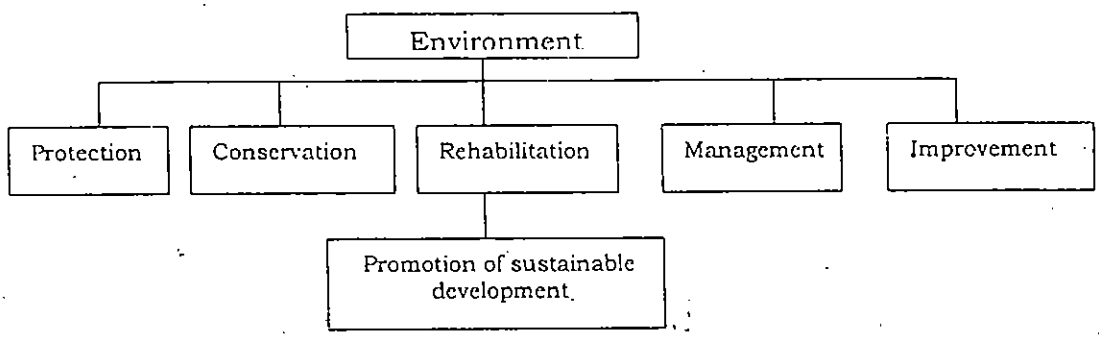
Act, 1977. All these laws provide central and state governments with ample authority to control point of source pollution and damage to the natural environment however various institutional impediments (such as inadequate institutional arrangement; policy conflicts, bribery and undue emphasis on command and control in the administration of laws and the slow movement of cases through the courts are impeding progress in this area.

13.4 Environmental Law

Law is one of the key instruments of social regulation. This is achieved through the establishment of norms of conduct and the creation of the required machinery with their accompanying empowerment for ensuring that such norms are effectively compiled with. In the field of environmental management, law both international and national has been extensively applied, especially in the past thirty years or so, to promote pollution control, natural resource conservation and use, and protection of the cultural and aesthetic environment, the triple goals of environmental management. Since the United Nations Conference on Environment and Development of 1992 gave legitimacy to the concept of Sustainable Development, these goals are no longer viewed from a purely environmental perspective but in the context of integration of environment and development.

Environmental law encompasses and covers all the laws, rules, regulations, and recommendations for the protection of the elements constituting the environment on the earth, seas, air and outer space. These include but not limited to water, vegetation, forests, rivers, disposal areas for industrial, biological, chemical and nuclear wastes on the earth, the oceans, seas and marine life, the air enveloping the earth and the outer space.

So the aim of environmental law can be described by this figure as follows:



13.4.1 Environmental Law Classification:

The basic and generic classification of the environmental laws can be broadly done into the following branches, which give coverage to the fields we have at present and which we fore see in future:

1. Conventional Law
2. National Law

3. International Law

13.4.1.1 Conventional environmental Law

This branch is based on practices, precedents and conventional behavior with respect to environmental problems and their solutions based on historical backgrounds. In many cases it falls within the envelop of the laws of nature on the subject to which this universe is obligated by its creator. They form the basis of any man-made laws to safeguard, secure and control the environment. Any interference by human race in this cycle results in chaos; confusion and unequilibrium in the natural process which in turn result in calamities and tragedies for human race.

13.4.1.2 National Laws

With the advent of the industrial revolution and the scientific progress attained during present time, national governments have awareness of the importance of environmental elements on the life health and material progress of this nations have enunciated environmental policies and laws controlling the environments and safeguarding its natural resources, national wealth and well being of its nationals. Many industrially developed western countries have legislated in their countries steps to improve environmental conditions, control and correct the pollution, eliminate the sources of pollution and research and study in field of environmental science and engineering.

13.4.1.3 International Environmental Law

Environmental issues have their impact beyond national geographical boundaries and the political frontiers do not act as a barrier in this case, whether it concerns the pollution at high seas or outer space. Therefore, the need for the development of various branches of international law to address these diverse issues cannot be overemphasized. Due to communication revolution the world has shrinked and the trend of international cooperation after the World War-II augers a good future for improved relationship between various nations. With the advent of United Nations and its specialized agencies the universal approach to multi-country problems has become practical and some headway has been made in this direction. Customary or national laws provide limited means to solve multi national problems and there the need is felt to have new institutions, standards and localized regimes to deal with the protection of environment, but at the same time rules of customary or conventional laws have a definite role, which cannot be under estimated. In particular positions established by that they provide ground rules or basis and define some fundamental competence provided under customary laws certain freedom, which lead to the abuse of environment.

13.4.3 History of Development of Environmental Law

The history of development of environmental law can be grouped into four phases as under:

Phase I:

*Development of environmental law principle*The environmental law principle has been developed in the twentieth century. A basic legal principle applicable to environmental controversies or disputes has been that a nation should not permit action within its territorial jurisdiction to harm the interest of other states. In other words of L. Oppenheim the renowned writer on international law:

> "A state is, in spite of its territorial supremacy, not allowed to alter the natural conditions of its own territory to the disadvantage of the natural conditions of the territory of the neighbor state....."

Phase II:

Recognition of environmental law liability principles as the principle of international law by the United Nations Even though international environmental law liability principle was established by the 1941 decision of the Trial Smelter arbitration, it was not until the decade of sixties that there emerged an environmental awareness in the minds of general public about the rapidly damage to the environment. In this regard it is worth noting that when United Nations was established in 1945, no mention was made of the environment as a common concern in its agenda. This awareness led to the creation of new laws, regulations and even governmental agencies on the international, regional, federal, state and local level. The practice of international environmental declaration and action plans started in 1972 with the Stockholm Declaration, which declared environmental protection as the common concern of entire mankind.

Phase-III:

*1992 Earth Summit and Its Follow –Up*The third phase is the awakening of consciousness of national leaders i.e. politicians and policy makers, that environmentalism is a force to be reckoned with and that it has a significant effect upon public concerns about the government policies. The beginning of this era was 1992, when national laws were globalized by adoption of several international treaties signed as a follow-up the Earth Summit held in Rio de Janeiro, Brazil in 1992 9also known as the United nations Conference on Environment and Development or the Rio Summit).

Phase-IV:

2002 Johannesburg Summit and its Implications: The fourth phase f development of environmental law principles appears to be characterized by the growing realization by both the business community and the environmental NGOs that partnership and dialogue is the key to finding acceptable solutions to the world's environmental problems and that industry has the means to deliver the required improvements.

13.3.3 ***Characteristics of Environmental law***

Environmental law differs from other type of law in many ways:

- It is not restricted to factories and work-related disputes only as labour laws are.
- It does not concern only with personal interest or harms like criminal laws are.
- It encompasses entire range of societal activities.
- It goes beyond the human society to the natural environment.

13.3.4 Development of environmental Law in Pakistan;

The legal system of Pakistan and India has the sane origin i.e. laws enacted in the areas of Pakistan and India during British Rule. However, the environmental laws were not enacted in Pakistan until the lat 1950's and in the first half of the 60s. Further the Environment Ministry was established in Pakistan in 1975, as a follow up of Stockholm Declaration of 1972. The development of environmental law can be divided into four different periods.

1. The first period of environmental law runs from 1958 to 1965. In this period six or seven specific environmental laws were promulgated.

2. The second period of environmental laws run from 1970 to 1976. During this period comparatively lesser laws were enacted.

3. The third period of environmental law runs from 1983 to 1997. This is the very effective period of environmental law. In this period first environmental Protection Ordinance 1983 was promulgated. With this ordinance the campaign of environmental legislation started which contemplated on the enactment of Pakistan environmental Protection act, 1997.

4. The fourth period marks the beginning of judicial activitism for the environmental issues by the Pakistani judges. This started with the 1994 landmark decision of the Supreme Court of Pakistan in the Shehla Zia case in which Constitutional rights for people living close to source of pollution was established.

Activity 13.1

As described above in Pakistan environmental law development is categorized into four stages. How environmental laws are developed in your country. Search the literature.

13. 5 Environmental Regulations

Regulations are designed to modify human behavior. In other words, government use regulations to make people act or behave in a prescribed manner that will lead to the realization of desired goals. As a consequence regulatory policies are based on assumptions about human behavior. Regulations are generally equated with setting of standards and guidelines for acceptable behavior. However they are not the same as standards and guidelines. Standards imply strict and rigid rules of behavior in which quality of law and fair treatments are applied. Guidelines are associated with flexibility and are applied in unique and unusual circumstance. Regulations involve direct sanctions and penalties and therefore it is assumed that

people will modify their behavior to comply with the regulations rather than incur the penalties. Regulations, standards and guidelines embrace both reliable, predictable behavior and unreliable, unpredictable, unique circumstance.

In the environmental policy field, the formulation of regulations, standard and guidelines relies extensively on scientific and technological knowledge. Social and pure sciences are of major importance in establishing causality, which in many cases forms the basis of regulation decisions. For example our pure science is invaluable in determining that specific types of activity cause environmental problems, for example that the emission of sulphur dioxide fumes into the atmosphere causes acid rain; while social science play an important role in the regulatory process by determining the best way of changing behavior. To put this in another way, when specific types of activity produce a known hazard, social science can determine the optimum means of modifying behavior to avoid the problem.

It is important to consider another critical part of regulatory process; the implementation and enforcement of regulations. Without effective means of implementation and enforcement of regulations they become meaningless. Implementation therefore involves a variety of activities by government that aims to bring about a change in behavior, including information and determination activities, public meetings and seminars, training and education, collecting information on a voluntary or a compulsory basis, notifying authorities of certain plans or actions, research and analysis, monitoring inspecting, issuing orders and ensuring they are obeyed, imposing fines revoking permission or licenses, and prosecution.

13.5.1 Factors Effecting Implementation of Regulations

Factors that influence the implementation of regulations include;

- *Public and private behavior:* Implementation involves more than just what public officials say and do. Private behavior is of major concern because of the limited ability of regulatory agencies to perform all the necessary activities to implement, monitor and enforce regulations. For example individual initiatives such as notifying the police or another relevant authority, registering complaints and reading pertinent information are essential if regulations are to be implemented and enforces effectively.

- *Inherent institutional impediments;* the implementation of regulation also affected by the inherent institutional impediments that plague governmental operations and activities. These problems, coordination, delegation of authority and regional considerations, affect the manner in which environmental regulations are implemented.

13.5.2 Environmental regulations: current scenario of Pakistan

The following rules and regulations have been issued under the Pakistan Environmental Protection Act, 1997.

Rules:

- National Environmental Quality Standards (SelfMonitoring and Reporting Industries) Rules, 2001.
- Provincial Sustainable Development Fund (procedure) Rules, 2001.
- Pakistan Sustainable Development Fund (Utilization) Rules, 2001.
- Pollution Charge for Industry (Calculation and Collection) Rules, 2001.
- Environmental Tribunals Procedures and Qualification Rules, 2000.
- Environmental Sample Rules, 2001.
- Hazardous Substance Rules, 2000.

Regulations:

- Review of IE/EIA Regulations, 2000.
- National Environmental Quality standards (Certification of Environmental Laboratories) Regulations, 2000.

Suggested Reading:

Pakistan's Environmental Laws and Their Compliance, 2003, by Dr. Shoaib Qadar, Lahore Law Times Publications.

Students of Other countries should search for their county's regulations and laws fro managing the environment.

15.4 Environmental Tribunals

Laws and regulations play an important role in environmental management but require institutional mechanism for implementation and enforcement. In the 1960's and 70's, the judicial branch of government was highly responsive to environmental and social concern especially in first world countries. Thus environmental tribunals as established by many countries are the important part of legal framework for environmental management.

Citizens can seek relief in the courts from unjust laws or actions in two ways:

1. By bringing a civil suit, asking for payment of damages that were caused by a private individual, corporation or governmental agency and that injured you or your property.
2. Ask for a judgment by the court about the constitutionality of laws passed by government or the adequacy and legality of regulation established by an administrative agency. If the court finds a law or

regulations to be improper, it can issue an injunction to stop implementation or application of that law or regulation and may even direct what the new regulation should be.

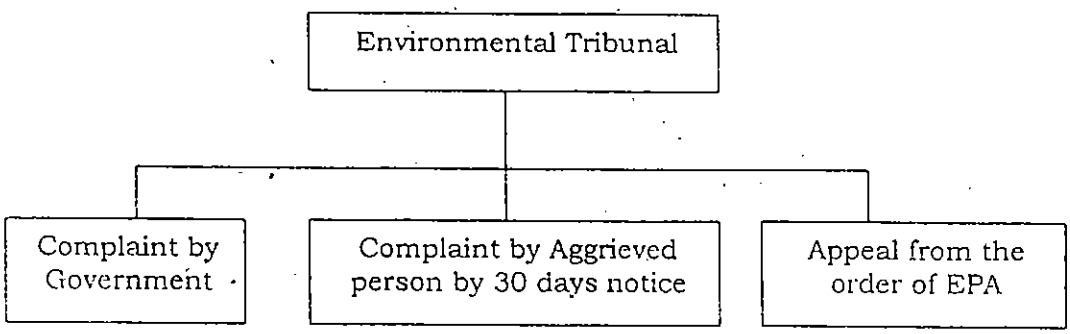
However there are several problems that make law suits difficult for ordinary citizens who want to protect the environment or some other public source:

1. You have to show that the law or action you oppose is illegal.
2. You have to establish that you have standing in court (a right to be heard). To do so, you must prove that you are directly affected.
3. Suits are expensive; a major suit might cost hundred or thousands of rupees in legal fees, court fees, witness etc.
4. It may take years before a suit finally settled, and by that time it may be too late to save the resource.
5. You have to prove that the defendant (an agency, corporation, or individual) is responsible for the harm that you allege. A corporation ca admits that you produce a toxic chemical, but you have to show, beyond reasonable doubt, that it was their chemical that caused the problem.
6. Counter lawsuits are often brought against environmental activists by business, developers and governmental agencies whose project they oppose.

15.4.1 *Environmental tribunals in Pakistan*

Two Environmental tribunals were established in Pakistan by Federal Government, one in Karachi and other in Lahore after the passing of Pakistan Environmental Protection Act by the parliament in December 1997.

The jurisdiction of Karachi Tribunal is over Sindh and Balochistan Provinces while Lahore Tribunal covers Punjab and NWFP Provinces. Each tribunal consists of one chairman, two judges, one member technical, one member legal, one Deputy Superintendent and one Registrar. Tribunals may only hear the cases when EPA makes a compliant in writing, or the local council or any aggrieved person who has given at least thirty days notice to an EPA of the offense and of his intentions to make a compliant to the Tribunals. The Tribunal may also hear appeal from the EPA.



Offenses triable by Environmental Tribunal includes:

- Pollution in excess of NEQS.
- Failure of an IEE and EIA.
- Import of hazardous waste.
- Non-compliance of an environmental protection order.

Appeal from the Tribunal shall lie before the High Courts.

Activity 13.2

Draw a framework of mechanism and jurisdiction environmental Tribunals of your country.

15.5 Public interest litigations:

Environment groups working through the courts have been a powerful force in shaping the direction of environmental quality control since the early development of environmental concerns in 1970's. Their influence rouse in part because the courts, appearing to respond to the national crisis of that time, took a more active stance and were less willing to defer to the judgment of agencies. At the same time, citizens were guaranteed an unprecedented access to the courts and through them to environmental policy.

Even without specific legislative authorizations for citizen's suits, courts have allowed citizen actions in environmental cases as part of a trend to liberalize standing requirements. Two of such examples are given in the boxes.

India- The Taj Mahal Case:

Besides the obvious health and environmental impacts, the almost intolerable levels of air pollution in India's cities are wreaking havoc on country's renowned architectural heritage. International concern has been generated in light of the noticeable deterioration of the famous Taj Mahal in Agra, Uttar Pradesh. Legal history was made in 1993 when Supreme Court of India ordered the closure of 212 industrial units in and around Agra that were found to be in willful default of air emission standards, and thus thought to be contributing directly to the deterioration of this historic seventeenth-century monument.

By virtue of the fact that public interest litigation is allowed under section 19 of the Environmental Protection Act (1986), the environmental lawyer M.C. Metha filed a writ with the Supreme Court of India Demanding that suitable order/directions be issued to restrain air pollution being caused by the polluting industries located in the area, of the Taj Mahal. Subsequently the Supreme

Court ordered the Uttar Pradesh Pollution Control Board (UPPCB) to undertake a survey:

"in order to identify the actual industries and foundries operating in the region and further directed that the board, after complementing the survey should issue notices to all the foundries and industries in that region to ensure that he necessary anti-pollution measures were undertaken by said industries and foundries."

In its report to the Supreme Court the UPPCB stated that notice had been issued to 511 industries in and around Agra. The court then directed the UPPCB to issue notice to these industries to install antipollution mechanisms. Some months later the UPPCB filed an affidavit stating that 212 industries had ignored the notice, and the court ordered the immediate closure of these units. Industries that had filed replies were given time to install pollution-control devices.

A further 29 units that had made no progress towards the installation of air pollution-control systems were directed to close, meaning that a total of 241 industries were required to shut down. One hundred and thirty six of these have since installed pollution control systems, and eight have removed the source of air pollution. These 144 industries have been allowed to reopen, but the remaining 97 are still closed. Out of the remaining 270 industries, 257 have installed pollution-control systems and three have removed the source of pollution. Installation of such system is underway in ten industries. Thus out of a total of 511 industries, 393 have installed air pollution control systems, 10 are constructing such systems, eleven have removed the Source of Pollution and 97 remain closed. In 1994 the Supreme Court also ordered the central Ministry of Environment and Forests to establish a special division to develop a green belt around the Taj Mahal.

Pakistan- Shehla Zia Case

Another such case is known as Shehla Zia Case was filed and heard by the full bench judgment of Supreme Court of Pakistan on 12ht January 1994. The case was initiated by a group of concerned citizens, against WAPDA in connection with the construction of a grid station near a residential area. Supreme Court on receipt of a letter from four residents of sector F-6/1, of Islamabad, found that letter raised two questions namely

1. Whether any Government agency had a right to endanger the life of citizens without the latter's consent and

2. Whether zoning laws vest rights in citizens, which could not be withdrawn or altered without citizen's consent.

Citizens under Article 9 of the Constitution of Pakistan were entitled to protection of law from being exposed to hazards of electro-magnetic field or any other such hazards, which may be due to installation, and construction of any grid station or such like installations. The word life here used has very broad and significant scope.

So, the judgment given in this case, is in favor of the citizens, and WAPDA is further directed in future prior to installing or constructing any grid station and/or transmission line, they would issue public notice in newspapers, radio and television inviting objection and to finalize the plan after considering the objection, if nay, by affording public hearing to the persons filing objections. The became a landmark decision in the field of environmental law and set the precedent for succeeding cases brought to the Supreme Court on environmental grounds (Qadar, 2003).

The case laid two important principles;

1.Right to life, enshrined in the constitution, includes the right to an unpolluted environment.

2.Where there are threats of serious or irreversible damage, lack of scientific research certainly shall not be used as a pretext for delaying cost-effective measures to prevent degradation.

Unit Summary

Legal framework is the integral part of the environmental management. The obvious objective of the legislations, laws and regulations is to preserve and protect the environment from unnecessary damage. To protect the environment legal framework works through its different components.

First component is the integration of concept of environmental management in national constitution. In south Asian countries, provisions for environmental protection are provided in constitutions whether these are broader or narrower in the scope.

Second component is the environmental legislations. Environmental legislations reflect policies and Programmes, establish the institutional machinery, and empower the related institution to work efficiently.

Third component is the environmental law. Environmental law covers all the laws, rules, regulations, and recommendations for the protection of the elements constituting the environment on the earth, seas, air and outer space. It is different from the other laws as it is not restricted to any individual or institution; it deals with whole society and also natural environment.

Fourth component is environmental regulations. Environmental regulations regulate the behavior of people and involve enforcement of standards, guidelines, and penalties.

Environmental tribunals are established to hear the cases filed by government institutions, individuals of the society or any organization.

Public interest litigations are the powerful tool to control pollution as public is the forceful group to compel any industry or government to modify or stop their activity if causing any damage to environment and human health.

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UNIT 14

POLICY FRAMEWORK

Unit introduction

Changing social practice, at the level of the individual and the organization, is widely seen as a vital component of local, national and international strategies for addressing environmental issues. Public authorities frequently find themselves in situations where inhibit social change that is deemed, by themselves and their advisors, to be socially or environmentally beneficial. In such situations, they may seek to influence behavior by implementing 'policy instruments.'

The unit deals with the policy life cycle and instrument by covering the topics:

- Need for environmental policy
- Policy development life cycle
- Policy Instruments; voluntary means, direct regulations, market based, communication and awareness building, laws and legislations
- Criteria for choosing instrument

Unit Objectives

After going through this unit, student will be able to learn about:

1. Environmental public policy and its development
2. Different policy instruments
3. What are the benefits and problems associated with these instruments
4. Criteria for choosing the policy instruments

14.1 Introduction

Having identified the nature of environmental problems, it is necessary to turn to a discussion of the appropriate means for solving them. There is no single or simple answer to the question of means: it depends on the nature of the issue being addressed and on the response of industry, consumer and pressure groups. Different issues can require different solutions. These can take form of tax, setting targets and limits, a ban, or an appropriate mixture of policy responses. Policy response are all, in various ways attempts to solve collective action problems. Industry pollutes because it cheap method of disposal; resources are depleted because it is to advantage of each kind of each kind to take what they can. If environmental resources are to be used in sustainable manner, then environmental policy has to find way of ensuring that the actions of individuals, business and government are themselves sustainable.

The environmental policy often described, as public policy is a specific course of action taken collectively by society or by a legitimate representative of society, addressing a specific problem of public concern that reflects the interests of society or particular segment of society. This definition emphasizes a course of action rather than principles. It does not restrict action to government it refers to collective nature of such action, and does not claim that each and every public policy represents the interests of society as a whole. Enough interests have to be represented, however, so that the policy is supported and can be implemented effectively.

Environmental public policy includes all of the laws and agencies in a society, which deal with the society's interactions with the environment. Included are the policies that prevent or lower the pollutants of air, water and land as well as those concerned with the use of natural resources. Public policies are developed at all levels of local, state, and federal, however in a democratic society, the ultimate responsibility for environmental public policy should reside with the public, not the authorities.

14.1 The need for environmental policy

The purpose of all environmental public policies is to promote the common good. Exactly what the common good consist of may be a matter of debate, but the improvement of human welfare would certainly be a central concern. In addition many would include the protection of natural world that provides for the continued existence of the ecosystem and species, the perspective of environmental stewardship.

Human populations and their economic activities have the potential for doing great damage to the environment, and that damage has direct impact on present and future human welfare. The impacts of pollution and the misuse of resources are most clearly seen in those parts of the world where environmental public policy is often not established and implemented. Millions of death and wide spread disease are directly traced to degraded environments. The cost to human welfare is imposed on the health, economic productivity, and on the ongoing ability of the natural environment to support human life needs. It is quite obvious that laws to protect the environment are not luxuries to be tolerated only if they do not interfere with

individual freedom or economic development. Such laws are part of the essential foundation of justice and they are ignored or down warded only on at great human and environmental cost.

14.2 Policy Development or Life Cycle of Policy

Environmental public policies are developed in sociopolitical context, usually in response to problems. Some policies are developed at local level, some problems are however are broader in their scope and must be addressed at higher levels of government. When specific problem such as acid deposition and the production of ground level ozone are addressed policy often takes a predictable course, called the policy life cycle.

The typical policy life cycle has four stages:

i. Recognition

ii. Formulation,

iii. Implementation, and

iv. Control

Each of the stages can be said to carry a certain amount of political "weight," which varies over time.

14.2.1 Recognition stage

The stage begins with the early perceptions of an environmental problem, often coming as a result of scientific research. Scientists have published their findings. And the media have picked up the information and popularized it. The public is now involved, and the political process is underway. Eventually, the problem gets attention from some level of the government, and the possibility of addressing it with public policy is considered.

14.2.2 Formulation Stage

The public is now aroused, and debate about policy about policy options occurs in the corridors of power. The political battles may become fierce, as questions of regulation and who will pay for the proposed changes are addressed. The media coverage is high, and politicians begin to hear from their constituencies. Lobbyists for special interests or environmental groups put pressure on legislators to soften or harden the policy under consideration.

During this stage, policymakers should be considering what may be called the "Three E's" of environmental public policy:

- Effectiveness (the policy really accomplishers what it intends to do in improving the environment),
- Efficiency (the policy accomplishes it objectives at the least possible cost),

- Equity (the policy parcels out the financial burdens fairly among the different parties involved).

Often, policymaker is prone to emphasize effectiveness over efficiency and equity at this stage of development, because they are looking for a workable solution and trying to make it into a low as soon as possible.

14.3.3 Implementation Stage

At this point, the policy has reached the implementation stage, where its real political and economic costs are exacted. The policy has been determined, and the focal point moves to a regulatory agency. By now the issue is not very interesting to the media, and the emphasis shifts to the development of specific regulations and their enforcement. Industry learns how to comply with the new regulations. Over time, greater attention may be given to efficiency and equity as all the players in the process gain experience with the policy.

14.3.4 Control Stage

The final stage in the policy life cycle is the control stage. By this point, years have passed since the early days of the recognition stage. Problems are rarely completely resolved, but the environment is improving, as things are moving in the right direction. Policies (and their derived regulations) are broadly supported and often become imbedded in the society, although their vulnerability to political shifts continues. Regulations may become more simplified. The policymakers must now see that the problem is kept under control, and in due time, the public often forgets that there ever was a serious problem.

14.4 Policy instruments

There are a many instruments that can be adopted by a country to attain its pollution control objectives.

These instruments include:

- Voluntary means
- Direct regulations
- Economic instruments
- Communication and Awareness building
- Institutions
- Laws and legislations

14.4.1 Voluntary means

Individuals ad industry, producers and consumers can adopt voluntary means of solving environmental problems, individual can recycle paper and bottles, and refrain from car use, business can voluntarily clean up their processes. People can adapt to different patterns of consumption and change their life style, seeking individually or collectively to develop sustainable practices. Although business is often subjected to legal requirements

concerning waste products as so on, there are other voluntary approaches such as ISO 14000 certification, which have been adopted.

Voluntary responses are always valuable and it is undeniable that there has been a shift in environmental consciousness. No rules or regulations or government direction will ultimately work unless people are prepared to modify their own behavior. However problem with relying voluntary action alone, important as it is, is that it cannot guarantee a particular outcome and is also likely to fall short of what is required. The environment is a public good and therefore collective action problems are likely to arise. Voluntary actions are unlikely to be enough because there is no guarantee that the sum of individual actions will be adequate and every reason to believe that it will be inadequate. Thus governments intervene because without intervention certain environmental goods will not be provided.

14.4.2 Direct Regulations

What sorts of government interventions are possible? The first and most easily understood is straightforward regulations and control through an appropriate regulatory body, such as the Environment Protection Agency in the Pakistan.

The regulation enforcement instrument requires the relevant authorities to take the following four steps:

I. Set rules and regulations governing the behavior of all sectors of industry (including environmental audits, effluents control devices, maximum allowable limits on discharges and so on;

II. Establish a set of penalties under the law for non-compliance with the regulations;

III. Continually monitor the actions of targeted industries so that instances of non-compliance with the regulations;

IV. Make timely use of the judicial process in seeking the imposition of penalties on defaulting industries. The effectiveness of this approach depends on the premise that even minor violations will not be ignored by the enforcement authorities, that defaulting industries are first given an opportunity to mend their ways before being forced to pay major fines or injunctions, and that the enforcement authority had sufficient budgetary and human resources to enforce the law.

Command and control as the standard regulatory approach is often known typically takes the form of legislation, the issuing of orders to industry and others actors. Although it tends to be although of as related primarily to industry it could in fact comprise anything from a ban on the use of cars in a city center to controls over the emissions of effluents from a factory, to an outright ban on a particular pollutant. Regulations define acceptable processes, establish emissions standards and specify quality objectives.

Traditionally, regulations require the relevant agency to concern itself with activities of an industry or plant and it can't take many forms from complete control over every activity of firm to a more hands off approach, which assumes that firms are doing what they should unless it can be proved that they are not. Acceptable levels of emissions can be determined and companies punished where they feel to meet them. One problem with this approach is that punishment by definition follows the crime and hence emerges only after the environmental damage has already been done. Further the level of fines may be inadequate to act as a deterrent; it may be cheaper for a company to pay fines than to change its producing processes. Another problem is that standards and punishing a firm for exceeding hat level creates no incentives for it to seek to reduce its emissions beyond the standard. It receives nothing for doing so.

The use of regulations on the other hand, is straightforward and uncomplicated; it is readily understood by governments and by the public. The other advantage is that in case of some pollutants, the only acceptable level is zero. If monitoring regime and appropriate deterrents are in place, simple prohibition through regulation is a sound option. Further it is possible to act quickly: the regulator can step in and ban or reduce an emission where serious environmental damage is occurring or likely to occur.

14.4.3 Economic Instruments

Command and control system have their merits, but a key disadvantage is simply that they punish transgressors for doing wrong where that is needed in environmental policy is to encourage potential polluters to do right. One way of doing this is to establish a system within which poiluters have a incentive not only to avoid polluting but also to reduce their polluting activities and in so doing gain a fiscal advantage. Economic incentives enable a polluter to choose how to adjust to the required environmental standard. Some will prefer to pay while other will prefer to install new or modified equipment.

Economists argue that the operation of the market provides a machanism, which harnesses individually self-interested actions to the good of all. In economic theory a properly working free market should produce as outcome, which although not intended by any single company or person is, nevertheless to everyone's advantage.

The use of economic instruments is not only concerned with providing internal incentives to polluters and resource users to reduce their emissions or to reduce their inputs. It also seeks to internalize the external costs of pollution and resource depletion.

Market based policies have the virtues of simplicity, efficiency, and (theoretically) equity. All polluters are treated equally and will chose their responses based on economic principles of profitability. There are strong incentives to reduce the costs of using resources or of paying for the right to a certain amount of pollution.

Some polluters and resource users cannot make simple market based choices, because of their poverty or powerlessness. In these cases, the

market approach must be modified to include concerns for the disadvantaged distributional justice. This is especially crucial when the resources or processes in question are a matter of economic survival.

Many environmental problems are not readily amenable to market based policies. For example, based on knowledge of the health effects of pollutants, a society may choose to set standards that reflect the health of the most vulnerable members of the population. This is the case with the basic criteria covering air pollutants.

In order to implement the economic based approach, the enforcement authority must:

I. Determine the precise set of charges or prices per unit of discharge of each polluting substance that will induce the necessary abatement actions on the part of dischargers;

II. Continually monitor the levels of discharges as well as establish a system of self reporting with spot-checks and an environmental auditing mechanism;

III. Levy a sum equal to the charge per unit of pollutant multiplied by the amount of the pollutant discharged during each reporting period. This approach provides a graduated incentive to industries by marketing pollution itself a cost of production; it also provides incentives for technological innovations.

There are two types of economic instruments used in environmental public policy:

1. Price based mechanism; green taxes
2. Right based mechanism: tradable permits and Quotas

14.4.3.1 Price based Mechanism:

This mechanism is flexible and efficient alternative to traditional command and control techniques. In principle they reduce compliance costs and they also polluters to choose how best to adjust to the environmental quality standards. Polluters facing high pollution abatement costs will prefer to pay the tax; those with low costs will install equipment to avoid paying. Taxes can be imposed in different ways and upon different things. E.g. emission charges are levied on the discharge of pollutants into the air, water or soil; user charges are related to treatment or disposal cost; product charges are levied on product that are harmful to the environment when used in production processes or when consumed.

The green tax has the following advantages:

1. They can be administered through the existing tax framework.

2. Tax provides an incentive for further reduction in emissions, because reducing the amount of emission reduce the amount of tax for which the firm is liable.

3. There is incentive to commit funds to research and development in to new less polluting technology.

4. Taxes on one pollutant may have the related effect of reducing emissions of associated pollutants.

There is however problems with green taxes:

1. They are often regressive in impact e.g. a carbon tax levied on domestic or motor fuel has a high impact on low-income groups, whereas the better off can afford to pay the higher costs because fuel makes up a much smaller proportion of their total income.

2. It is intrinsically difficult to set it at precisely that level at which people are sufficiently discouraged from using that product to have the desired environmental effect.

3. Taxes will need to be readjusted frequently to ensure that they maintain the same effects against a background of changing relative costs, currency fluctuations, innovations in research and development, entry into and out of an industry and shifting patterns of consumer demand.

14.4.3.2 Right based mechanism

Right-based approaches, such as tradable quotas and permits, start with end to be achieved and work backwards. Industries are given the right to consume environmental resources and to trade any surplus they do not need. A market is created in the right to pollute or to consume resources; the overall level of emissions or resource use is determined in advance and the quotas or permits are left to find their own price.

This system has following advantages:

1. Permits can guarantee the achievement of particular targets, because the authorities control the number of available permits.

2. If permits are leased rather than sold, the authorities are able to tighten the ambient targets by cutting the number of permits available.

3. There is no need, as there is with the imposition of green taxes, to ascertain both the required standard and the appropriate tax rate. All that is needed is for the proper environment standard to be identified and for permits to be distributed through a fair and acceptable procedure.

There are problems with too many permits holder in a market and with too few:

1. Under a tradable permit scheme, the administrative costs could be very high if there are a great many polluters. Where there are comparatively few, the costs of administration are low, but a new

problem arises in that one or two polluters may corner the market in permits and refuse to trade them. This would act like a barrier to entry for new firms and the permits could therefore contribute to non-competitive behavior.

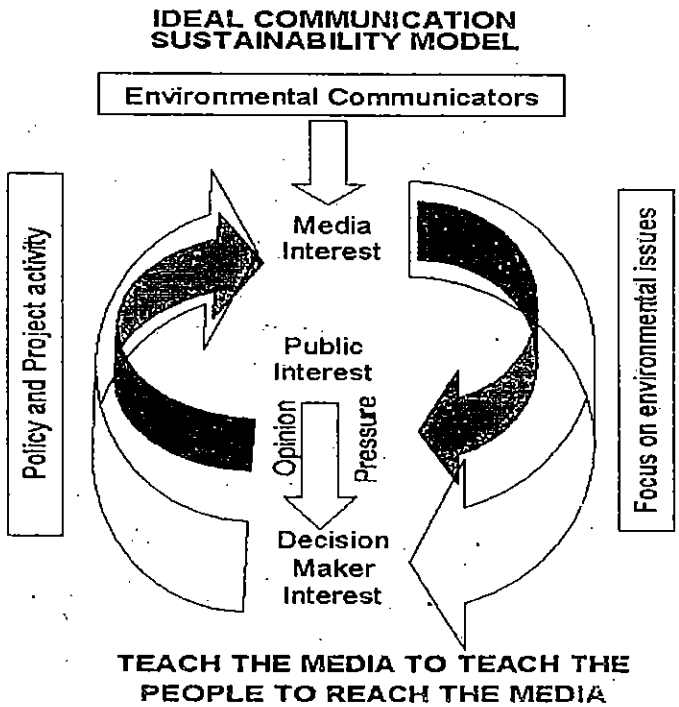
2. A permit scheme is undesirable in case both where there are a very high number of emission sources e.g. exhaust emission from motor vehicle and where the number of sources is too low few a operators dominate the market.

Self-Answering Question 14.1

Regulations and market-based instruments are often compared as though there was a closed set of options in which we have to choose either one or the other. By comparing the advantages and disadvantages of both approaches, what do you think which approach is best for you country and why?

14.4.4 Communication and Awareness building instruments

The essence of environmental communication is to convince people there is really a problem at hand, that this problem requires their urgent attention, that environmental problems do have solutions, and that these solutions do actually work. Any policy for environmental communication should aim at making the cycle of links between the media, the public and the decision maker self-reinforcing and perpetual.



Given the multi sectoral nature of the environmental issues, environmental communication has to deal with a wide range of audience, messages and media. While a general programme that seeks to sprinkle seeds of hope every where is important, it must be implemented bay a thorough communication prgramme that seeks to communicate the most appropriate messages to the most appropriate audience through most appropriate medium.

The message treatment requires concentrating on such local and regional parameters as language used and customs of members of the same target group living in different parts of the country. A message that is readily accepted in urban areas may be totally ignored in rural ones based on its presentation alone.

The phenomenal growth of radio and television has expanded the reach of communicator. The potential in video production of special environmental documentaries is, however, much more real and immediate. The opportunities present are of special significance in extension work both with rural audiences and with decision makers, elected representatives and industrial and business communities.

Outdoor publicity, including all forms of hoardings, posters, chalking and other public displays with environmental messages incorporated into advertising can be a useful means of general communication. Endorsement to environmental campaign by celebrities and public figures and using green songs and theater could be another priority mechanism for communicating general environmental awareness and focusing on strategic issues such as population, education and conservation ethics.

The search for communicator must extend beyond the media. It is teachers, mothers, and religious leaders who have served this role and who have acted along with community opinion leaders as the true catalysts of change. Thus any communication strategy must rely on community opinion leaders-individuals within groups who take the lea din first educating themselves on environmental concern and then conveying their newfound awareness to everyone they are in contact with.

14.4.5 Institutions

There is direct relationship between weakening of traditional institutions and destruction of infrastructure and resources because the social organization to manage them no longer exists. The weakening of social control has led to such phenomenon as the overgrazing of rangelands and pastures, desertification, deforestation and decaying irrigation infrastructure.

Environmental protection and management can no longer be left to weak and under funded government departments or to several departments with overlapping responsibilities. The issue of integrated pollution control must be addressed responsibly. To this end, all nations have established departments or ministries of the environment as a structural response to the changing perceptions of the environmental challenge. It is not enough to improve the quality and availability of information that affects decision-making. The existing institutions and procedures must also be changed. Environmental considerations must be formally recognized as essential

decision-making criteria within government and private sector organizations. Improved decision making, which takes full account of environmental considerations, demands that all these partnerships be strengthened and expanded.

There are five sets of institution concerned with environmental issues in Pakistan; Government Agencies, political institutions, local institutions, national and international institutions and bilateral and multilateral donors.

The government agencies are responsible for planning and implementing activities for preserving and protecting the living environment and for controlling pollution. The political institutions include the parliament and provincial assemblies while local institutions involve local bodies. For governance of environmental affairs the federal and provincial government institutions are responsible. At the federal level, the Ministry of Environment, Local Government and Rural Development (MELGRD) is the main institution responsible for planning and implementing activities in relation to the environment, pollution and ecology. Most of the responsibilities for the implementation of NCS and PEPA, 1997 have been devolved to the Provincial, Environment Protection Department (in Punjab only) and Environment Protection Agencies have been set up in the provincial departments, generally in the Housing and Physical Planning Departments, to follow and monitor the formulation and implementation of environmental impacts of different projects.

14.4.6 Laws and legislations

The idea of environmental protection has always been a part of legislation in one form or the other-under various regulations, laws, rules and statutes. To protect public health and the environment, effective laws should be passed and vigorously enforced. Legislative and regulatory instruments are designed to ensure adherence to set rules and regulations for the protection of the environment. For example, through the environmental impact assessment (EIA) process governments can ensure that environmental factors are considered in decision-making. This can be done through the use of such regulatory instruments as prohibition, standards, guidelines, permits and the like.

Institutional arrangements for environmental protection cannot exist without appropriate legal foundations. In general, combining governmental and legal institutions is a very cumbersome arrangement. The result is often a host of laws, rules and regulations, orders, ministries, departments, divisions, parastatal bodies, commissions, boards and councils in a complex web of interrelationships.

14.5 Criteria for Choosing Instrument

There are a number of different criteria for choosing between instruments. According to neo-classical economic theory, an *ideal* instrument would:

- Be effective;
- Provide motivation for further change;
- Be administratively cheap;

- Be economically efficient;
- Be politically acceptable.
- Distributional impacts

This ideal is not achievable, but considering the different criteria provides a basis for evaluating the strengths and weaknesses of different types of instruments, and between the range of possible instruments within that type.

14.5.1 Effectiveness

This concerns the ability of the instrument to meet the objective, which has been set with reasonable certainty and speed. It is difficult to predict how much effect a tax, subsidy or voluntary instrument will have. In contrast, regulation and tradable permits are designed to achieve a specified reduction in pollution. A further important factor to consider here is the extent to which the pollution objective is locationally sensitive. An overall objective (about regional or national reductions in carbon dioxide emissions, for example) can be addressed through tradable permits; however, if there is concern about pollution at one location (for example, discharges to a particular river) then only regulation will ensure that the particular problem is addressed.

14.5.2 Motivation

The instrument should provide a reason for individuals and companies to continue to reduce their pollution beyond the target of the instrument. In this respect taxes, subsidies, tradable permits and some voluntary instruments do better than regulation in which there is no further incentive to change behavior once the flat fee has been avoided.

14.5.3 Administrative cost

Administrative cost refers to the costs of monitoring liability for a particular instrument, and those of ensuring compliance. Any instrument that varies with weights, volumes, or concentrations of pollutants (i.e. taxes or tradable permits) will be far more expensive to monitor than regulation, where the liability depends on whether a simple measure of volume (etc) has been exceeded. It is also important to consider the extent to which individuals or companies would be able to break the law or avoid the tax: if they did so, would they be discovered, would they be prosecuted and what would be their punishment? Policy instruments are clearly better if they are hard or expensive to avoid.

14.5.4 Economic efficiency

This refers to the extent to which the instrument minimizes the costs of pollution-reduction. The key question here concerns whether or not the instrument makes polluters reduce their pollution to the same extent. If it does, then it is likely to be inefficient. This can be understood in relation to the different types of instrument. The imposition of a regulation ensures that all individuals or companies reduce their pollution to the same standard.

This may be very easy (and cheap) for some polluters and very difficult for others. Because it is very expensive for some polluters to meet this standard, the overall costs to society may be high. If a tax or tradable permits were imposed instead then the individuals/companies could vary the extent to which they responded according to their costs. This would ensure that society's overall costs of pollution reduction would be minimized.

14.5.5 *Political acceptability*

Political acceptability refers to the extent to which the policy instrument fits in with the government's wider priorities – which are, of course, greatly influenced by pressures emanating from a wide range of interest and pressure groups, as well as the mass media and the general public. There are two particular matters, which should be considered here. Firstly, what is the effect of the instrument upon people's liberty? It can be politically unacceptable to ban an activity (for example, smoking) just because it is known to be dangerous. Another important factor, however, relates to the distributional effects of the tax. Are poor people forced to change their behavior more than rich people? Regulation means that everyone changes their behavior to the same extent; taxes mean that rich people can use their wealth and pay for continuing pollution. Whether a government views this as fair or not will depend on their political leanings.

14.5.6 *Distributional Impact*

Methods affect different people differently. For example, taxes tend to be regressive in that they have a greater impact on the poor. Thus they might be politically or morally sensitive and must be avoided (Jacobs, 1991).

Unit Summary

Environmental public policy includes all of the laws and agencies in a society, which deal with the interactions with the environment. The purpose of this policy is the improvement of human welfare and protection of the natural world. The typical public policy life cycle has four stages; recognition, formulation, implementation and control.

There a number of policy instrument available some important of which are; voluntary means, direct regulation i.e. command and control, economic instruments including price based mechanism of green taxes and right based mechanism of permits and quotas, communication and awareness building instruments, institutions and laws and legislations. Each instruments have its own merits and demerits, and suitable in different situations. One instrument feasible for a pollutant control might not be suitable in other country situation. Policies are usually mix of different instruments.

However there are some set criteria to choose between the instruments which include, effectiveness, motivation, administrative cost, efficiency, political acceptability and distributional impacts

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Unit 15

INSTITUTIONAL FRAMEWORK

Unit Introduction

Environmental protection and management can no longer be left to weak and under funded government departments or to several departments with overlapping responsibilities. The issue of integrated polution control must be addressed responsibly. To this end, all nations have to establish departments or ministries of the environment as a structural response to the changing perception of the environmental challenge.

Keeping in view this aspect of environmental management, present unit describes:

- Role of institutions in environmental management.
- Framework of institutions for environmental management.
- What part these institutions play for managing environment
- Framework of Institutions in Pakistan

Unit Objectives

The students will learn from this unit:

1. Why institutions are necessary component of environmental management?
2. What is the framework of institutions currently working for environment at different levels from international to local?
3. How these institutions play part in managing environment.

15.1 Introduction

Legal and institutional arrangements for environmental management has gradually evolved and changed as scientific understanding of the dynamics of environmental processes and the impact of anthropogenic activities on such dynamics has increased. Trends indicate a move form sectoral approaches that isolate and exploit the environment, to a holistic eco-system approach that is concerned with sustainable development and promotes an integrated and coordinated approach to environment and the economy. Institutional arrangements have also been influenced by participatory approaches to development and the devolution of power to sub-national levels, including the empowerment of grass-roots communities to decide and act on the political, economic and social issues that affect them.

Environmental laws and regulations are considered as indispensable frameworks and basis for the effective implementation. They establish mandates for institutions as well as define roles and responsibilities for governments, civil society and individual citizens. These rights then have the backing of the law and hence, are enforceable.

Thus, when one discusses the implementation of environmental laws and regulation one is also speaking about the implementation of the environmental management framework.

Since environment is an area that transcends all sectors, it is now accepted that its management requires the coordination of a multitude of stakeholders. In other words, its management requires inclusiveness. Effective management of the environment requires divers national and individuals with a wide range of skills to work in harmony.

National and international institutional arrangements for environmental management inevitably will compose all stakeholders in the formulation and implementation of environmental laws, including their enforcement. These will include;

- Government institutions
- Academic institutions
- Community based organizations and NGO's
- Professional associations
- Private Sector and
- Regional networks

15.2 Agenda 21

Agenda 21 recognizes in Chapter 38, the importance and the role played by international institutional arrangements in the integration of environment and development issues at national, sub-regional, regional and international

levels. Chapter 38.21, for instance, emphasized the need for an enhanced and strengthened role of United Nations Environmental Program and its governing bodies. Agenda 21 also recognizes the specific roles played by other UN bodies including specialized agencies within their field and comparative advantage including the need for these international bodies to cooperate and coordinate their relevant activities to avoid duplication in the implementation of agenda 21.

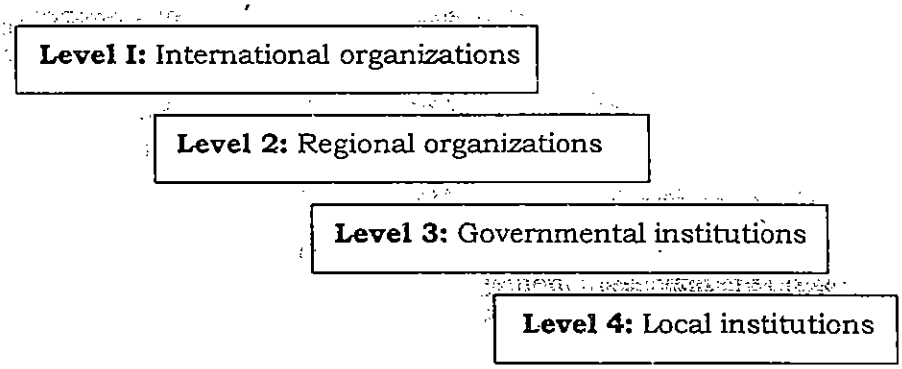
15.3 Role of Institutions in Environmental Management

The past decade or so, in particular after the 1992 United Nation Commission on Environment and Development (UNCED) process, the international community has witnessed phenomenal growth, establishment and strengthening of institutions both at national, regional and global level dealing with different aspects on environment. With the growth in importance on the subject of environmental management came also the development of institutions to ensure and facilitate effective coordination and management of natural resources at all levels.

Institutions at global and regional level refocused their activities and environment became an important activity in a number of them. At national level, likewise, environmental management has been institutionalized with the establishment or designation of national institutions by law.

15.4 Framework of Institutions

There are many levels of organization of institutions, which play role in managing environment from global to local level. These can be better described by the figure given below;



Beside these institutions, several other institutions, like bilateral and multilateral donor agencies, nongovernmental agencies and academic institutions also serve as pillars in the building of environmental management.

Now we will discuss these one by one.

15.4.1 International Organizations

The international cooperation is an essential component of the enforcement of international environmental agreements and therefore it is appropriate to state that the international environmental law and international cooperation are complementary to each other. International environmental law needs an authority to supervise, control regulate and implement the international environmental agreements. In the absence of authority there is a vacuum in the implementation of international law. This is not meant that international environmental law is supplementary to international organizations. Every international organization needs norms, a set of principles and decision-making, procedures around which actors expectations converge in a given issue area as Krasner explains the regime. These instrumentalities are provided by the international environmental law. Therefore both are co-existent with each other. The international environmental agreements are aiming to prevent environmental degradation, and to promote the conservation of natural resources. The international organization like UNO and other organizations under it system, World Bank, GATT/WTO, NGOs, and regional organizations are working together towards the sustainable development.

15.4.1.2. The United Nations as Key international organization

United Nations Organization has been unilaterally assigned the responsibility of promoting the sustainable development. This is evident in its contribution towards the sustainable development since 1972. The UN performs basically two roles towards environment among other functions, that is:

- An arena or forum for global bargaining between governments.
- An instrument for implementing and executing policies of its members.

Un organized the 1972 Stockholm Conference and the1992 Rio Earth Summit. UN has facilitated the members to conclude more international environmental agreements. It has played a key role in diffusing tensions and conflicts between nations on environmental issues. These are some of the important functions that UN has performed under the first role.

Establishment of United Nations Environment Programme (UNEP) in 9172 and the Commission on Sustainable Development, represents one of the functions under the second role. UNEP is an instrument in creating the global environmental facility in association with United Nation Development Program (UNDP) and World Bank and it has established the Globa Environmental Monitoring System (GEMS), which helps member nations with environmental information's while farming their national policies and for negotiations.

The Commission on Sustainable Development was established in 1993 to coordinate UN activities on the environment and to monitor national and international implementation of Agenda 21.

15.4.2 Regional Organizations

The regional organizations have also grown in pace with the global organizations. There are few regional organizations on environment in South Asia. A few factions are relevant to mention to enhance regional cooperation in South Asia:

- South Asia is a densely populated, developing area leading to greater risks of environmental deterioration.
- The process of political and legal integration is under development stage.
- Cooperation in environmental maters needs homogeneity of economic and political systems.

15.4.1.2 South Asia Environment Program (SACEP) as key player

The establishment of this organization in 1982 was the result of initative taken for management of South Asian environment by United Nation Environment Program (UNEP): Regional Office for Asia and Pacific in the late seventies. The mission of the SACEP is to promote and support conversation and management of the environment, both natural and human, in the member states of the South Asian region in a cooperative manner to achieve sustainable development.

South Asia Co-operative Environment Programme (SACEP) is an inter-governmental organization, of eight countries, namely; Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka, who has ratified the Articles of Association of SACEP. All member countries of SACEP belong to the developing world, and five have been classified as least developed covering one twentieth of the earth surface and a home for about one fifth of the world's population. Most of these nations share many similar environmental problems, stemming from poverty, over population and its consequences on natural resources. According to the World Bank, during the past decade, South Asia has been the second fastest economically growing region in the world, and their efforts at increased production have put increasing pressure on natural resources and the environment. Significant natural resource concerns in South Asia include depletion of water quality and quantity, dwindling forests and coastal resources, and soil degradation resulting from nutrient depletion and salinization.

In most of these countries, much work has been undertaken for the protection and management of the environment in the face of the need for accelerated development. They are also party to several international agreements, covering many aspects of economic development and environmental conservation. However, the progress and achievements in the field of environment in these nations were not much known to each other and therefore, SACEP fulfilled a long felt need for a regional arrangement for the sharing of information and knowledge as well as for a common effort on tackling environmental problems.

The SACEP was established to fulfill a vision based on following five assumptions:

1) The types and scales of environmental degradation taking place in the South Asian Region are positively dangerous not only to economic development but also to the survival of the humans inhibiting it.

2) The greed of the rich and the needs of the poor continue to cause irrevocable damage to the fragile ecosystems and their ability to regenerate themselves.

3) There is an urgent need to reduce environmental degradation and pollution, while giving equal emphasis to the elimination of the root causes of environmental degradation such as poverty, over population, over consumption and waste production.

4) Environment and development are two sides of the same coin and therefore integration of environmental concerns in to development activities should be recognized as an essential prerequisite to sustainable development.

5) The ecological and development problems of the South Asian Region transcend national and administrative boundaries; hence co-operative action is needed to effectively deal them.

The functions SACEP perform are:

(a) To promote cooperative activities in priority areas of environment of mutual interest;

(b) To ensure that these activities result in benefit individually or collectively to the member states;

(c) To extend support as needed through exchange of knowledge and expertise available among the member countries;

(d) To provide local resources towards implementation of projects and activities; and

(e) To encourage maximum constructive and complementary support from interested donor countries and other sources.

It should be noted that, this was the first regional organization to be established in the sub region even before the coming into being of the South Asian Association for Regional Cooperation (SAARC) a couple of years later. Due credit should be given to the leaders of South Asia for their far sightedness in establishing this specialized agency.

Since its inception, SACEP has promoted sustainable development in the region by implementing a number of projects and programmes in the fields of environment education, environment legislation, biodiversity, air pollution, and the protection and management of the coastal environment with the assistance of various bilateral and multiilateral funding agencies.

UNEP's Environment Assessment Programme for Asia Pacific (UNEPEAP.AP) made use of SACEP as a sub-regional partner in the field of environment assessment, reporting, data management and capacity building by establishing South Asia Environment and Natural Resources Information Centre (SENRIC) with the assistance from Asian Development Bank

In consultation with member governments the following areas have been selected for priority attention.

(a) Capacity Building and Awareness Raising

(b) Systematic Information Exchange and Intra-regional Technology Transfers

(c) Environmental Management for Training and Institutional Development for Training

(d) Regional Co-operation in Management Plans for Mountain Ecosystems, Watersheds and Coastal Resources

(e) Wildlife and Wildlife Habitat Conservation in the Region

15.4.2 Governmental Institutions

Where there is appropriate legal foundation is present, institutional arrangement including government and legal institutions, for environmental protection exists. In general combining governmental and legal institutions is a very cumbersome arrangement. The result is often a host of laws, rules and regulations, orders, ministries, departments, division, parastatal bodies, commissions, boards and councils in a web of interrelationships.

It is not suggested here that a single ministry or department should be responsible for all pollution control. Decentralization is sometimes better than a highly centralized governing body. In many countries, for example, it has been decided that fisheries departments rather than environmental protection department should deal with marine pollution. Prior to the introduction of sophisticated analytical methods, fish were the best indicators of pollution: they died or left polluted areas. Fisheries officers and the fisher man deal with on a daily basis often make the best marine policemen since they know the local fishing areas, the movement of local water and the behavior of marine life in the areas, and they know when something is wrong.

The centralization of all forms of pollution control is neither necessary nor desirable; but if several ministries or departments are involved there must be some means of ensuring that their efforts are coordinated and do not duplicate or worse contradict each other. Having two ministries perform the same or similar functions with respect to the environment is not an efficient use of government resources, and it confuses the public, as they do not know which standards or rules to follow. Duplication also creates legal problems since a person cannot be convicted twice for the same misdemeanor, even the offence may have been committed under two separate pieces of legislation governed by two ministries.

There are three options exists to make the role of national institutions effective:

1. Leave responsibility fro environmental protection and management with the existing ministries, but to strengthen the present laws. This option will bring about least change in administration of the government. However as environmental pollution control would generally be split between several ministries, the situation would become more complicated and duplication as well as jurisdictional disputes could occur.

2. To create a powerful central agency or ministry with over all responsibility for the environment, in effect a super environmental agency or ministry. It requires radical changes in terms of the organization of government administration and the distribution of power among various ministries. Hence this option would be more easily implemented and more effective in small nations.

3. Third option is a compromise between the first two. It involves the introduction of a comprehensive environmental law, as well as an environmental ministry or department to set national standards on air and water quality and oversee the management of the environment in general. The new law could cover all existing environmental responsibilities to maintain and even strengthen their powers in their particular jurisdiction. The environmental law performs a 'backstopping as well as audit function for other ministries with existing responsibilities, but would operate as the primary law in new environmental areas. This option would also entail a much more active role being played by the central environmental policy agency, both as a decision making body and as the final arbiter of sectoral and jurisdictional differences.

Government institution performs the function of ensuring compliance with environmental legislations and regulations. Every country has its own institutional arrangements that involve, ministries, courts and councils.

15.4.4 Local institutions:

Local institutions work at provincial, or district level for managing environment and facilitating people. At province level it include environmental protection departments, whose prime function is to follow and monitor the environmental effects of projects.

At urban centers there are several development authorities are working. These authorities are established to address the development needs of the local people at local level and to take care of the basic facilities, like housing, water, sanitation, solid waste management etc..

In small cities and rural areas the municipal committees and union councils are made responsible for addressing environmental concerns of the communities in their jurisdiction. Poor co-ordination and communication

between various public sector institutions leads to duplication and overlapping of work.

However public face problems due to inefficiency of these local institutions. The inefficiency of these departments could be attributed to the factors such as:

- Lack of skilled manpower.
- Limited outreach facilities.
- Absence of accountability and limited awareness of the major issues.
- Lack of training.
- Lack of professional confidence and
- Meager wages.

15.4.5 Non Governmental Organizations (NGOs)

Environmental non-governmental organizations have contributed significantly in promoting sustainable development through helping, assisting, bargaining and coordinating with international organizations both locally and globally. The NGOs are proliferating than ever before since the Stockholm Conference. Before the Stockholm Conference the NGOs had been playing very limited role within the United Nations unlike at the present. The UNESCO has been instrumental in the establishment of International Union for Conservation of Nature (IUCN). The World Wild life Fund for Nature (WWF) became the first funds raising NGO in 1961.

The IUCN prepared the world Charter for Nature, and the United Nations adopted it in 1982. It had also prepared and adopted the World Conservation Strategy, 1980, which is beginning for the development in the Brundtland Report, 1987.

WWF has 23 representatives of national organizations of developed and developing nations. One of the principle activities of the WWF is financing operations of conservation throughout the world. WWF and IUCN prepare annually a common strategy for financing Programmes towards conservation leading to sustainable development.

WWF and Greanpeace enjoy greater access to UN deliberations. Other influential environmental NGOs are World Resource Institute, World Watch Institute, International Institute for Environment, the Center for Our Common Future, the Third World Network, and the Independent Sectors Network.

15.4.6 Donor and Funding Agencies

World Bank and its affiliates, International Development Associations, International Finance Corporations and Multilateral Investment Agency, are actively involved in the realization of sustainable development. World Bank group has singular responsibility of funding for poverty alleviation in the developing countries. World Bank has undertaken a policy change and structural change in their investment decisions and such changes took place in 1987.

There are three factors responsible for these changes:

- The Brundtland Report 1987,
- The Publication of the Committee Paper on Banks Environment Strategy
- Appointment of Mr. Conable as the president of the World Bank.

World Bank has established a "Standard Procedure for Environmental Assessment" to make investment decisions. "Environment Issue Papers" on every Environmental Action Plans in the respective nations.

Since 1994 the World Bank has adopted the following agenda in its policy decisions and Programmes to:

- Help member nations set priorities, build institutions and implement Programmes for sound environmental stewardship.
- Ensure that potential adverse environmental impacts from Bank-financed projects are addressed;
- Help member countries build on the connections among poverty reduction, economic efficiency and environmental protection and to
- Address global environmental challenges through participation in the Global Environmental Facility

15.4.7 Academic and Research Institutions

South Asian region has been particularly neglectful of education. There is no denying the efficiency of this instrument for moving towards sustainable development, although being predominantly focused on the younger generation its impacts are long term. Specific training measure can also help expand the critical knowledge mass among adults. Training that takes the labour force out of the productive jobs should be specifically oriented the needs of the trainee, given the more focused worldview of most adults and the frustration that can follow if the person trained cannot apply newly learnt skills.

Research and technology are critical for all development, not just sustainable development. They can help a country compensate for resource deficiencies or exploit to the full any advantage it might have. The lack of

staff to conduct world-class research in South Asian countries is on of the constraints in the field of environment.

The objectives of the education on sustainable development are to help individuals and groups within society:

- Become aware of any sensitive to the total environment and its allied problems;
- Acquire basic knowledge about the environment, its associated problems and humanity's critical presence and role in it;
- Learn skill for anticipating, avoiding and solving environmental problems;
- Develop the ability to contribute to and evaluate environmental policies, measures and programme; and
- Develop sense of responsibility and urgency leading to a direct participation in appropriate actions.

To facilitate the creation of a sustainable development constituency, strategic initiatives need to be taken at three distinct levels of formal education;

- In Schools
- In Colleges
- In Universities

In addition, the non-formal sector has an important role to play.

15.5 Environmental Institutions of Pakistan

There are five sets of institutions concerned with environmental issues in Pakistan:

1. Government agencies,
2. Political institutions,
3. Local institutions,
4. National and international NGOs, and
5. Bilateral and multi-lateral donors.

15.5.1 Government agencies

The government agencies are responsible for planning and implementing activities for preserving and protecting the living environment and for controlling pollution.

There are two key working agencies at present:

15.5.1.1 The Pakistan Environmental Protection Council

This is the apex body established per section 3 of the Pakistan Environmental Protection Act, 1997. It is chaired by the prime minister and Chief Executive and comprise of all the four provincial chief Ministers, Federal and Provincial Ministers of Environment an dup to thirty five persons with least twenty non-professionals including representatives of the Chambers of Commerce and industry and agriculture, medical and legal professionals, trade unions, NGOs, scientists, technical expert and educationists.

Function and powers of council include:

a) Approval of NEQS

b) Approval of comprehensive national Environmental Policies, within the frame work of the NCS

c) Provision of guidelines for the protection and conservation of renewable and non-renewable resources and

d) Coordination of the integration of principle of sustainable development into national development policies and plans.

15.5.1.2 Pakistan Environmental Protection Agency (PEPA)

It exists under the Pakistan Environmental Protection Council. A Director General heads it.

Functions of PEPA include:

a) Preparation, revision, establishment and enforcement of NEQS.

b) Establishment of system for surveys, monitoring, inspection and audit.

c) Certification of environmental laboratories

d) Rendering of advice and assistance in environmental matters.

e) Encouraging the formation and working of NGOs community organizations and village organizations

f) Taking all necessary measure for the protection, conservation, rehabilitation and improvement of the environment, prevention

and control of pollution and promotion of sustainable development.

15.5.2 *Political institutions*

The political institutions include the parliament and provincial assemblies. These institutions play a key role in developing laws and regulations, and taking action for community development as the member of assemblies are the elected persons of public through voting and represent the people's choice of the particular member as their representative in the assembly. However instability of governments in Pakistan in last decade has resulted in inefficiency of this institution and political constraints.

15.5.3 Local institutions

Local institution involves local bodies. Local bodies in Pakistan include Development authorities in urban centers and Municipal Committees and Union Councils in rural areas and small cities.

For governance of environmental affairs the federal and provincial government institutions are responsible.

15.5.4 Federal institutions

At the federal level, the Ministry of Environment, Local Government and Rural Development (MELGRD) is the main institution responsible for planning and implementing activities in relation to the environment, pollution and ecology. Prior to the establishment of the MELGRD, Environment and Urban Affairs Division (EUAD) was responsible for these activities. These two institutions have been largely responsible for promulgating the Pakistan Environmental Protection Act 1997. Within the MELGRD, the National Conservation Strategy (NCS) Unit is responsible for promoting and monitoring progress of NCS implementation. Environmental policy planning and coordination with government agencies, NGOs and other stakeholders and liaison with the parliament, also mark the jurisdiction of the Unit. Moreover, mass awareness and environmental education; along with project preparation, coordination, monitoring and evaluation, add to the list of responsibilities of the NCS unit.

The Federal Planning and Development Division and the Federal Planning Commission ensure involving environmental concerns at the policy planning, and project conceptualization and approval stages by Environment Section. The provincial Planning and Development Departments advocate environment on their agenda in liaison with the Federal Planning and Development Division and federal Planning Commission. The Environment Section formulates and reviews environmental policy, prepares 3-year plans and conducts mid-term review of 5-year plans. It also holds annual planning, training, research and project screening exercises.

15.5.5 Provincial Institutions

Most of the responsibilities for the implementation of NCS and PEPA, 1997 have been devolved to the Provincial, Environment Protection Department (in

Punjab only) and Environment Protection Agencies have been set up in the provincial departments, generally in the Housing and Physical Planning Departments, to follow and monitor the formulation and implementation of environmental impacts of different projects.

In large urban centers, Development Authorities have been established to address local development needs. Most of these DAs have now created environment sections to plan and implement protection and conservation-oriented environmental activities. In small cities and rural areas Municipal Committees and Union Councils have been made responsible to address environmental concerns. Poor co-ordination and communication between various public sector institutions leads to duplication and overlapping of work. A number of institutional innovations have been suggested to improve co-ordination and sectoral planning. In this regard, the NCS Unit in MELGRD, and the Environment Section in the Planning and Development Division have improved the overall co-ordination and communication among government agencies on one hand, and with the NGOs and private sector on the other hand. Weakness in the government institutions could be attributed to lack of skilled manpower, limited outreach facilities, absence of accountability and limited awareness of the major issues. Public sector's limited capacity is compounded by lack of training, professional confidence and meager wages.

Activity 15.1

What is the framework of institutional arrangement and what role these institutions are playing in managing environmental problems?

Unit Summary

Many formal institutions, intergovernmental at various levels exist today, and are prime movers in environmental policy development and implementation. Such institutions have mushroomed at the global and regional levels and have direct implications at the national level. The most important being ineffective implementation because of lack of human, financial, scientific and technical resources. Equally significant are increasing trends to evade laws and regulations put in place. Clearly, therefore, enhanced and streamlined institutions are needed.

The institutional framework for environmental management works at different levels including international, regional, national and local level. Beside these non-governmental organizations, donor and funding agencies and academic institution work in parallel to the other government institution for managing environment.

In Pakistan five levels of institutions work for environmental management. That includes, government agencies, federal institutions, provincial institutions, local institutions and political institutions.

Lack of coordination, lack of skilled staff, meager wages, absence of accountability, limited resources are among the few reasons of inefficiency of institution in South Asia region.

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UNIT 16

SOCIAL FRAMEWORK

Unit Introduction

What will our future be? Whether we are headed towards crisis and disaster, or will enjoy a happier life, more fulfilling life depends very much on our attitudes, behavior and life styles. The steps we can take to change our attitudes and social actions taken for managing environment our important components of conceptual framework for environmental management.

The chapter explains:

- Role of public and private sector in managing environment
- How communities could be get involved in managing process
- How individuals could make difference
- Need of environmental education
- Effectiveness of collective action for managing environment

Unit Objectives

After studying this unit, individuals will be able to:

1. Reasons to be optimistic as well as pessimistic about our future. What can be done at public, societal and individual level?
2. Recognize opportunities for making a difference through the goods and services we choose as well the limits of consumption.
3. Be aware of the goals of environmental education.
4. Formulate philosophy and action plan for what you can and should do to create a better world and a sustainable environment.

16.1 Introduction

In the South Asian countries, environmental quality in both rural and urban areas continues to be under serious threat. Problems of deforestation, soil erosion, air pollution, solid wastes are among the serious problems. These problems impose significant costs on society in terms of externalities and the inefficient use of the rich natural resources.

In recent years, progress has been made in improving the management of natural resources and the environment. Earlier interpretations and application of the environmental management focused on the following two aspects.

1. Environmental management by economic enterprise; the asses of the environmental externalities of economic production activities with the aim of controlling the environmental impact of activities with the aim of controlling the environmental impact of activities, products or services

2. Environmental management through projects and programs to assess and mitigate negative impacts and enhance positive ones.

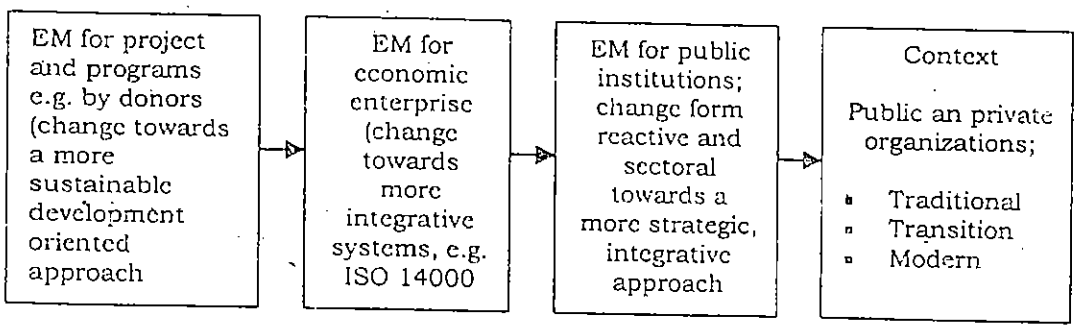
While the earlier, narrower applications of environmental management retain relevance for their stated objectives, there is a need to develop a new orientation on environmental management as a key responsibility of public entities. At least three recent developments have contributed to this need.

1. The development model of "good governance" emphasizes the role of competitive markets, government responsibility to manage the state (including environmental management), and the importance of civil society.

2. Environmental management capacities need to be strengthened to address the environmental risks of private sector growth and free trade.

3. There is need for environmental management to build bridges between public and private sector entities.

So development of environmental management concept could be described as follows:



16.2 Role of Private Sector and Civil Societies in Environmental Management

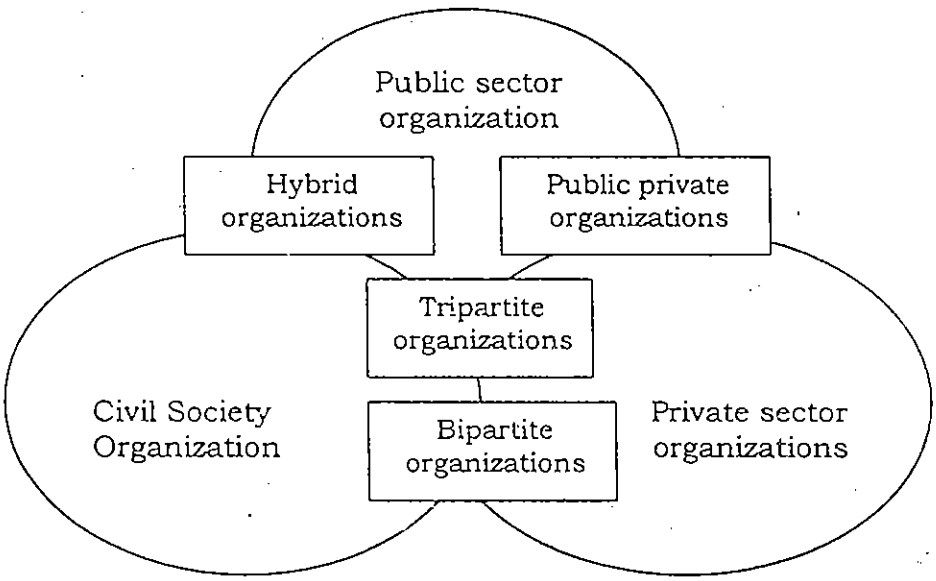
Environmental management is an intersectoral discipline with responsibilities within both private and public sector. It can broadly be defined as

> "The total of activities carried out by a particular society with the objective to protect the environment."

Conceptually, the environmental management system is the reflection of the organizational arrangement made in society. These organizational arrangements can be subdivided into three categories:

- The Public Sector
- The Private Sector
- The Middle ground: the Civil Society

These categories are not strictly exclusive and separated from each other; various blends exist as indicated in the figure below.



Source: (IADB, 2001)

The existing relations between these three main categories are mainly determined by the specific political organizations of their country concerned. Most of the public sectors can be characterized as pluralistic in relation to the civil society, with some corporate remnants in their relations to the private sector (although the rapid process of privatization has reduced the importance of public enterprises). Most environmental goods and services consist of a mixture of public and private goods for which the different

sectors each have certain responsibilities. As a consequence, environmental management function can conceptually be allocated to the three different categories of social organization as indicated in the table below.

Table 16.1 Allocation of Functions to Each Category of Social Organization

Public Sector	Civil Society (Claimed function)	Private Sector (Claimed functions)
▪ Legislation and justice regarding international /supranational issues. ▪ Coordination and policy coherence (international, national and intersectoral. ▪ Disaster preparedness ▪ Legislative fame work, regulations and quality standards ▪ Control and enforcement ▪ Development and application of economic and market instruments. ▪ Finance for environmental programs and investments to support private sector ▪ Strategic planning, mainly at sectoral and national levels, and research. ▪ Spatial planning ▪ Information supply (public disclosure), environmental education and research ▪ Environmental capacity development ▪ Implementation of environmental activities, e.g. environmental infrastructure.	▪ Advocacy (international) and (political) lobbying; getting issues on the political agenda. ▪ Awareness raising and education ▪ Monitoring and early warning (watchdog function). ▪ Co-ordination and networking (international, national, intersectoral). ▪ Fundraising for environmental objectives. ▪ Implementation of (innovative) environmental activities. ▪ Research and provision of environmental expertise ▪ Co-management (with private and /or public sector) and co-decision making (e.g. in norm setting and legislation)	▪ Research an development of environmentally sound technologies ▪ Technical implementation of environmental regulations and activities. ▪ Provision of environmental expertise (e.g. control) ▪ Co-management and co-decision making (covenants and codes) ▪ Monitoring and environmental auditing.

Source: (IADB, 2001)

An environmental process can be viewed as a conscious, goal oriented process driven by normative principles. The process needs to be iterative or recursive to keep environmental management adjusted to the changing

dynamics of human society and the environment. A good process results in the improvement of environmental qualities in line with societal preferences.

Citizen participation and legitimacy is necessary for the process of environmental management as it:

- Ensures legitimate responsibilities during the Environmental management process
- Generates ownership among all parties involved
- Stimulates social network for exchange, interactive learning and conflict resolution processes.

16.4 How public could be engaged

Public could be engaged in environmental management process by following a common mechanism that involves:

- Public participation,
- Information disclosure
- Communication
- Awareness raising
- Education
- Training

However some innovative mechanisms that could be adopted for the purpose of engaging the public involves:

- Co-management arrangements,
- Covenants (e.g. voluntary agreements between governments and private sector organizations)
- Partnership
- Joint fact finding
- Participatory monitoring
- Private enforcement

16.5 How Individual Can Make Difference

What is the destiny of humankind on Planet Earth?

Is the glass half empty or half full?

You have gone through all of the scenario on environmental problems and their possible solutions. By knowing this one could be depressed, but one should also be encouraged and inspired by the literally millions of people in all walk of life who are acutely aware of the problems and who are making outstanding efforts to bring about solutions.

Every pathway toward solution that has discussed in unit earlier in the units represents the work of thousands of dedicated professionals and volunteers ranging from scientists and engineers through business people, lawyers and public servants. Still, the forces aligned with the traditional, non-sustainble directions are formidable. Thus the outcome is still unsure.

Will only time tell? Lester Brown, President of WorldWatch Institute states;

> "Until now the Environmental Revolution has been viewed by society much like a sporting event, one where thousands of people sit in the stands watching, while only a relative handful are on the playing field actively attempting to influence on the outcome of the contest. Success in this case depends on erasing the imaginary sidelines that separate spectators form the participants so we can all get involved. Saving the planet is not a spectator sport."

Indeed, we are involved whether we realize it or not. Simply by our existence on the planet, every thing we do, the car we drive, the products we use, the waste we throw away, virtually every choice we make and action we take, has a certain environmental impact and a certain consequence for the future. Therefore, it is not a matter of having an effect but of what and how great that effect will be.

It is a matter of each of us asking ourselves, will I be part of the problem or part of the solutions? The outcome will depend on how each of us responds to the challenges ahead.

There are four levels on which we may participate to work toward a sustainable society:

- Individual lifestyle changes
- Political involvement
- Membership and participation in nongovernmental environmental organizations
- Career choices

Activity 16.1

There are good reasons to be pessimistic about what we are doing to our environment, but there are also are signs of progress and reasons for optimism. Where do you stand on this spectrum?

Now we will discus the above mentions levels one by one;

16.5.1 Life Style Changes

Life style changes may involve such thing as switching to a more fuel efficient car or using bicycle for short errands, recycling papers, cans and bottles; retrofitting your home with solar energy; starting a backyard garden and composting and recycling food and garden wastes in to your soil; choosing low impact recreation, living closer to your workplace and any number of additional things.

Here two concepts are very important to be discussed that are;

- Producing less waste and
- Consuming environmental friendly products

16.5.1.1. Producing less waste

Some primer reasons for our destructive impacts on earth are our consumptions of resources and disposal of wastes. Technology has made consumer goods and services cheap and readily available. While consuming resources the first question we should ask ourselves is

Whether we really need to consume so much?

How much we ought we leave for other generations?

Although advertisements urges us to buy or consume more, are our lives will be really better with more stuff or simply more complicated and stressful?

To avoid waste production, we can practice, recycling and reuse making environmentally sound decisions and reducing waste. For this what can be done is summarized in the table 16.2

Table 16.2 Reducing Consumption

Purchase less - Ask yourself whether you really need more stuff. - Avoiding buying things you do not need or would not use. - Use items as long as possible (and do not replace them just because a new product become available).
Reduce excess packaging - Carry reuse able bags when shopping and refuse bags for small purchases. - Buy items in bulk or with minimal packaging; avoid single serving foods. - Choose packaging that can be recycled or reused. **Avoid Disposable Items** - Use cloth napkins, handkerchiefs and towels. - Bring a washable cup to meetings; use washable plates and utensils rather than single use items. - Buy pens, razors, flashlights and cameras with replaceable parts. - Chose items built to last and have them repaired; you will save material and energy while providing jobs in your community. **Conserve Energy** - Walk, bicycle or use transportation turn off (or avoid turning on) lights, water, heat and air conditioning when possible. - Put up clotheslines or racks in the backyard, carport, or basement to avoid using a clothes dryer. - Carpool and combine trips to reduce car mileage. **Save Water** - Water lawns and gardens only when necessary. - Use water-saving devices and fewer flushes with toilets. - Don't leave water running when washing hands, food, dishes and teeth.

16.5.1.2 Consuming environmental friendly products

Obviously we can never reduce our consumption levels to zero. We can however, make sound informed decisions about the products we buy to select those that are least environmentally damaging in production, use and disposal. As consumers demand environmental friendly products, manufacturers, food producers and merchants are moving to safer more humane and more sustainable consumer items. Although each of our individual choices make a small impact, collectively they can be important.

Some claims made by green marketers are of questionable validity, however. Consumers must look closely to avoid "green scams" many terms used in advertising are vague and have little meaning. For example:

- "Nontoxic" suggests that a product has no toxic effects on humans. Since there is no legal definition of the term, however, it can have many meanings. How non-toxic is the product? And to whom? Substance not poisonous to humans can be harmful to other organisms.

- Biodegradable, recyclable, reusable or compostable may be technically correct but not signify much. Almost everything will biodegrade eventually, but it may take thousands of years. Similarly, almost anything is potentially recyclable or reusable; the real question is whether there are programs to do so in your community. If the only recycling or composting program for a particular material is half a continent away, this claim has little value.

- Natural is another vague and often misused term. Many natural ingredients, lead or arsenic, for instance are highly toxic. Synthetic materials are not necessarily more dangerous or environmentally damaging than those created by nature.

- Organic can connote different things in different place. On items such as shampoos and skin care products; organic may have no significance at all. Most detergents and oils are organic chemicals whether they are synthesized in a laboratory or found in nature. Few of these products are likely to have pesticides residues anyway.

- Environmentally friendly, environmentally safe and would not harm the ozone layer are often empty claims. Since there are no standard to define these terms, anyone use them. How much energy and nonrenewable material are used in it. How much waste is generated and how will item be disposed of when it is no longer functional? One product may well be more benign than another, but be careful who makes these claims.

Products that claim to be environmental friendly are being introduced in the markets at greater than ever before. To help consumer informed about choices they should make there are several programmes. One of the oldest program begun in 1978 in Germany with the name "Blue Angel." To date 2,000 products display Blue Angel Symbol.

Similar programs are being developed in many first world countries. Some our autonomous, non-governmental efforts other are quasi-governmental institutions. However it is not easy to being green. Even with the help of endorsement programs, doing the right thing from an environmental perspective may not be obvious.

Now the question arises why we should select environmental friendly products?

What difference our individual choice will make?

As we know that pollution can be found almost everywhere, along with the enlarging of man-made environment. Facing these environmental threats, human re-think and become more concern about the value of health, as well as recognize the importance of environmental protection to the sustainability of human. On the other hand, researches on Environmental Health urge

human to concern that the consequence of pollution would make all members in the society suffer.

As a citizen of the earth, we need to "Think Globally, Act Locally": We need to change our personal behavior and take action to improve our surrounding environment. It seems impossible to stop consuming in the society. Consumption does not always damage the environment, but depends on the ways that we are consuming.

Green consumerism is a direct action through which we could urge producers and the government to alter the process of production and the framework of operation. One of the objectives of Green Consumerism is to alter the operational model in the current economy. However, it is obvious that the "Green Products" that are now produced and promoted, follows the same system of production and promotion as the traditional one. They still make huge amount of wastes and severe pollution. Examples include heavy packaging, as well as energy wastes to transportation.

So the at individual level when you select the environmental friendly product means that you are compelling the producer and manufacturer to manufacture and add environmental concerns in its manufacturing process. Taking personal responsibility for our environmental impact can have many benefits. Recycling, buying green products, and other environmental good works not only set good examples for your friends and neighbors, they also strengthen your sense of involvement and commitment in valuable ways. There are limits, however to how much we can do individually through our buying habits and personal actions to bring about the fundamental changes needed to save the earth.

16.5.2 Political Involvement

Political involvement ranges form supporting and voting for particular candidates to expressing your support for particular legislations through letters or phone calls. The out come when environmentally concerned people are not sufficiently active is the result of selection of those people whose prime objectives are to earn money and they do nothing for people welfare. Citizens should made clear to the elected representatives that they need clean air, water and other such facilities and should force the regulatory bodies that regulations should be passed for ensuring environmental protection.

16.5.3 Membership in nongovernmental organizations

Membership in non-governmental organizations can enhance both lifestyle change and political involvement. As a member of an environmental organization you will receive and may help disseminate knowledge, information making you and other people more aware of particular environmental problems in your surroundings and things yours can do to help. Specifically you will be informed regarding significant legislations so that you may focus your political efforts at the most effective time and place. Also, your member ship and contribution serve to support lobbying efforts of the organization. A lobbyist representing only him or her has relatively little impact on legislators. On the other hand if the lobbyist represents a million-

member organization that can follow up with many phone calls and letters the impact is considerable.

Activity 16.2

Identify nongovernmental organizations in your region that are working towards environmental protection and ensuring sustainable development.

1.What specific projects are under way?

2.What roles are local governments and your elected representatives playing in the process?

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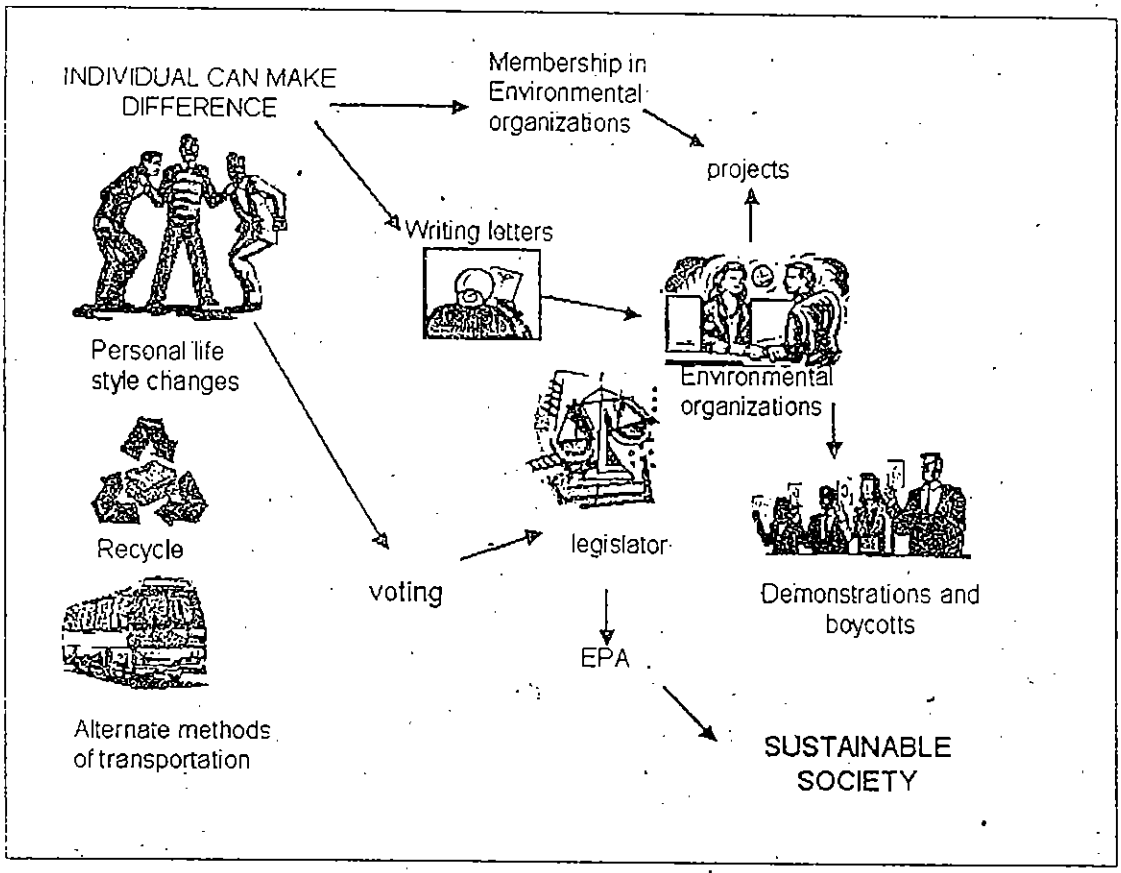
3. How can you become involved?

16.5.4 Environmental Careers

Finally you may choose to devote your career to implementing solutions to environmental problems. Environmental careers go far beyond the traditional occupations of wildlife or park management. There are any numbers of lawyers, journalists, teachers, scientists, engineers, medical personnel's, entertainers and others focusing their talents and training on environmental issues or hazards, there are innumerable business and job opportunities in pollution control, recycling waste management, ecological restoration, city planning, environmental monitoring and analysis, non chemical pest control, production and marketing of organically grown produce and so on.

The whole of the individual's action that can be taken are summarized blow in the figure:



16.6 Environmental Education

Another important thing when dealing with environmental issues is the environmental education. Environmental education is necessary for the management of environment as it:

- Improve the understanding among the general public of the natural and built environment and their relationship between humans and their environment, including global aspects of environmental problems and
- To encourage post secondary students to pursue careers related to the environment.

Speaking to the first of point, broad environmental literacy program, which every citizen fluent in principle of ecology and gives working knowledge of the environment is needed.

Environmental literacy can help create a stewardship ethic, a sense of duty to care for and mange wisely our natural endowment and our productive resources for the long haul.

Environmental education will prepare us for facing the challenges that will come across in the present century. As in the present century it will not be enough for few specialist to know what is going in the surroundings while others of us wander about in ignorance.

16.6.1 Outcomes of Environmental Education

The outcomes could be divided in to many broad categories in to many contexts that include:

- *The natural context:*

An environmentally educated person understands the scientific concepts and facts that underlie environmental issues and the interrelationship that shape nature.

- *The Social Context:*

An environmentally educated person understands how society influencing the environment, as well as the economic, legal and political mechanisms that provide avenues for addressing issues and situations.

- *The Valuing Context:*

An environmentally educated person explores his or her values in relation to environmental issues; from an understanding of the natura and social contexts, the person decides whether to keep or change those values.

- *The action context:*

An environmentally educated person becomes involved in activities to improve, maintain or restore natural resources and environmental quality for all.

16.7 Collective Actions

Although it is effective to change your behavior and activities toward sustainable patterns, it is more productive and more satisfying to work collectively for the purpose. Collective action multiply individuals power as

- You get encouragement and useful information from meeting regularly with others how shares your interests.
- When working individually it is easy to get discouraged by the slow pace of change
- Having a support group helps maintain enthusiasm.

However there is a broad spectrum of environmental and social action groups. Some will suit your particular interests, preferences or beliefs more than others.

Options that can be use for collective action include:

16.7.1 Student Environmental Groups

Organizations for secondary and college students could be among our most active and effective groups for environmental change. By teaching them ecology and environmental ethics at elementary and secondary school levels and by training them about environmental problems and their solutions and get involving them in community projects, purpose of environmental management could be served very effectively.

As Margreat Mead once said that

> "Never doubt that a small, highly committed group of individuals can change the world; indeed, it is the only thing that ever has."

16.7.2 Organizing an environmental Campaign

It is the most effective tool to bring the attention of the national and international planners, decision makers and mangers towards a particular issue. It is very dynamic process in which you must constantly adapt to changing conditions. Some basic principles apply in most situation fro organizing the environmental campaign, however are given below:

1. What do you want to change? Are your goals realistic, given the time and resources you have available?
2. What and who will be needed to get the job done? What resources do you have now, and how can you get more?
3. Who are the stakeholders in this issue? Whose are your allies and constituents? How can you make contact with them?
4. How will your group make decisions and set priorities? Will you operate by consensus, majority votes or informal agreements?
5. Have others already worked in this issue? What successes or failure did they have? Can you learn from their experience?
6. Who has the power to give you what you want or to solve the problem? Which individuals, organizations corporations or selected officials should be targeted by your campaign?
7. What tactics will be effective? Using the wrong tactics can alienate people and be worse than taking no action at all.
8. Are there social, cultural or economic factors that should be recognized in this situation? Will the way you dress, talk or behave offend or alienate your intended audience? It is important to change your appearance or tactics to gain support?
9. How will you know when you have succeeded? How will you evaluate the possible outcomes?
10. What will you do when the battle is over? Is yours a single-issue organization, or will you want to maintain the interests, momentum and network you have established?

Using the communication media to get your message out is an important part of the modern environmental campaign.

Unit Summary

The focus of environmental management has now been changed from engaging enterprise and regulations to involvement of public sector and civil society in solving environment problems. Citizen participation and legitimacy in the process of environmental management ensures legitimate responsibilities during the environmental management process, generates ownership among all parties involved and stimulates social network for exchange, interactive learning and conflict resolution processes.

Considering our selves as the part of the problem, develop the sense of responsibility among individuals to also participate in the management process.
There are four levels on which individual may participate to work toward a sustainable society:

- Individual lifestyle changes
- Political involvement
- Membership and participation in nongovernmental environmental organizations and
- Career choices.

For changing attitude of individual environmental education is an effective tool. However individual efforts could do less for the environmental problems at international and global level. Students group and environmental campaigns our effective collective actions if organized properly.

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